SCIENTIFIC TERRESTRIAL SERVICES

# Terrestrial Biodiversity Assessment

**FOR THE PROPOSED SOLAR PHOTOVALTAIC (PV) FACILITY AT THE MARULA PLATINUM MINE, NEAR BURGERSFORT, LIMPOPO PROVINCE.**


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# EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by SLR Consulting (Africa) (Pty) Ltd to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) process for a proposed photovoltaic (PV) facility at the Marula Platinum Mine (MPM), which is located near Burgersfort within the Limpopo Province, hereafter referred to as the "study area".

Desktop Results

According to national and provincial databases, the following was discerned regarding the study area:

- Small sections of the study area are located within the remaining extent of the Sekhukhune Plains Bushveld, which is currently **endangered (EN)** and considered to be **poorly protected** (as per the National Biodiversity Assessment (NBA 2018);
- According to the 2022 Red List of Ecosystems, the study area is located within the remaining extent of a threatened ecosystem, namely the **endangered (EN) Sekhukhune Plains Bushveld ecosystem;**
- According to the 2018 Limpopo Conservation plan, sections of the study area are located within the following areas: **Category 1 Ecological Support Area (ESA), Category 2 ESA**, **Other Natural Areas (ONAs)**, as well as **No Natural Remaining (NNR) areas**; and
- According to the National Web-based Screening Tool, the study area is associated with the following theme sensitives:
  - » For the animal species theme, the study area is located within an area of **medium sensitivity.** Triggering species include Mammals*:* *Crocidura maquassiensis* (Makwassie musk shrew (VU))*,* Reptiles*:* *Kinixys lobatiana* (Hingeback Tortoise (VU)), and Invertebrates*:* *Aroegas fuscus* (Brown False Shieldback (EN));
  - » For the plant species theme, the study area is located within areas of **low** and **medium sensitivity.** Triggering species include *Asparagus fourei* (vulnerable, VU), *Asparagus sekukuniensis* (EN), *Polygala sekhukhuniensis* (VU), *Searsia batophylla* (VU), Sensitive species 1033[1] (EN), and Sensitive species 1252 (VU); and
  - » For the terrestrial biodiversity theme, the study area has a **low** and a **very high sensitivity.** Triggering features of the very high sensitivity included the presence of **Category 1 and Category 2 ESAs.**

Field Results

A field assessment was conducted in November 2022 (to ground-truth the desktop results), during which two habitat units were distinguished for the study area. The habitat units were determined based on species composition, vegetation structure, ecological function, biophysical environment, and habitat condition:

- **Degraded Bushveld Habitat:** low-lying habitat comprising of loose, sandy soils that support a species poor floral community that is dominated by *Dichrostachys cinerea*; **and**
- **Modified Habitat:** habitat associated with areas in which little to no vegetation structure can be assigned to the floral communities, i.e., associated with areas of historic clearing and/or excavation activities (in which habitat has subsequently started to recover, although floral communities are still largely absent and species poor)), or areas of current utilisation, e.g., roads[2].

The sensitivities of each of the habitat units was as follows, from a floral and faunal perspective: the Modified Habitat was of a **low sensitivity** (faunal and floral) and the Degraded Bushveld was of a **moderately low sensitivity** (faunal and floral)**.**

Species of Conservation Concern (SCC)

No floral SCC including Red Data List (RDL) and Threatened or Protected Species (TOPS) were recorded within the study area. However, protected trees as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA) as well as provincially protected species as listed under the Limpopo Environmental Management Act,

[1] According to the best practise guidelines provided by SANBI, the name of sensitive species provided by the Online EIA screening tool may not appear in the final EIA report nor any of the specialist reports released into the public domain. This is to protect species that are under threat to factors such as illegal harvesting and overexploitation.

[2] Informal, gravel roads are present within the study area. However, these have not been mapped given the small extant thereof. Larger modified features (e.g., historic excavation areas) were however mapped.

2003 (Act No. 7 of 2003) (LEMA) were recorded within the study area. If the proposed development is authorised, a walkthrough of the study area will need to be conducted in which all SCC are identified and marked to determine which species would be destroyed during the proposed PV facility activities, or which species are eligible for rescue and relocation. SCC that are relocatable (i.e., many herbaceous and succulent species as per the LEMA), should be relocated to suitable habitat outside the direct footprint (as far as is feasible). Rescue and relocation activities should be done by a suitably qualified specialist and either relocated to suitable habitat outside of the development footprint or moved to registered nurseries such as the Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Any other floral SCC encountered during the construction phase of the proposed development should also be relocated by a suitably qualified specialist and, where required, the necessary permits should be applied for.

The extent of bush encroachment within the study area, the degradation of the herbaceous layer, and surrounding anthropogenic activities have made the study area largely unsatiable for faunal SCC habitation. The National Screening Tool indicated that the study area is considered to be of medium sensitivity for faunal species. Furthermore, the screening tool highlighted the following species as potentially occurring: *Crocidura maquassiensis (*Makwassie musk shrew (**VU**)*), Aroegas fuscus* (Brown False Shieldback (**EN**)) and *Kinixys lobatsiana* (Lobatse hinge-backed tortoise (**VU**)). Taking into account the degraded state of the habitat, increased anthropogenic activities, lack of suitable food resources and limited habitat connectivity, it is considered unlikely that these three, and any other faunal SCC will make use of or be reliant on the study area.

The proposed activities will impact on Ecological Support Area 2 (ESA2) habitat. ESA2 habitat was identified within the Degraded Bushveld Habitat. Although the proposed development layout overlap with red list ecosystem habitat (EN Sekhukhune Plains Bushveld ecosystem), neither the Degraded Bushveld, nor the Modified Habitat units observed within the study area are considered representative of the EN ecosystem (in terms of species composition and structure). Thus, impacts to red list ecosystem habitat within the study area is not anticipated.

The direct impact of the proposed development on the floral ecology of the study area is anticipated to vary between medium and very low for the habitats prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the study area can be reduced to lower levels. Impacts to the faunal ecology of the study area range from medium to insignificant prior to mitigation. With mitigation these impacts can be further reduced to low and to insignificant levels. It is the opinion of the specialists that the proposed activities and associated vegetation clearing be kept to what is absolutely necessary and remain within the approved areas only.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development. Whilst the proposed activities will result in the loss of habitat, such impacts are not considered so extensive as to consider the project a No-Go.

# DOCUMENT GUIDE

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

| **Theme-Specific Requirements as per Government Notice No. 320<br>Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output** | | |
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| **No.** | **SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS** | **Section in report/Notes** |
| 2 | **Terrestrial Biodiversity Specialist Assessment** | |
| 2.1 | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity. | Appendix J |
| 2.2 | The assessment must be undertaken on the preferred site and within the proposed development footprint. | 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; | Section 4 |
| 2.3.2 | Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site; | Section 4 |
| 2.3.3 | The ecological corridors that the proposed development would impede including migration and movement of flora and fauna; | Section 4 |
| 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; | Section 4<br><br>**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 220156, 2023)* |
| 2.3.5 | A description of terrestrial biodiversity and ecosystems on the preferred site, including:<br>a) main vegetation types;<br>b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;<br>c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and<br>d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified; | Section 3 (desktop analysis) |
| 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:<br>*a) the reasons why an area has been identified as a CBA;*<br>*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;*<br>*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);*<br>*d) the impact on ecosystem threat status;*<br>*e) the impact on explicit subtypes in the vegetation;*<br>*f) the impact on overall species and ecosystem diversity of the site; and* | Section 3 (desktop analysis) and 4 |

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| | g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;* | |
| 2.3.7.2 | Terrestrial Ecological Support Areas (ESAs), including:<br>*a) the impact on the ecological processes that operate within or across the site;*<br>*b) the extent the proposed development will impact on the functionality of the ESA; and*<br>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, 2003 including-<br>*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;* | Section 3 (desktop analysis) |
| 2.3.7.4 | Priority areas for protected area expansion, including-<br>*a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;* | Section 3 (desktop analysis) |
| 2.3.7.5 | SWSAs including:<br>*a) the impact(s) on the terrestrial habitat of a SWSA; and*<br>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);* | Section 3 (desktop analysis)<br><br>**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 220156, 2023)* |
| 2.3.7.6 | FEPA sub catchments, including-<br>*a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;* | Not Applicable<br><br>**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 220156, 2023)* |
| 2.3.7.7 | Indigenous forests, including:<br>*a) impact on the ecological integrity of the forest; and*<br>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.** | |
| | Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities and the results of the **Faunal Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities are in **Sections 4 – 6.** | |
| **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; | Appendix J |
| 3.1.2 | A signed statement of independence by the specialist; | Appendix J |
| 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; | Section 1.2 |
| 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; | Section 2<br>Appendices C, D & E |
| 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; | Section 1.2 |
| 3.1.6 | A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant); | Section 5 |
| | **Impact Assessment Requirements** | Section 6 |

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| | 3.1.7 Additional environmental impacts expected from the proposed development;<br>3.1.8 Any direct, indirect and cumulative impacts of the proposed development;<br>3.1.9 The degree to which impacts and risks can be mitigated;<br>3.1.10 The degree to which the impacts and risks can be reversed;<br>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;<br>3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr); | |
| 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 | Executive Summary & Section 7 |
| 3.1.15 | Any conditions to which this statement is subjected. | Section 5, 6, & 7 |
| 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. | This report is submitted to the EAP and applicant and will be appended to the EIA / EMP by the EAP in due course as part of the application process |
| 3.3 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | |

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson *et al*. (2011), Hui and Richardson (2017) and Wilson *et al*. (2017), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), and the associated Alien and Invasive Species Regulations, 2020].

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

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

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

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

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

# LIST OF ACRONYMS

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|---|---|
| **AIP** | Alien and Invasive Plant |
| **ARC** | Agricultural Research Council |
| **BESS** | Battery Energy Storage System |
| **BGIS** | Biodiversity Geographic Information Systems |
| **C-Plan** | Limpopo Conservation Plan |
| **CARA** | Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) |
| **CBA** | Critical Biodiversity Area |
| **CR** | Critically Endangered |
| **DEA** | Department of Environmental Affairs |
| **DFFE** | Department of Forestry, Fisheries, and the Environment |
| **EA** | Environmental Authorisation |
| **EAP** | Environmental Assessment Practitioner |
| **E-GIS** | Environmental Geographical Information Systems |
| **EIA** | Environmental Impact Assessment |
| **EMPr** | Environmental Management Programme |
| **EN** | Endangered |
| **ESA** | Ecological Support Area |
| **EW** | Extinct in the Wild |
| **GBIF** | Global Biodiversity Information Facility |
| **GIS** | Geographic Information System |
| **GN** | Government Notice |
| **GPS** | Global Positioning System |
| **Ha** | Hectare |
| **IBA** | Important Bird and Biodiversity Area |
| **IEM** | Environmental Management |
| **IUCN** | International Union for Conservation of Nature |
| **km** | kilometre |
| **LC** | Least Concern |
| **LEDET** | Limpopo Department of Economic Development, Environment & Tourism |
| **LEMA** | Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) |
| **m** | Metre |
| **MAP** | Mean Annual Precipitation |
| **MAPE** | Mean Annual Potential Evaporation |
| **MASMS** | Mean Annual Soil Moisture Stress (% of days when evaporative demand was more than double the soil moisture supply) |
| **MAT** | Mean Annual Temperature |
| **MFD** | Mean Frost Days |
| **MPM** | Marula Platinum Mine |
| **NBA** | National Biodiversity Assessment |
| **NEMA** | National Environmental Management Act, 1998 (Act No. 107 of 1998) |
| **NEMBA** | National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) |
| **NNR** | No Natural Remaining (Habitat) |
| **NPAES** | National Protected Area Expansion Strategy |
| **NR** | Nature Reserve |
| **ONA** | Other Natural Areas |
| **P** | Protected |
| **PES** | Present Ecological State |
| **PNR** | Private Nature Reserve |
| **POC** | Probability of Occurrence |
| **PV** | Photovoltaic |
| **QDS** | Quarter Degree Square |
| **REDZ** | Renewable Energy Development Zones |
| **RDL** | Red Data Listed |
| **SABAP 2** | South African Bird Atlas Project 2 |
| **SACAD** | South African Conservation Areas Database |
| **SACNASP** | South African Council for Natural Scientific Professionals |

| | |
|---|---|
| **SANBI** | South African National Biodiversity Institute |
| **SanParks** | South African National Parks |
| **SAPAD** | South African Protected Areas Database |
| **SCC** | Species of Conservation Concern |
| **STS** | Scientific Terrestrial Services |
| **SWSAs** | Strategic Water Source Areas |
| **TOPS** | Threatened or Protected Species |
| **TSP** | Threatened Species Programme |
| **VEGMAP** | National Vegetation Map Project |
| **VU** | Vulnerable |
| **WSAs** | Water Source Areas |

# 1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by SLR Consulting (Pty) Ltd to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) process for a proposed photovoltaic (PV) facility at the Marula Platinum Mine (MPM), which is located near Burgersfort within the Limpopo Province, hereafter referred to as the "study area".

The study area, approx. 92 hectares (ha), is located within the Greater Tubatse local Municipality which is an administrative area in the Sekhukhune District Municipality of the Limpopo Province. The R37 runs approximately 4 km east of the MPM. The study area is located approx. 5 kilometres (km) north of the R516 and approx. 7.5 km west of the R101. See Figures 1 and 2 for an indication of the extent and location of the study area in relation to surrounding areas.

The proposed PV facility will include the construction of PV panels and associated infrastructure including internal roads, offices, a control room, laydown area(s) and a substation (Figure 3). At the time of assessment, a Battery Energy Storage System (BESS) was proposed, however, it was not yet known if the proponent would make use of such technology. Furthermore, the battery type (Sodim Sulphur Battery, Lithium Ion Battery, Redox (Vanadium) Flow Battery, etc)) and location of the BESS was not known. It is however, assumed that the BESS (if utilised) will be within the study area footprint area.

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

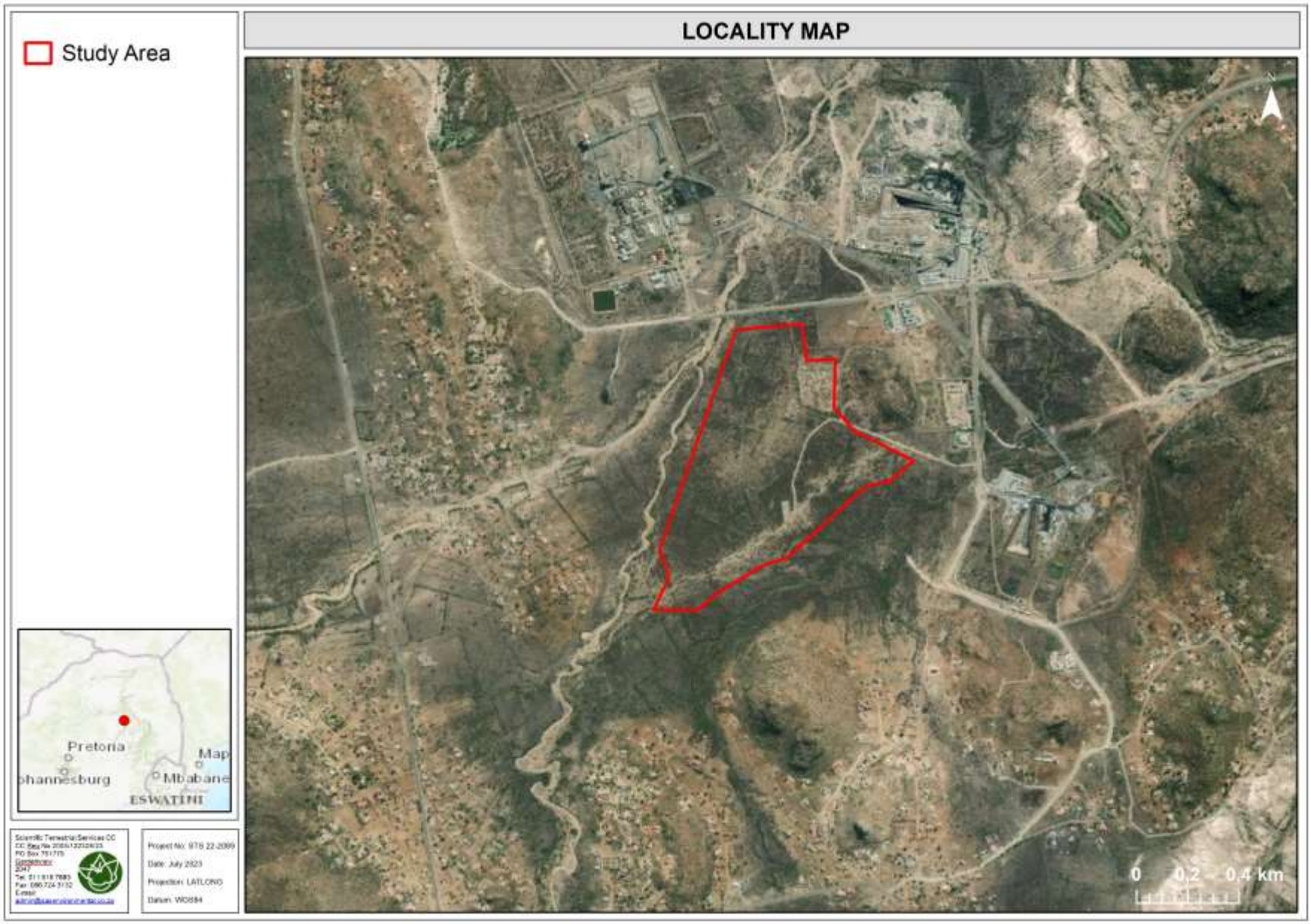



**Figure 1: Digital Satellite image depicting the location of the study area in relation to surrounding areas.**

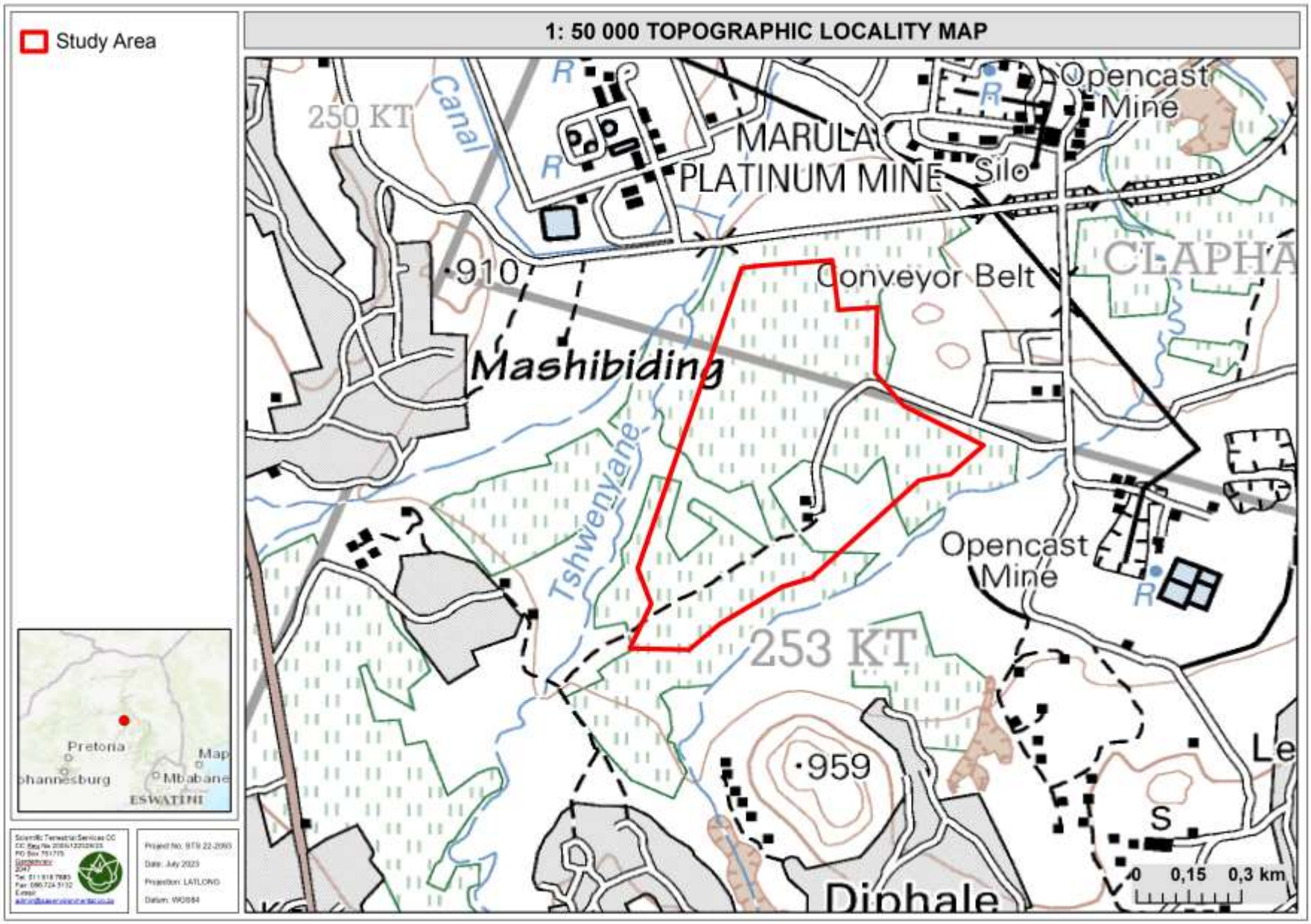



**Figure 2: The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.**

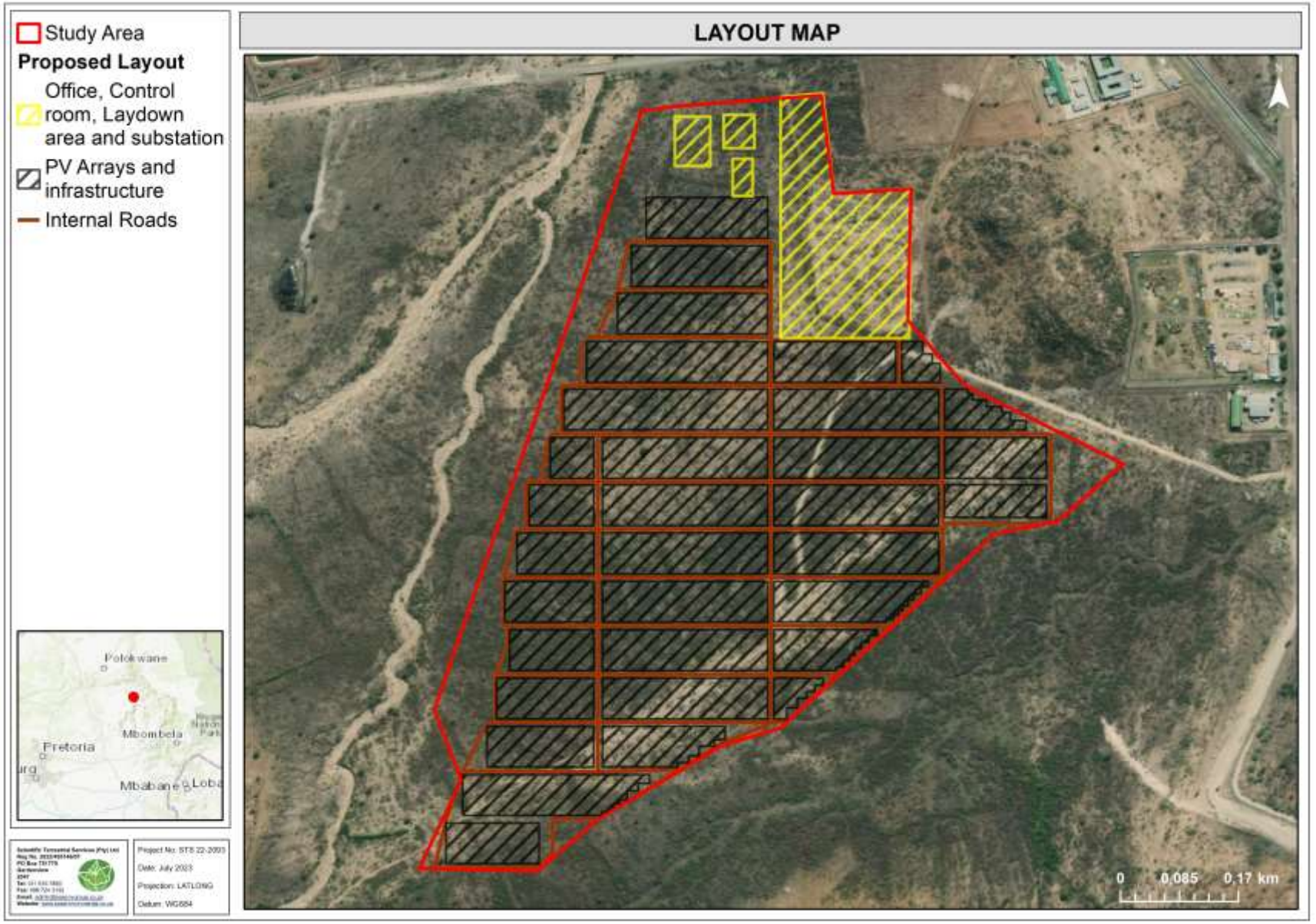



**Figure 3: The proposed development layout associated with the study area. The BESS is not illustrated on the map as it was not yet known if the proponent would make use of such technology. It is however, assumed that the BESS (if utilised) will be within the study area footprint area.**

## 1.1 Project Scope

Specific outcomes in terms of this report are outlined below:

- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix J);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report);
- Compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute (SANBI)'s Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/);
- To define the Present Ecological State (PES) of the biodiversity of the study area;
- To determine and describe habitats, communities and the ecological state of the study area;
- To conduct a faunal and floral Species of Conservation Concern (SCC) assessment, including the potential of suitable habitat to occur within the study area for SCC;
- To identify and consider all sensitive landscapes, including rocky ridges, wetlands or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- To determine the environmental impacts that the construction of the proposed PV facility might have on the biodiversity associated with the study area; and
- To develop mitigation and management measures for all phases of the proposed development.

## 1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the surrounding areas or adjacent properties, although ecologically important or sensitive areas according to the desktop databases of the surrounding areas have been included on the relevant maps;
- Sampling, by its nature, means that not all individuals are assessed and identified. Some species and taxa associated with the study area may have been missed during the assessment. It is, however, expected that most floral and faunal communities have been accurately assessed and considered. Relevant online sources and background information were further assessed to improve on the overall understanding of the study area's ecology;

- Due to most faunal taxa's nature and habits, it is unlikely that all species would have been observed during a field assessment of limited duration. Due to cyclical nature of many species' life stages, as well as the season of the assessment, very few faunal species were observed. As such, background data (desktop) and literature studies (previous work undertaken in the area, e.g., STS 200060 (2020)) were used to further infer faunal species composition and sensitivities in relation to the available habitat;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A field assessment was undertaken on the 17th of November 2022 (early summer). A more comprehensive assessment would require that assessments take place in all seasons of the year. However, on-site data were augmented with all available desktop data. Together with project experience in the area (e.g., STS 200060 (2020)), the findings of this assessment are considered an accurate reflection of the ecological characteristics of the study area;
- The proposed PV facility will include the construction of PV panels and associated infrastructure including internal roads, offices, control room, laydown area and substation (Figure 3). At the time of assessment, a BESS was proposed; although it is not known if the proponent will make use of such technology. Furthermore, the battery type (Sodim Sulphur Battery, Lithium Ion Battery, Redox (Vanadium) Flow Battery, etc)) and location of the BESS was not known. It is however, assumed that the BESS (if utilised) will be within the study area footprint. The impact assessment has been undertaken under the assumption that the remaining areas were the BESS could be placed (within the footprint area) will be cleared and developed (as no location has been provided for such infrastructure); and
- Some floral SCC identities will not be made known in this report, although their potential to occur on-site will still be assessed. As per the best practise guideline that accompanies the SANBI protocol and the National Web-based Environmental Screening Tool (hereafter referred to as the "screening tool"), the name of the certain sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered (CR) plant.

## *1.3 Legislative Requirements*

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[4];
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
    - Government Notice (GN) number 2747 (Gazette Number 47526): The revised National list of Ecosystems that are Threatened and in need of Protection, dated 18 November 2022, as it relates to the NEMBA;
    - GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated September 2020 as it relates to the NEMBA;
    - GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA;
    - GN 3009: Regulations Pertaining to Threatened or Protected Terrestrial Species and Freshwater Species in Government Gazette 47984 dated 3 February 2023, as it relates to the NEMBA; and
    - GN 3012: List of Terrestrial and Freshwater Species that are Threatened or Protected, Restricted Activities that are Prohibited, and Restricted Activities that are Exempted, in Government Gazette 47984 dated 3 February 2023, as it relates to the NEMBA.
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA);
- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
    - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA;
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Environment, Forestry and Fisheries (DEFF)'s national environmental screening report required with an application for environmental authorisation as identified in regulation 16(1)(v) of EIA Regulations:
    - For the Terrestrial Biodiversity Theme: GN 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

[4] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

- For Animal and Plant Species Themes: GN 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; and

- The Limpopo Environmental Management Act, 2003 (Act No.7 of 2003) (LEMA).

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

# 2 ASSESSMENT APPROACH

The below section briefly outlines the approach taken for ground-truthing and reporting of biodiversity aspects of the study. Please refer to Appendices C – E for more detailed descriptions.

## *2.1 Desktop Research Approach*

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the study area and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the study area included [5]:

- The National Protected Areas Expansion Strategy (NPAES) – 2018 database;
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2022);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2022);
- The Limpopo Conservation Plan (C-Plan) v2 CBAs 2018 (LEDET, 2018);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
  - 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a)
- The Red List of Ecosystems 2022 (SANBI 2021a and b);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno et al, 2019):

[5] Datasets obtained from:
- SANBI BGIS (2019). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2019; and
- DEA Environmental Geographical Information Systems (E-GIS) website. URL: https://egis.environment.gov.za/

  - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
  - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).
- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al, 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- The International Union for Conservation of Nature (IUCN);
- The DFFE's screening tool (accessed 2023);
- The Transmission Corridors and Expansions Corridors databases, which contains spatial data for the Strategic Transmission Corridors, associated with the Renewable Energy Development Zones (REDZ); and
- From the 2017 Strategic Water Source Areas (SWSA) project:
  - 2017 SWSA Surface water (Water Research Commission, 2017).

## *2.2 General Approach*

An on-site visual assessment of the study area was conducted (17 November 2022) to confirm the assumptions made during the consultation of the background maps and to determine whether the ecological status of the habitat associated with the study area has changed.

The vegetation surveys are based on the subjective sampling method which is a technique where the specialist chooses specific sample sites within the area of interest, based on their professional experience and background research done for the site, to allow representative recordings of floral communities and optimal detection of SCC (**Appendix C**).

For the faunal field surveys, a reconnaissance 'walkabout' was undertaken to confirm habitat types and to consider whether the areas are representative of these habitats, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot to identify and define the faunal assemblage within the footprint area. A detailed explanation of the method of assessment is provided in **Appendix D** of this report. The faunal categories covered in this assessment include mammals, avifauna, herpetofauna and general invertebrates.

The below list includes the steps followed during the preparation for, and the undertaking of, the field assessments:

- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to the site, during which broad habitats,

vegetation types and potentially sensitive sites were identified. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where targeted investigations were required (e.g., for SCC detection and within the direct footprint of the proposed parking area);

- Databases used for background information include the SANBI Threatened Species Programme (TSP), the NBA (2018), Red List of Ecosystems 2022, SAPAD & SACAD (Quarter 3, 2022), NPAES (2018), Limpopo Conservation Plan (C-Plan, 2018), and the International Union for Conservation of Nature (IUCN);
- The subjective sampling method requires that field assessment take place on foot. Based on the broad habitat units delineated before going to the site, and points of interest recorded, which is updated based on on-site observations, the selected sample areas were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed; and
- Photographs were taken of each vegetation community that are representative of the typical vegetation structure of that community, as well as photos of all detected SCC (where such species were not flagged on the screening tool as sensitive species for which identities may not be made known).

For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to **Appendix E** of this report.

## *2.3 Sensitivity Mapping*

All the ecological features associated with the study area were considered, and sensitive areas were delineated using a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery.

# 3 RESULTS OF THE DESKTOP ANALYSIS

## *3.1 Conservation Characteristics of the Study Area*

The following table contains data accessed as part of the desktop assessment. It is important to note, that although all data sources used provide useful and often verifiable high-quality data, the various databases do not always provide an entirely accurate indication of the area's actual biodiversity characteristics, and as such require ground truthing.

**Table 1: Summary of the terrestrial conservation characteristics for the study area (Quarter Degree Square (QDS) 2430CA)**

| DETAILS OF THE STUDY AREA IN TERMS OF THE 2018 FINAL VEGETATION MAP OF SOUTH AFRICA, LESOTHO, AND SWAZILAND | | | | | |
|---|---|---|---|---|---|
| **BIOME** | The study area is situated within the **Savanna Biome** | | | | |
| **BIOREGION** | The study area is located within the **Central Bushveld Bioregion** | | | | |
| **VEGETATION TYPE** | **Sekhukhune Plains Bushveld** (SVcb 27) | | | | |
| **DESCRIPTION OF THE VEGETATION TYPES ASSOCIATED WITH THE STUDY AREA ACCORDING TO MUCINA & RUTHERFORD (2006)** | | | | | |
| **ALTITUDE (m)** | 700–1 100 | | | | |
| **CLIMATE** | Summer rainfall with very dry winters. | | | | |
| | **MAP (mm)** | **MAT (°C)** | **MFD (Days)** | **MAPE (mm)** | **MASMS (%)** |
| | 518 | 19 | 4 | 2084 | 79 |
| **DISTRIBUTION** | Limpopo and Mpumalanga Provinces | | | | |
| **GEOLOGY & SOILS** | Complex geology, with rocks mainly mafic and ultramafic intrusive rocks of the main to lower zones of the Rustenberg Layered Suite on the eastern lobe of the Bushveld Igneous Complex (Vaalian). The zones (subsuites) are dominated by concentric belts of norite, gabbro, anorthosite and pyroxenite, with localised protrusions of magnetite, chromatite, serpentinised harzburgite, olivine diorite, shale, dolomite, and quartzite. Most of the area consists of red apedal soils. Deep, loamy Valsrivier soils are characteristic of the plains and shallow Glenrosa soils are found on the low-lying, rocky hills. Patches of erodable black, melanic structured horizons are common around small mountains. Some Steendal soils are underlain by gypsum. | | | | |
| **CONSERVATION** | **Vulnerable (VU).** Target 19%. Nearly 2% statutorily conserved in Potlake, Bewaarkloof and Wolkberg Caves Nature Reserves. Approximately 25% of this area has been transformed and is mainly under dry-land subsistence cultivation. A small area is under pressure from chrome and platinum mining activities and the associated urbanisation. Depending on commodities, this threat could increase in the future. There is a high level of degradation of much of the remaining vegetation by unsustainable harvesting and utilisation. Erosion widespread at usually high to very high levels with donga formation. Alien *Agave* species, *Caesalpinia decapetala*, *Lantana camara*, *Melia azedarach*, *Nicotiana glauca*, *Opuntia* species, *Verbesina encelioides* and *Xanthium strumarium* are widespread but scattered. | | | | |
| **VEGETATION & LANDSCAPE FEATURES (DOMINANT FLORAL TAXA IN APPENDIX F)** | Mainly semi-arid plains and open valleys between chains of hills and small mountains running parallel to the escarpment. Predominantly short, open to closed thornveld with an abundance of *Aloe* species and other succulents. Heavily degraded in places and overexploited by man for cultivation, mining, and urbanisation. Both man-made and natural erosion dongas occur in areas containing clays rich in heavy metals. Encroachment by indigenous microphyllous[6] trees and invasion by alien species is common throughout the area. | | | | |

[6] Microphyllus - having very small leaves. From *micro* meaning small and *phyllous* referring to leaves.

| CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES) | |
|---|---|
| **NATIONAL BIODIVERSITY ASSESSMENT (2018) (FIGURE 4)** | Small sections of the study area are located within the remaining extent of the Sekhukhune Plains Bushveld, which is currently **endangered (EN)** and considered to be **poorly protected**.<br><br>The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa. Two headline indicators that are applied to both ecosystems and species are used in the NBA: threat status and protection level:<br><br>i. Ecosystem threat status tells us about the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as CR, EN, VU or least concern (LC), based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds; and<br>ii. Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected, Poorly Protected, Moderately Protected or Well Protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA. |
| **RED LIST OF ECOSYSTEMS (2022) (FIGURE 5)** | According to the 2022 Red List of Ecosystems, the study area is located within the remaining extent of a threatened ecosystem, namely the EN Sekhukhune Plains Bushveld ecosystem. This ecosystem is classified as a B1(i) ecosystem; B1(i) ecosystems have been classified as such because they have a restricted distribution and high rate of loss (in terms of habitat) (Government of South Africa (2022).<br><br>The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the Red List of Ecosystems 2022) is based on assessments that followed the IUCN Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 CR, 51 EN and 14 VU types).<br><br>Following a series of consultations with conservation authorities and the public in 2020/21 the Revised list of terrestrial ecosystems that are threatened and in need of protection was the approved by the Minister for implementation in August 2022. The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022. |
| **IBA (2015) (FIGURE 6)** | Although the study area is not located directly within an IBA, it is located within a 10 km radius of an IBA (IBA, 2015) - the **Wolkberg** and the **Blyde River Canyon System IBAs** are located approximately 6 km north and northeast (respectively) of the study area. |
| **SAPAD (2022, Q3)[7], SACAD (2022, Q3)[8], & NPAES (2018) (FIGURE 7 & 8)** | According to the SAPAD (2022_Q3), there are several protected areas within a 10 km radius of the study area, namely the **Apiesboom Private Nature Reserve** (PNR; ~ 4 km), **Bokgobelo Protected Environment** (~ 9 km), **De Hoop Dam Protected Environment** (~ 8 km), **De Hoop PNR** (~ 6 km), **Glen Ore PNR** (~ 7 km), **Lekgalametsi Nature Reserve** (NR; ~ 8 km)), **Luiperdhoek PNR** (~ 5 km), **NR: Co-operation and Development** (~ 8 km); **Potlake NR** (~ 6 km), **Rietkom PNR** (~ 9 km), **Sonia Schoeman PNR** (~ 8 km), and **Wolkberg Wilderness Area** (~ 8 km).<br><br>According to the SACAD (2022_Q3), the study area is located within a 10 km radius of a conservation area, namely the **Kruger to Canyons Biosphere Reserve** (~ 5 km). The study area is located within the Transition zone of the Biosphere. |

[7] **SAPAD (2022):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act No. 57 of 2003) (NEMPAA). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the "System of Protected Areas", which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention

[8] **SACAD (2022):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.

| | |
|---|---|
| | According to NPAES database (2018), a no protected areas are located within a 10 km radius of the study area, nor are any priority study areas identified within the study area. |
| **DETAIL OF THE AREA OF INTEREST IN TERMS OF THE LIMPOPO CONSERVATION PLAN V2 (2018) (FIGURE 9)** | |
| **ECOLOGICAL SUPPORT AREA 1 (ESA 1)** | A small section within the northeast of the study area is located within a **Category 1 ESA**. These are natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes.<br><br>**Land Management Recommendations:** Implement appropriate zoning and land management guidelines to avoid impacting on ecological processes. Avoid intensification of land use and fragmentation of natural landscapes. **Incompatible Land-Use**: Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). **Note**: Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to maintain the overall ecological functioning of ESAs. |
| **ECOLOGICAL SUPPORT AREA 2 (ESA 2)** | A small section within the northeast of the study area is located within a **Category 2 ESA**. Category 2 ESAs are areas no longer intact but potentially retain significant importance from a process perspective (e.g., maintaining landscape connectivity).<br><br>**Land Management Recommendations**: Maintain current land-use. Avoid any intensification of the current land-use which may result in additional impact on ecological processes. **Incompatible Land-Use:** Any land use or activity that results in additional impacts on ecological functioning mostly associated with the intensification of land use in these areas (e.g., Change of floodplain from arable agriculture to urban land use or from recreational fields and parks to urban). |
| **OTHER NATURAL AREAS** | Most of the study area is located within an area considered to be **other natural areas (ONAs)**. These are natural and intact areas but are not required to meet targets, nor have they been identified as CBAs or ESAs.<br><br>**Land Management Recommendations**: No management objectives, land management recommendations or land-use guidelines are prescribed. These areas are nevertheless subject to all applicable town and regional planning guidelines and policy. Where possible existing "Not Natural" areas should be favoured for development before "Other natural areas". |
| **NO NATURAL HABITAT REMAINING** | Scattered sections throughout the study area are located within an area considered to have **No Natural Remaining (NNR) Habitat.** These are areas with no significant direct biodiversity value. These are either not natural areas or degraded natural areas that are not required as ESA. These areas include intensive agriculture, urban, industry, and human infrastructure.<br><br>**Land Management Recommendations:** No management objectives, land management recommendations or land-use guidelines are prescribed. These areas are nevertheless subject to all applicable town and regional planning guidelines and policy. Where possible existing "Not Natural" areas should be favoured for development before "Other natural areas". |
| **NATIONAL WEB-BASED SCREENING TOOL** | |
| The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below:<br>➢ Very high: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 square kilometres ($km^2$) are considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under CR, EN, or VU D criteria of the IUCN or species listed as critically/ extremely rare under South Africa's national red list criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.<br>➢ High: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level.<br>➢ Medium: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level.<br>➢ Low: Areas where no threatened species are known or expected to occur. | |
| **ANIMAL SPECIES THEME (FIGURE 10)** | For the animal species theme, the study area is located within an area of **medium sensitivity.** Triggering species include*:*<br>» Mammals*: Crocidura maquassiensis* (Makwassie musk shrew (VU))*;* |

| | |
|---|---|
| | » Reptiles*: Kinixys lobatiana* (Hingeback Tortoise (VU)); and<br>» Invertebrates*: Aroegas fuscus* (Brown False Shieldback (EN)). |
| **PLANT SPECIES THEME (FIGURE 11)** | For the plant species theme, the study area is located within areas of **low** and **medium sensitivity.** Trigger species include *Asparagus fourei* (VU), *Asparagus sekukuniensis* (EN), *Polygala sekhukhuniensis* (VU), *Searsia batophylla* (VU), Sensitive species 1033[9] (EN), and Sensitive species 1252 (VU). |
| **TERRESTRIAL BIODIVERSITY THEME (FIGURE 12)** | For the terrestrial biodiversity theme, the study area has a **low** and a **very high sensitivity.** Triggering features of the very high sensitivity included the presence of **Category 1 and Category 2 ESAs.** |
| **STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)** | |
| Surface Water Strategic Water Source Area (SWSAs) are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage. | |
| **NAME & CRITERIA (FIGURE 13)** | Although the study area is not located within a SWSA, it is located within a 10 km radius of a SWSA; the Wolkberg SWSA is located ~ 7 km northeast of the study area. |
| **RENEWABLE ENERGY: STRATEGIC TRANSMISSION CORRIDORS** | |
| **POWER CORRIDORS (FIGURE 14)** | Although the study area is not located within a power corridor, it is located ~ 1 km east of the International Power Corridor. |
| **RENEWABLE ENERGY DEVELOPMENT ZONES (REDZ)** | The study area is not located within a REDZ. |

**NBA = National Biodiversity Assessment; SAPAD = South African Protected Areas Database; SACAD = South African Conservation Areas Database; NPAES = National Protected Areas Expansion Strategy; IBA = Important Bird Area; MAP = Mean annual precipitation; MAT = Mean annual temperature; MAPE = Mean annual potential evaporation; MFD = Mean Frost Days; MASMS = Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); CBA = Critical Biodiversity Areas; ESA = Ecological Support Areas; SWSA = Strategic Water Source Areas; WSAs = Water Source Areas.**

[9] According to the best practise guidelines provided by SANBI, the name of sensitive species provided by the Online EIA screening tool may not appear in the final EIA report nor any of the specialist reports released into the public domain. This is to protect species that are under threat to factors such as illegal harvesting and overexploitation.

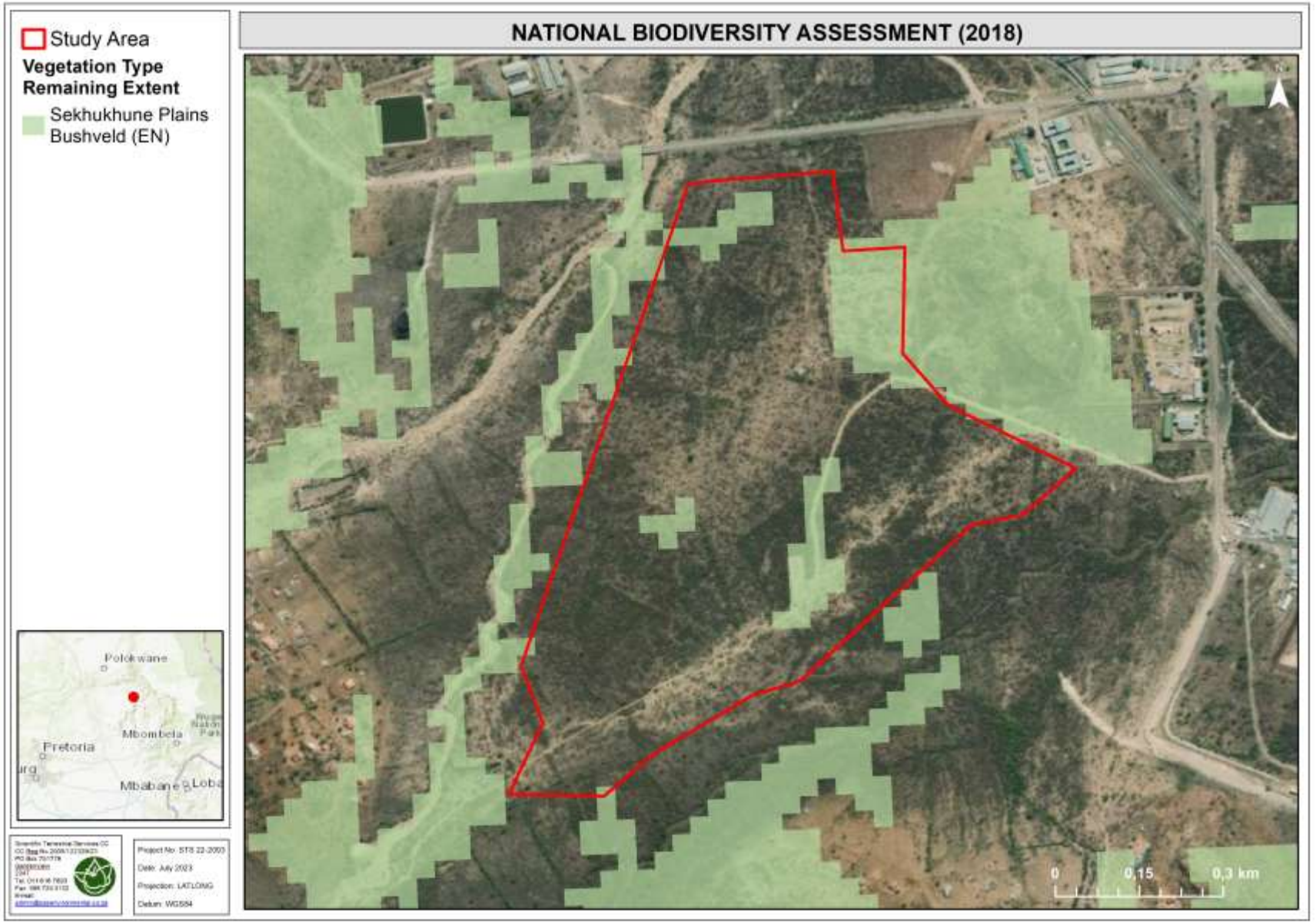



**Figure 4: The remaining extent of the endangered vegetation type associated with the study area according to the National Biodiversity Assessment (2018) in relation to the study area.**

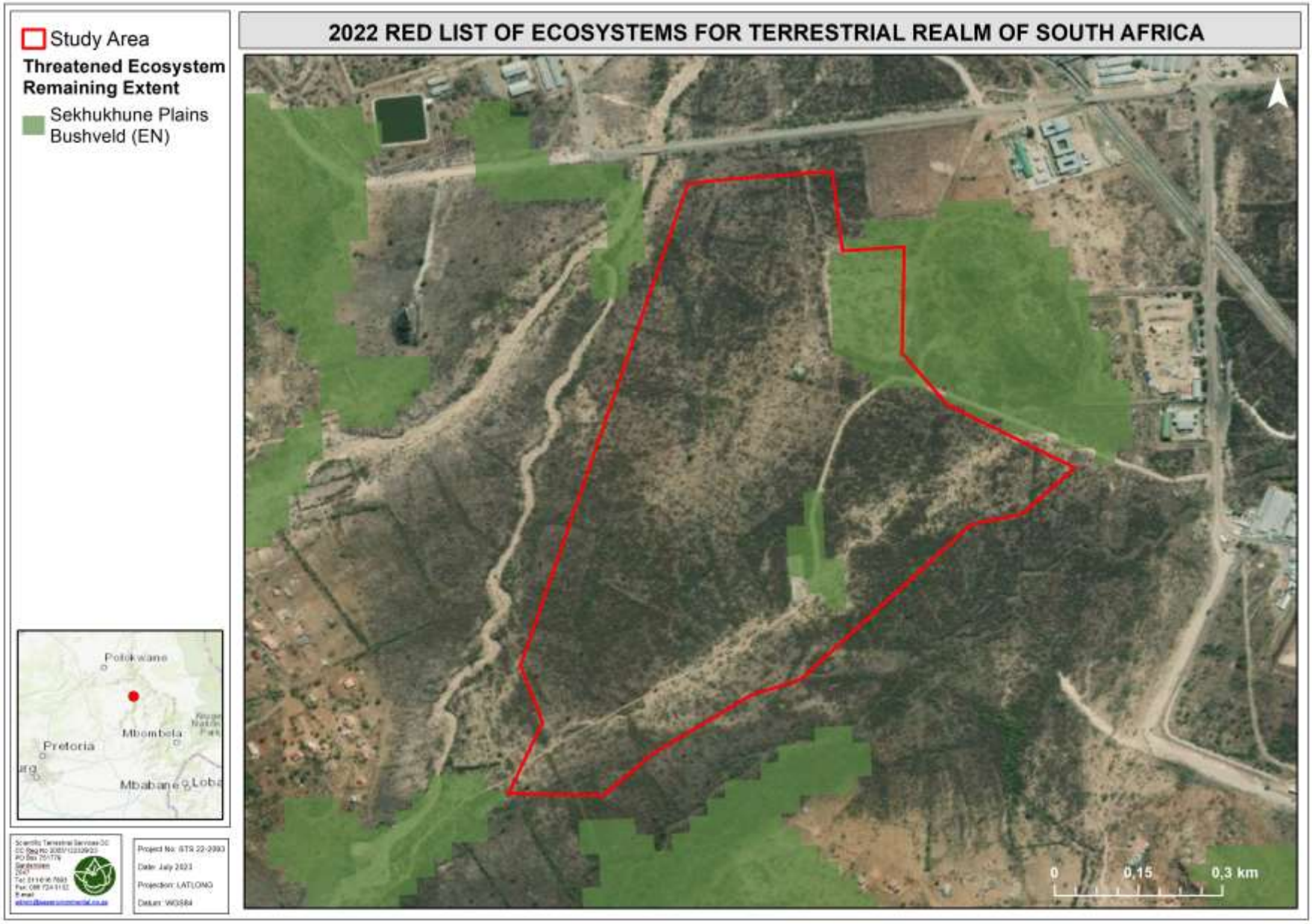



**Figure 5: The remaining extent of the endangered ecosystem associated with the study area according to the 2022 Red List of Ecosystems.**

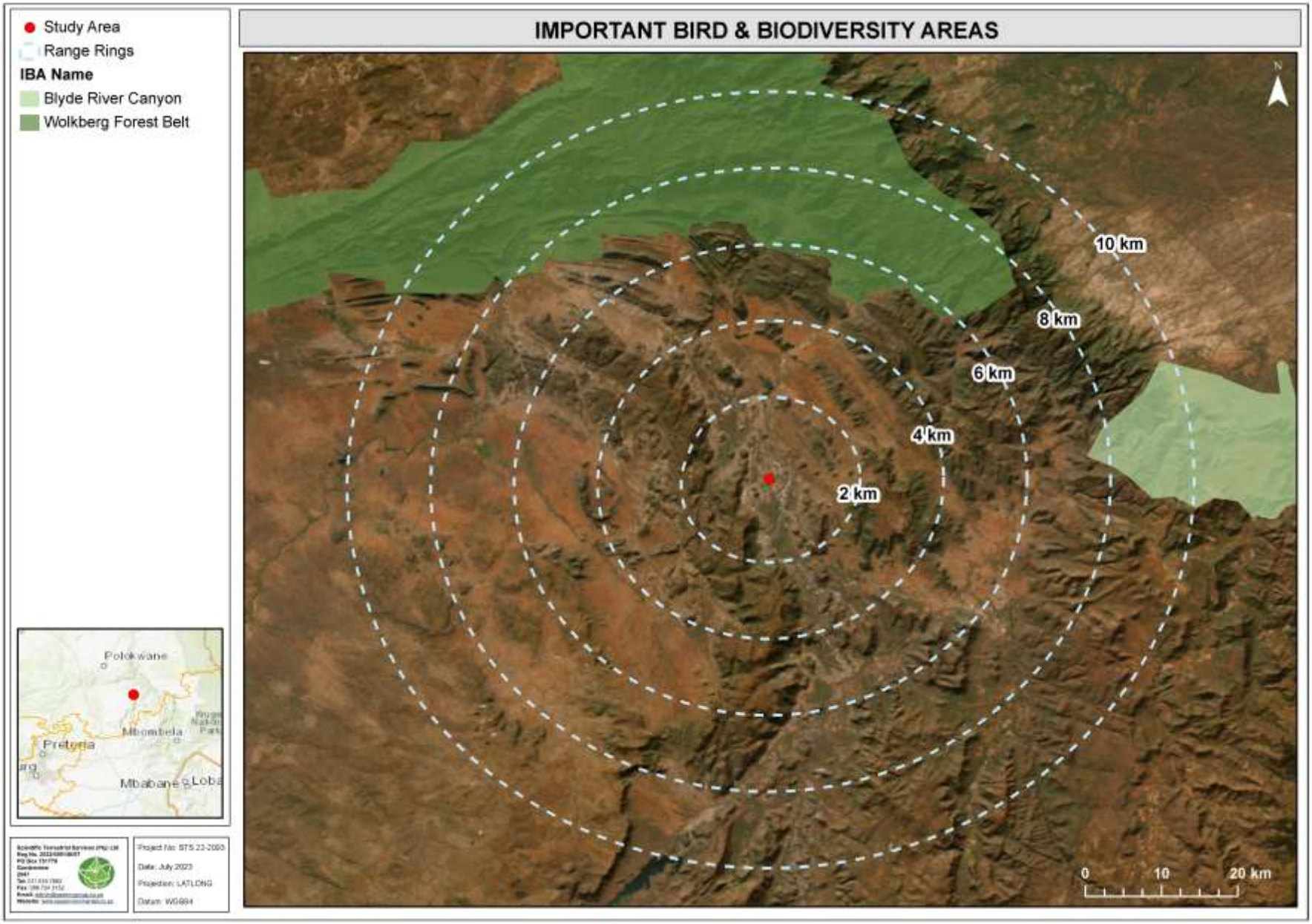



**Figure 6: The study area in relation to IBAs (2015).**

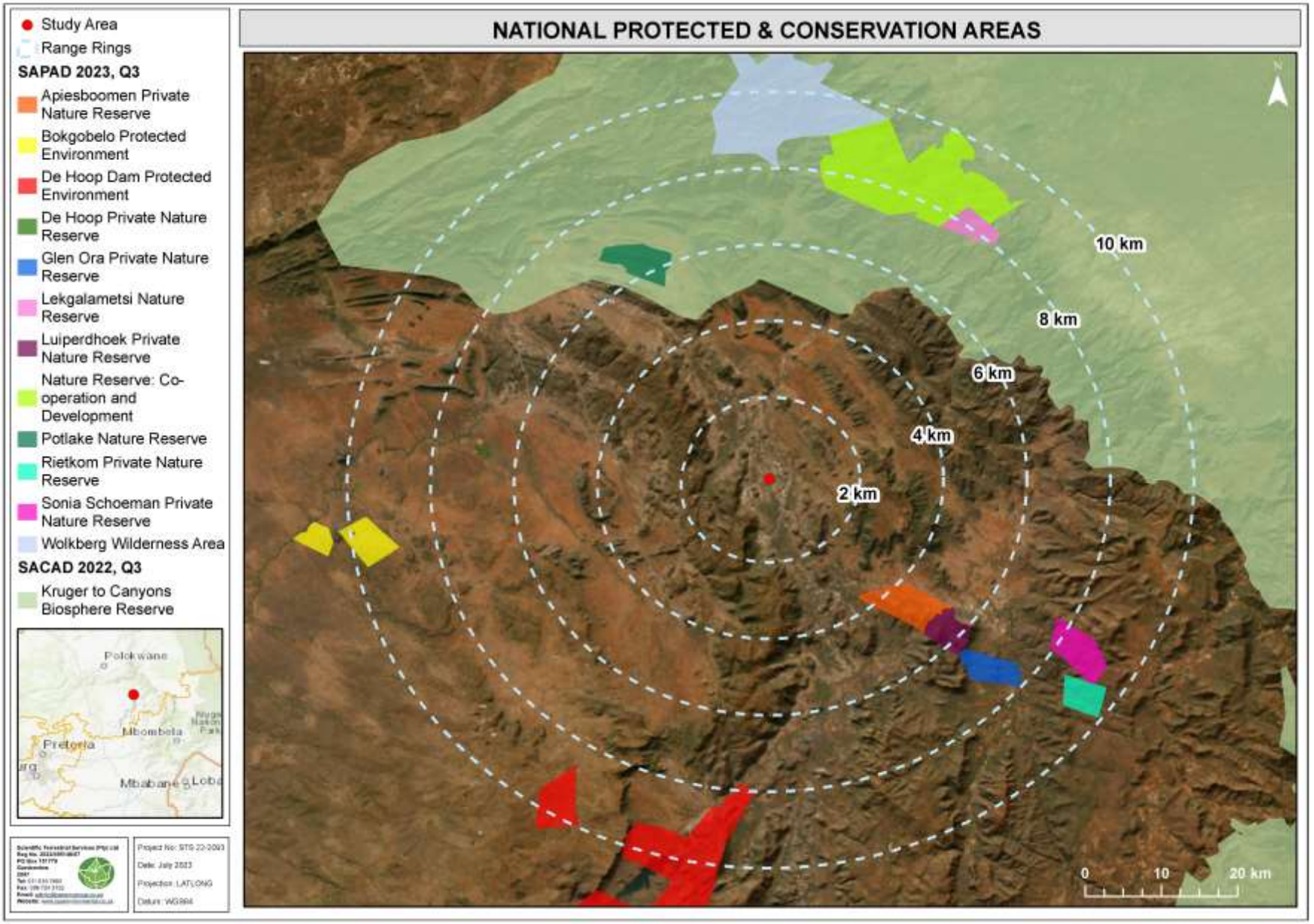



**Figure 7: The study area in relation to national protected and conservation areas as per the SAPAD (2022, Q3) and the SACAD (2022, Q3).**

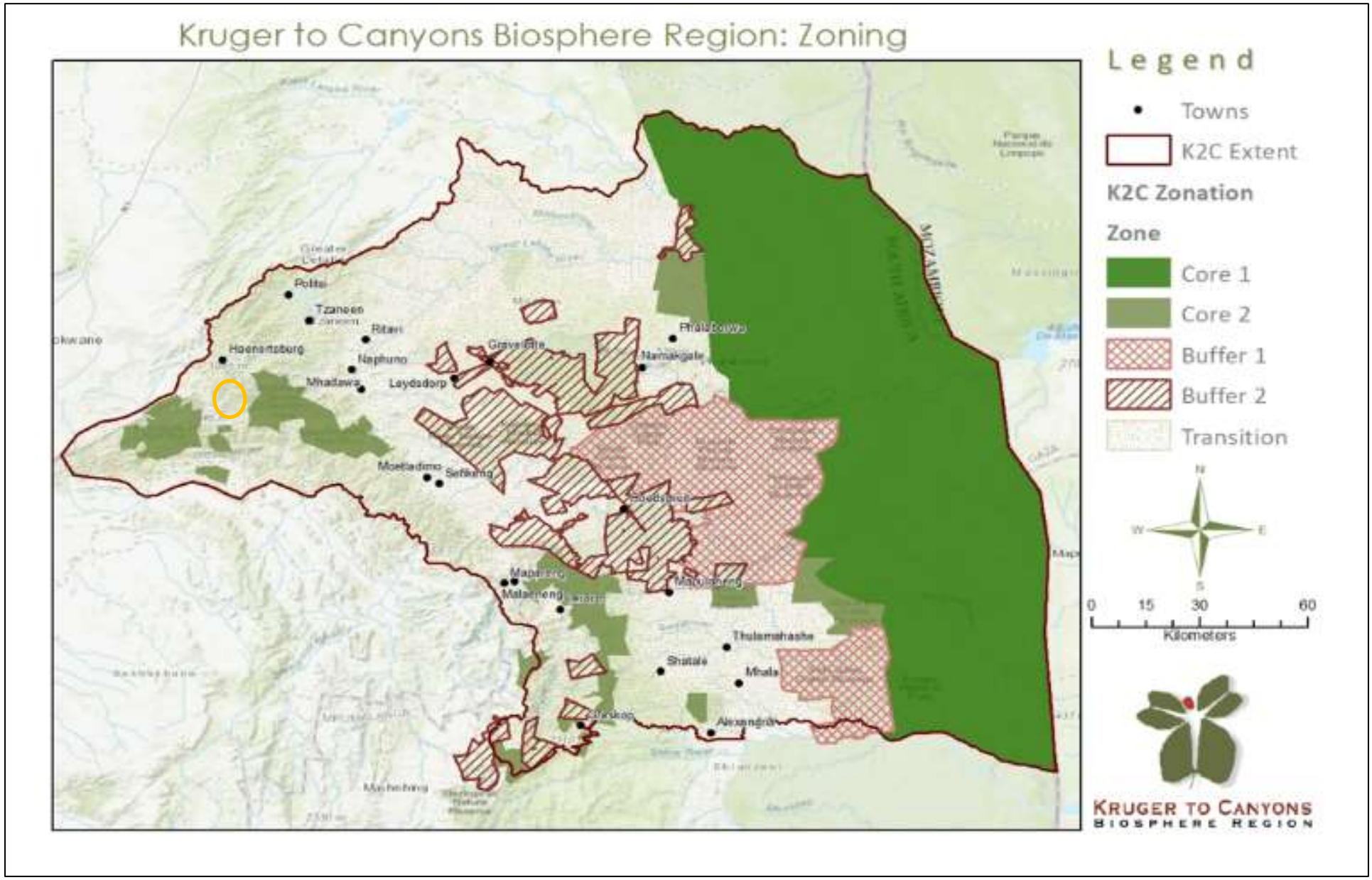



**Figure 8: The study area indicated in the yellow circle within the Kruger to Canyons Biosphere Reserve.**

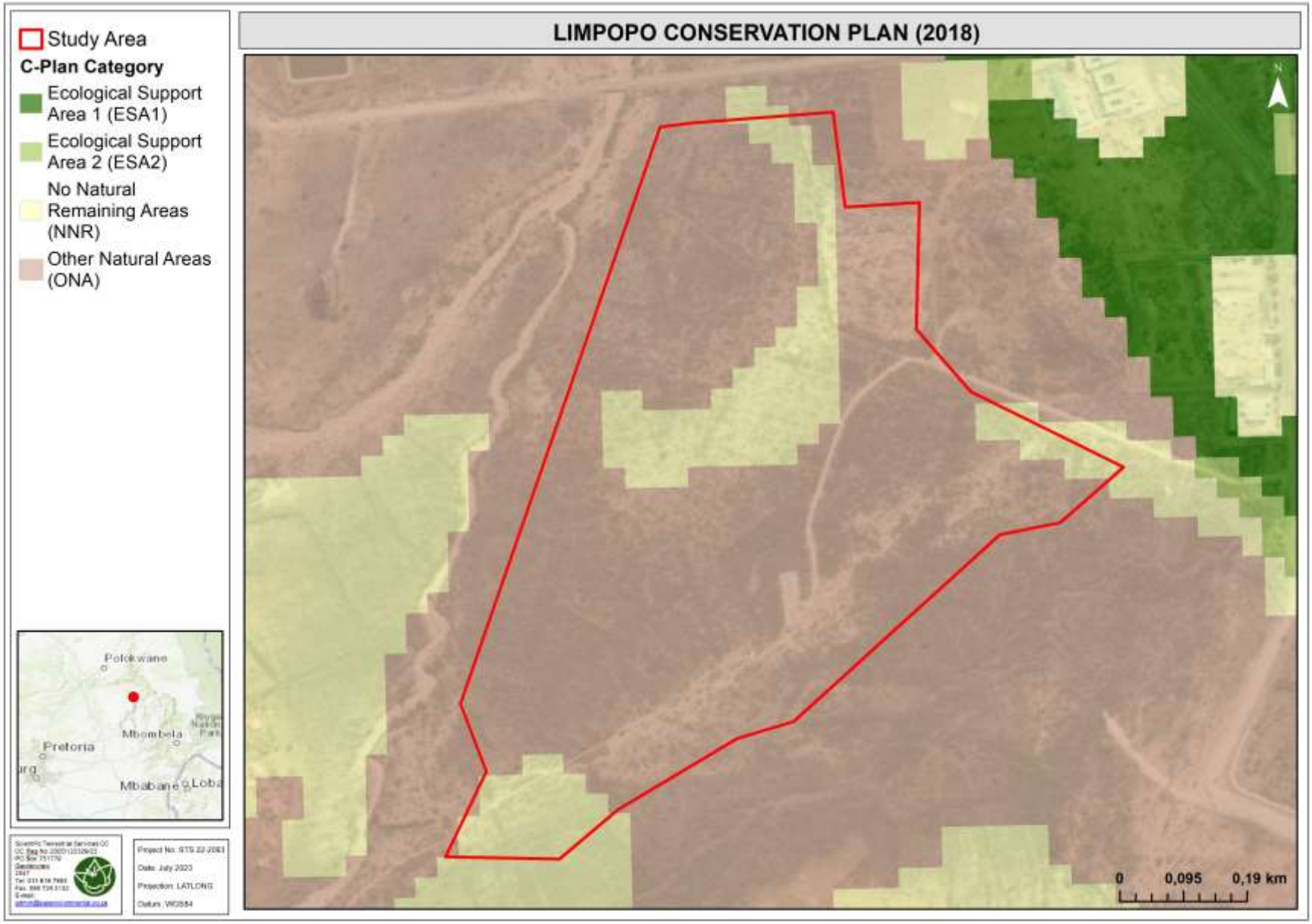



**Figure 9: The study area in relation to the C-Plan categories as indicated in the Limpopo Biodiversity C-Plan (C-Plan; 2018).**


**Figure 10: The Animal Species Theme sensitivity of study area as identified by the screening tool.**


**Figure 11: The Plant Species Theme sensitivity of study area as identified by the screening tool.**

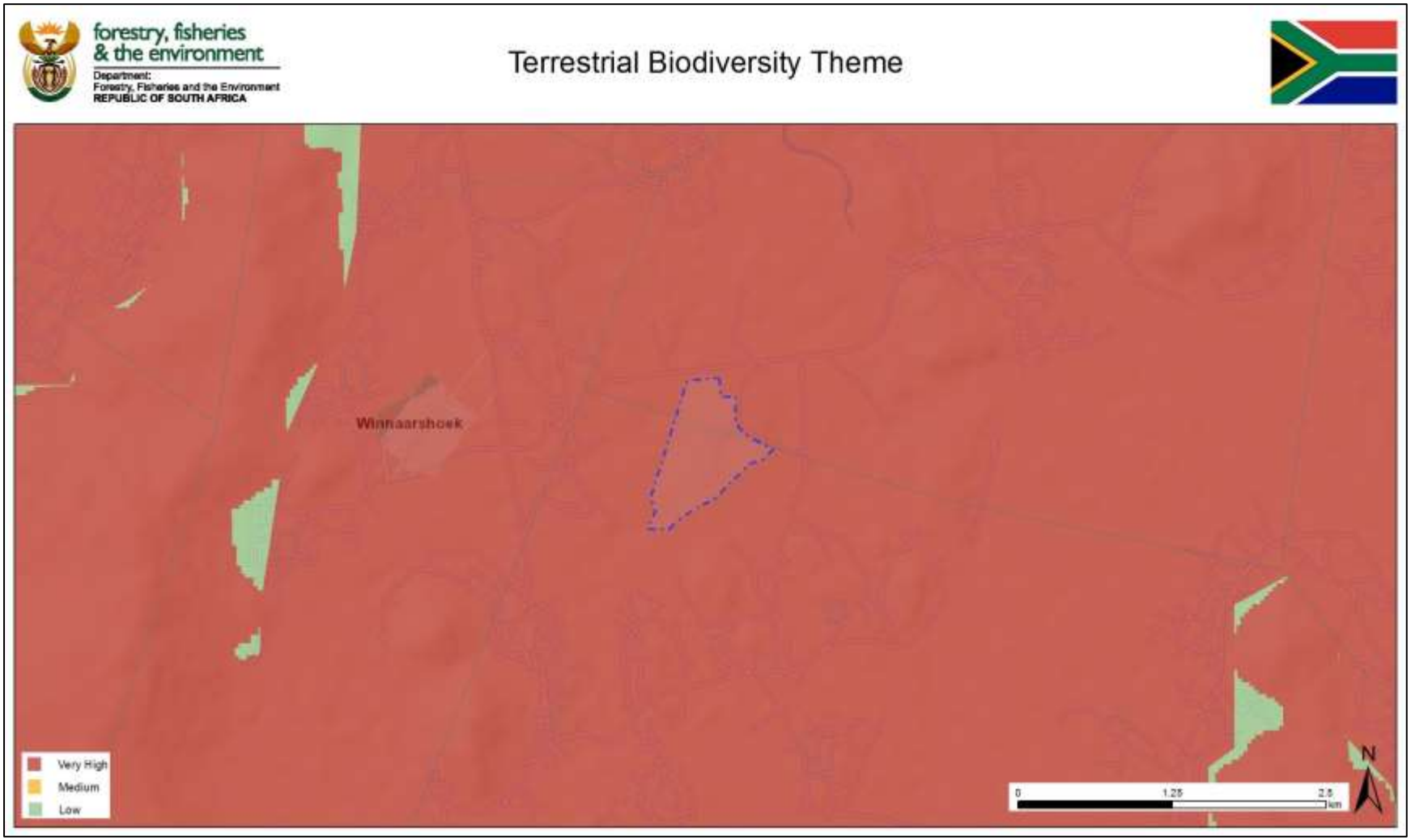



**Figure 12: The Terrestrial Biodiversity Theme sensitivity of study area as identified by the screening tool.**

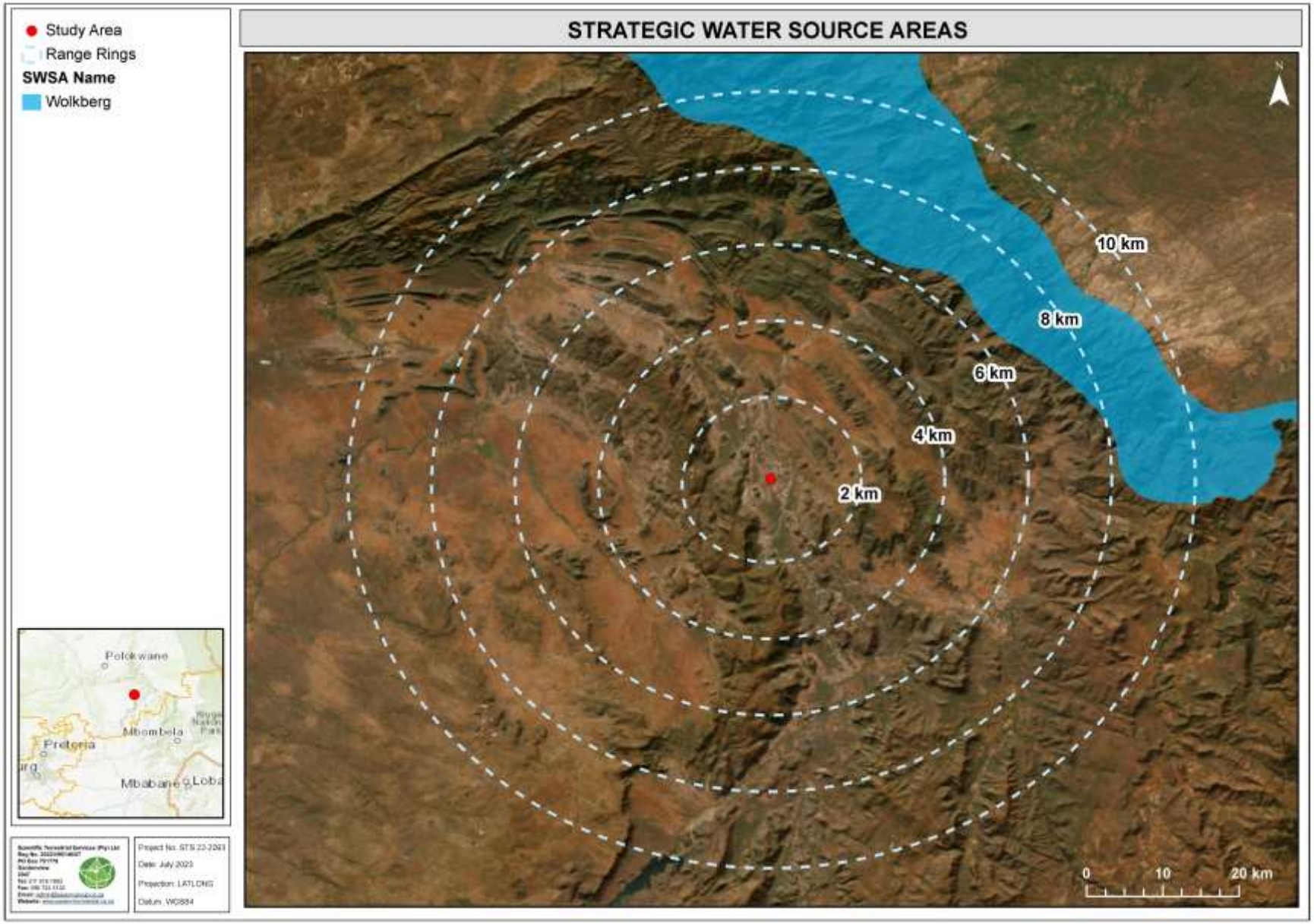



**Figure 13: SWSAs in relation to the study area.**

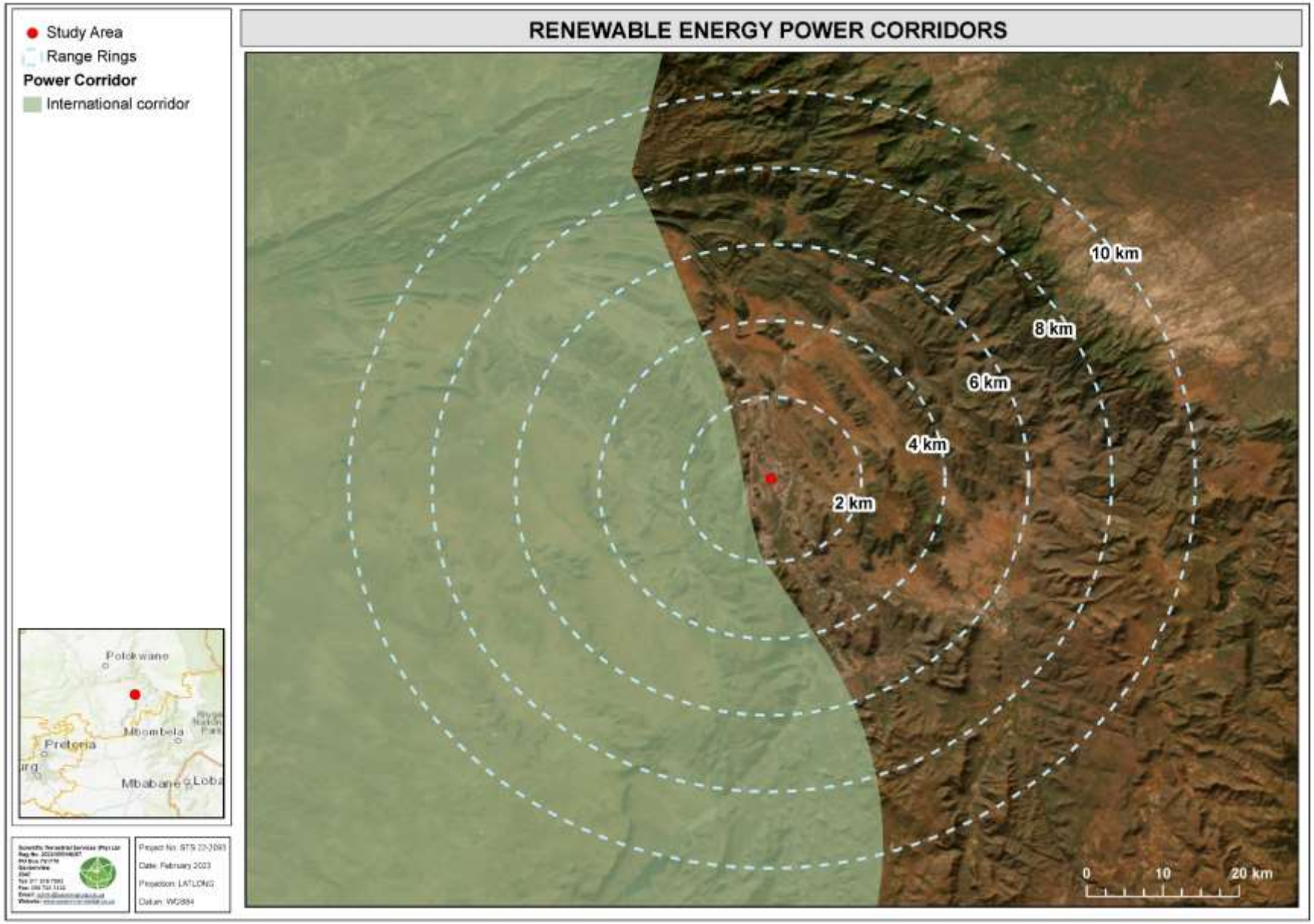



**Figure 14: Strategic Transmission Power Corridors in relation to the study area.**

# 4 BIODIVERSITY ASSESSMENT RESULTS

The below section provides the baseline results of the biodiversity assessment.

## *4.1 Broad-scale vegetation characteristics*

The study area is also located within the Sekhukhune Centre of Endemism. This centre supports a high diversity of floral species, largely due to the ultramafic soils present in the region. It has been estimated that the centre supports at least 30 species of endemic taxa and a further 50 near-endemic species. Currently, the centre is under considerable pressure from mining activities and population (and associated infrastructure) growth (Siebert, 2001).

## *4.2 Ground-truthed vegetation characteristics*

Based on the results of the field investigation of November 2022, two broad habitat units were distinguished for the study area:

- **Degraded Bushveld Habitat:** low-lying habitat comprising of loose, sandy soils that support a species-poor floral community that is dominated by *Dichrostachys cinerea*; and
- **Modified Habitat**: habitat that was associated with areas in which little to no vegetation structure can be assigned to the floral communities, i.e., associated with areas of historic clearing and/or excavation activities (in which habitat has subsequently started to recover, although floral communities are still largely absent and species-poor)), or areas of current utilisation, e.g., informal, gravel roads are present within the study area. However, these have not been mapped given the small extant thereof. Larger modified features (e.g., historic excavation areas) were however mapped.

For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, refer to Section 4.3. Figure 15 depicts the extent of the habitats within the study area.

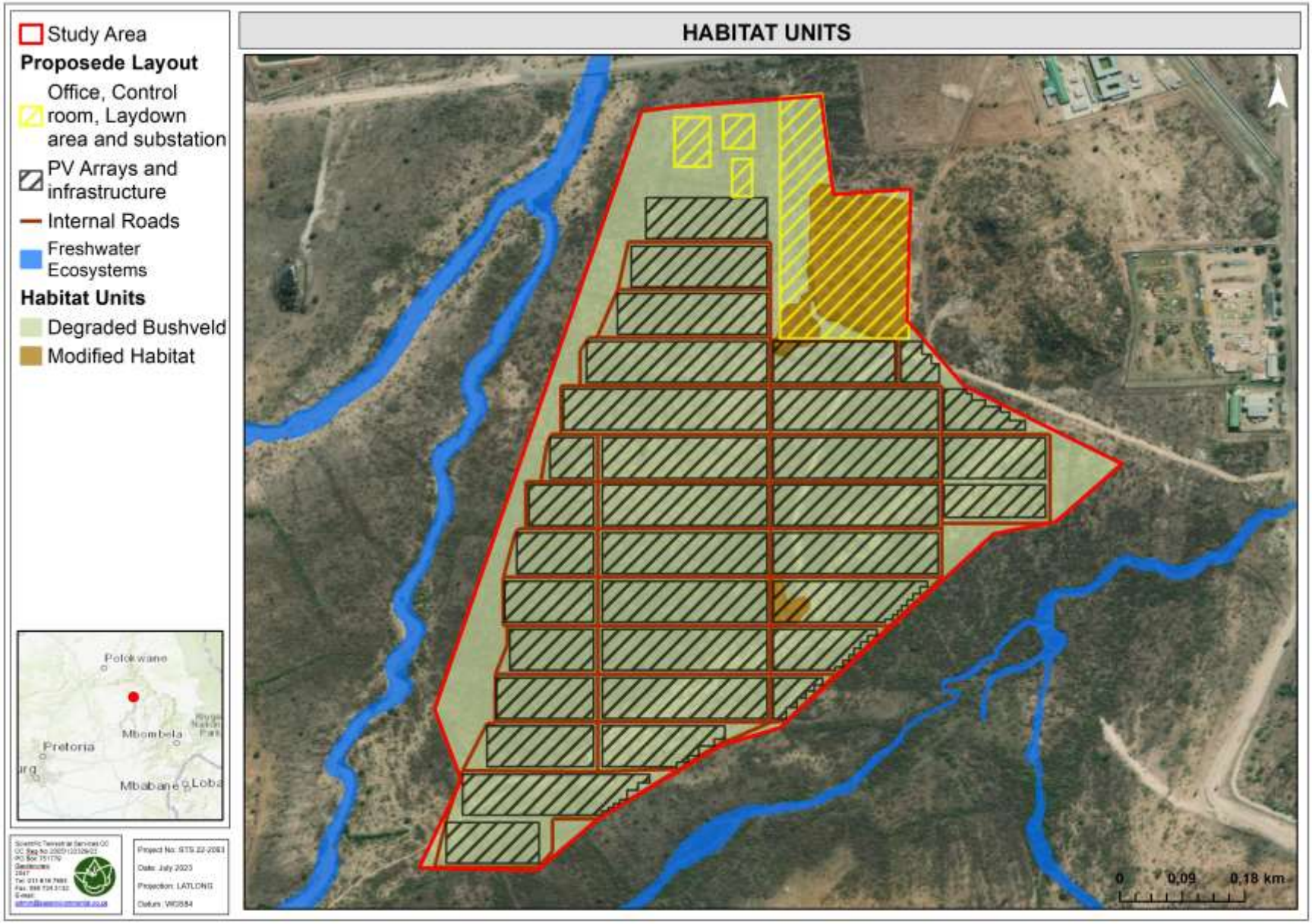


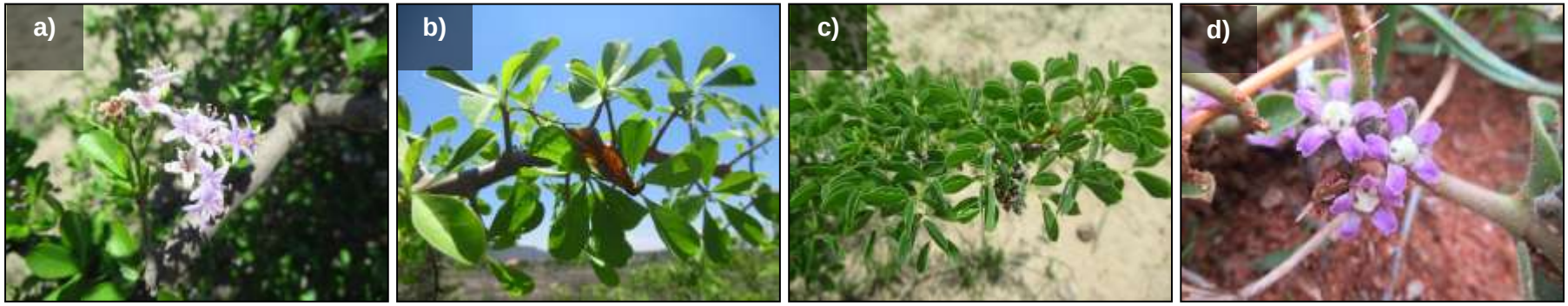

**Figure 15: Map illustrating the habitat units associated with the study area. Surrounding Freshwater features have been mapped for visual aid (they do not form part of the habitat discussion and impact assessment as the provided layouts are outside of the associated buffers).**

## 4.3 Floral Assessment Results

**HABITAT OVERVIEW**

The two broad habitat units identified within the study area included i) Degraded Bushveld and ii) Modified Habitat (discussed in more detail below). Refer to the photographs below for a visual representation of the habitat units and examples of species recorded within these habitats. Overall, species diversity across the study area ranged from moderately low (Degraded Bushveld Habitat), to low (Modified Habitat). Refer to Appendix G for a list of species recorded in these habitat units.


**Photographs: a-b) landscape associated with the Degraded Bushveld (i.e., poorly developed grassy layer with an established tree layer, dominated by thorny species, including *Dichrostachys cinerea* and *Senegalia mellifera* subsp. *detinens*), and c) typical Modified Habitat associated with the study area (i.e., bare ground in which a low floral abundance and diversity was supported).**




**Photographs: a) *Ehretia rigida* (in flower; a typical woody species recorded within the Degraded Bushveld), b) *Terminalia prunioides* (in fruit; a dominant tree recorded across the study area), c) *Senegalia mellifera* subsp. *detinens* (an encroacher species occasionally recorded within the study area), and d) *Raphionacme hirsuta* (in flower; an infrequently recorded herbaceous species within the Degraded Bushveld Habitat).**

| | |
|---|---|
| **Degraded Bushveld** | This habitat was the largest habitat recorded within the study area (approx. 91 ha). The habitat is not unique and is well represented within the greater surrounding areas. Overall, the habitat supported a moderately low floral diversity.<br><br>The Degraded Bushveld habitat supported a poorly developed **graminoid layer**; bare soils were recorded at a high incidence throughout the habitat. The low abundance and diversity of the graminoid layer is likely attributed to the intensity of grazing pressures within the habitat unit (i.e., the habitat is open and thus easily accessible to surrounding communities). Typical graminoid species recorded included *Aristida congesta* subsp. *congesta*, *Cynodon dactylon, Eragrostis rigidior, Heteropogon contortus,* and *Urochloa mosambicensis.* The **woody-layer** is well established although species poor and dominated by thorny encroacher species, including *Dichrostchays cinerea* and *Senegalia mellifera* subsp. *detinens*. Other species recorded within the habitat unit included *Ehretia rigida*, *Euclea crispa*, and *Ziziphus mucrontata.* The **herbaceous layer** was poorly represented, although generalist species (e.g., *Aptosimum lineare, Commicarpus pentandrus, Raphionacme hirsuta, Senna italica* subsp. *arachoides,* and *Tribulus terrestris*) were infrequently recorded. **Succulent species** were recorded within the habitat, albeit not prominently; succulent species recorded within the habitat included *Aloe cryptopoda, Eucphrobia tirucalli,* and *Kleinia longiflo*ra.<br><br>The habitat supported several alien and invasive plant (AIP) species, although the abundance thereof was moderately low. AIPs recorded within the habitat included *Agave sisalana, Bidens pilosa, Opuntia ficus-indica, Tagetes minuta*, and *Zinnia peruviana.*<br><br>The Degraded Bushveld habitat is surrounded by human settlements and/or current mining operations and thus has been exposed to high levels of anthropogenic influences (including wood harvesting, AIP proliferation, woody encroachment, severely altered fire, and herbivory regimes, etc.,). These anthropogenic activities have resulted in the habitat having a poor[10] ecological integrity. Given the level of anthropogenic influence and the current species poor floral communities of the Degraded Habitat, the habitat is not considered to be representative of the Sekhukhune Plains Bushveld (i.e., the reference vegetation type), in terms of either species composition and/or structure. Furthermore, given the level of anthropogenic influence and the lack of similarity to the reference vegetation type, the habitat is not considered to provided characteristic habitat of the threatened ecosystem, namely the EN Sekhukhune Plains Bushveld ecosystem. |
| **Modified Habitat** | This habitat unit was located in small, scattered sections within the western, eastern, and central areas of the study area (approx. 4.5 ha). This habitat was associated with areas in which little to no vegetation was present, i.e., associated with areas of historic clearing and/or excavation activities (in which habitat has subsequently started to recover, although floral communities are still largely absent and species poor)), or areas of current utilisation, e.g., roads (informal gravel roads).<br><br>The habitat is in a poor ecological condition and supports a homogenous vegetation community of low floristic diversity. The habitat was largely characterised by bare soils in which a low abundance and diversity of floral species were recorded. When present, floral communities were represented by a low abundance and diversity of grasses (e.g., *Aristida congesta* subsp. *congesta,* and *Melinis repens*), woody species (e.g., *Dichrostchays cinerea, Gomphocarpus fruitcosus,* and *Senegalia mellifera* subsp. *detinens*), and herbaceous species (e.g., *Senna italica* subsp. *arachoides*). When vegetation was recorded, AIP species were recorded in a higher abundance than native species. AIP recorded included *Argemone ochroleuca, Hibiscus trionum,* and *Senna didymobotrya.*<br><br>Given the level of transformation that has occurred within this habitat, and the low floral diversity and abundance, this habitat is not considered to be representative of either the reference vegetation type or the threatened ecosystem. |
| **VEGETATION STRUCTURE** | |
| **Degraded Bushveld** | **Modified Habitat** |

[10] Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition.

| | |
|---|---|
| The vegetation structure can be described as **semi-open to open woodland** (as per Figure C1 in Appendix C).<br><br>The presence of indigenous vegetation[11] was confirmed within the Degraded Bushveld. | Little to no vegetation structure can be assigned to the floral communities as they have shifted away significantly from the reference vegetation type.<br><br>The presence of indigenous vegetation was confirmed within the Modified Habitat (as clearance occurred > 10 years ago). |

**SPECIES OF CONSERVATION CONCERN (SCC)**

In terms of Section 56 of the NEMBA, Red Data Listed (RDL) species are those considered to be CR, EN, VU or Protected (P) categories of ecological status. Near-threatened (NT) species, are not considered RDL species, however, are still considered to be of increased conservation importance; these species are thus also considered as part of the SCC assessment.

The screening tool indicated that the study area is in an area of **low** and **medium sensitivity** from a Plant Species Theme perspective; triggering species included *Asparagus sekhukhuniensis* (EN), *Asparagus fourei* (VU), *Polygala sekhukhuniensis* (VU), *Searsia batophylla* (VU), Sensitive species 1033[12] (EN), and Sensitive species 1252 (VU).

No RDL species were recorded within the habitat during the field assessment; however no suitable habitat to support RDL species was identified within the study area. As no suitable habitat to support RDL species was identified within the Degraded Bushveld and Modified Habitats, the medium sensitivity for the Plant Species Theme as assigned by the screening tool was supported not supported within these habitats. Thus, a low sensitivity is instead recommended for the Degraded Bushveld and the Modified Habitat. The Probability of Occurrence Calculations (POC) of threatened species (including RDL and NT species) is provided below:

- Degraded Bushveld & Modified Habitat:
  - None.

The Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) provides a list of Specially Protected Plants (Schedule 11) and Protected Plants (Schedule 12) for the Limpopo Province. These species were also considered as part of the SCC assessment for the study area because they are considered important provincially. The POC of provincially protected species/genera/families' species is provided below:

- Degraded Bushveld Habitat:
  - ***Aloe cryptopoda* (POC = Confirmed; Status = LC);**
  - *Heurnia spp.* (POC = High; Status = species specific);
  - Orchidaceae Family (POC = High, Status = NA);
  - *Scadoxus puniceus* (POC = High; Status = LC);
  - Species within the *Orbea* genera (POC = High; Status = NA);
  - *Stapelia* spp. (POC = High; Status = species specific); and
  - *Elephantorrhiza praetermissa* (POC = Medium; Status = LC).
- Modified Habitat:
  - *Aloe cryptopoda* (POC = Medium; Status = LC); and
  - *Heurnia* spp. (POC = Medium; Status = species specific).

Additionally, several protected tree species, as per the NFA, were included in the SCC assessment. The POC for species within the habitat are provided below:

- Degraded Bushveld Habitat:

[11] **The NEMA Listing Notice definition of indigenous vegetation**: "Indigenous vegetation: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years.

[12] According to the best practice guidelines provided by SANBI, the name of sensitive species provided by the Online EIA screening tool may not appear in the final EIA report nor any of the specialist reports released into the public domain. This is to protect species that are under threat to factors such as illegal harvesting and overexploitation.

- ***Boscia albitrunca* (POC = Confirmed; Status = LC);**
- ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);**
- *Balanites maugamii* (POC = High; Status = LC);
- *Berchemia zeyheri* (POC = High; Status = LC);
- *Catha edulis* (POC = Medium; Status = LC); and
- *Philenoptera violacea* (POC = Medium; Status = LC).

➢ Modified Habitat:

- *Boscia albitrunca* (POC = Medium; Status = LC); and
- *Sclerocarya birrea* subsp. *caffra* (POC = Medium; Status = LC).

The Threatened or Protected Species (TOPS) List as per GN 3009: Regulations Pertaining to Threatened or Protected Terrestrial Species and Freshwater Species in Government Gazette 47984 dated 3 February 2023, as it relates to the NEMBA. Species as per the TOPS List that have the potential to be recorded within the habitat include:

➢ Degraded Bushveld Habitat:

- *Harpagophytum procumbens* (POC = High; Status = LC).

➢ Modified Habitat:

- *Harpagophytum procumbens* (POC = Medium; Status = LC).

Permits from the Limpopo Economic Development, Environmental and Tourism (LEDET) and authorisation from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

Refer to **Appendix H** for the complete floral SCC assessment results.

**PRESENCE OF UNIQUE LANDSCAPES**

Only small sections within the eastern part of the study area are located within the following biodiversity features (these features include the triggered landscape features that contribute to the very high sensitivity for the Terrestrial Biodiversity Theme as identified by the screening tool):

- **ESA1 -** Category 1 ESAs comprise of natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes. The habitat(s) that overlapped with ESA1 habitat included the Degraded Bushveld Habitat. The Degraded Bushveld Habitat is not considered to provide functioning ESA1 habitat (i.e., habitat that is capable of supporting CBA habitat by maintaining ecological processes (e.g., connectivity, recruitment, community dynamics, etc.)) because of the poor ecological integrity thereof, deviation from the reference vegetation type, and lowered capacity to support SCC).
- **ESA2 -** Category 2 ESAs are areas no longer intact but potentially retain significant importance from a process perspective (e.g., maintaining landscape connectivity). The habitat(s) that overlapped with ESA2 included the Degraded Bushveld. Despite the largely modified nature of the Degraded Bushveld and the degree of anthropogenic influences experienced within the habitat, the propensity of the habitat to contribute to basic landscape functions (e.g., connectivity, recruitment, community dynamics, etc.) is confirmed; thus, the presence of functioning ESA2 habitat (albeit modified) was confirmed within the Degraded Bushveld.

Other unique habitat features within the study area:

- **Within the Sekhukhune Centre of Endemism –** several endemic and/or near-endemic species were recorded within the study area.

Triggering features included the presence of ESA1s and ESA2 habitats. The presence of functioning ESA2 habitat was confirmed within the Degraded Bushveld Habitat; thus, the very high sensitivity as assigned by the screening tool to the Terrestrial Biodiversity Theme was supported within the Degraded Bushveld. The very high sensitivity for the Terrestrial Biodiversity Theme as assigned by the screening tool was not supported within the Modified Habitat. Thus, a low sensitivity is instead recommended for the Modified Habitat.

**CONCLUDING REMARKS**

The study area is associated with a range of habitat types that were delineated according to differences in (1) species composition and vegetation structure, (2) ratio of AIPs vs native floral species, (3) legal reference such as definitions of "indigenous vegetation" and "watercourses", and (4) the presence of floral SCC and potential for the habitat unit to support viable populations of floral SCC. The identified habitats range in species richness and habitat integrity, which have resulted in these habitats obtaining varying ecological sensitivities (from a floral perspective, refer to Section 5 for details).

Key considerations:

- Across the study area, SCC were recorded and/or have a high-to-medium POC within the various habitats. Prior to the commencement of any development or construction activities, a walkdown of the proposed study area will be required. During the walkdown all SCC must be marked for potential rescue and relocation to suitable habitat outside the direct footprint (as far as is feasible). Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Permits from the LEDET and authorisation from the DFFE should be obtained to relocate, remove, cut, or destroy any of the protected and/or threatened species (e.g., RDLs, LEMA, NFA, and TOPS) before any vegetation clearing may take place. During the walkdown, if any threatened species are identified, the recommendations as per the SANBI Red List should be followed. Large trees, which are difficult to relocate, will need to be destroyed. The proponent could advocate to plant more of the same species in nearby areas as a compensation (liaison with the permitting authorities will be required).

- Plant Species Theme: as no suitable habitat to support RDL species was identified within the Degraded Bushveld and Modified Habitats, the medium sensitivity for the Plant Species Theme as assigned by the screening tool was not supported within these habitats. Thus, a low sensitivity is instead recommended for the Degraded Bushveld and the Modified Habitat.

- Terrestrial Biodiversity Theme: triggering features included the presence of ESA1s and ESA2 habitats. The presence of functioning ESA2 habitat was confirmed within the Degraded Bushveld Habitat; thus, the very high sensitivity as assigned by the screening tool to the Terrestrial Biodiversity Theme was supported within this habitat. The very high sensitivity for the Terrestrial Biodiversity Theme as assigned by the screening tool was not supported within the Modified Habitat. Thus, a low sensitivity is instead recommended for the Modified Habitat.

- Due to the area already being exposed to disturbances and edge effect impacts from both the neighbouring settlements as well as the mine, the habitat units are susceptible to bush encroachment (particularly the Degraded Bushveld) and AIP proliferation (all habitats). Care must be taken to limit edge effects of these phenomena within the habitat units and on the surrounding natural areas. Furthermore, it is recommended that a bush encroachment and an AIP species management plan be developed to manage encroachment and AIP proliferation within the proposed development area and immediate surrounding areas.

## 4.4 Faunal Assessment Results

**Selected examples of faunal habitat and species recorded within the Study Area**

**Photos:** Images depicting the dominant faunal habitat of the study area.

**Fauna recorded on site from left to right:** *Anacridium moestum* (Tree Locust), *Anoplocnemis* sp (Twig Wilters), Family Agelenidae (Grass Funnelweb Spider) and *Mylabris oculata* (CMR Beetle)

## Faunal Habitat Overview

The faunal habitat within the study area has been notably degraded as a result of anthropogenic activities stemming from the local community, adjacent mining and overgrazing. This has led severe woody species encroachment throughout much of the study and a notable loss of herbaceous layer. The largely homogenous woody structure and lack of herbaceous material has resulted in a notable loss of food resources for fauna, limiting the breadth of faunal species able to occupy the study area. The habitat degradation, decreased habitat suitability and lack of niche habitats has resulted in a significant loss of faunal species abundances and diversity. Ecological connectivity has also been impacted upon as a result of the development of mines and the expansion of housing in the local area. Although no development has taken place as of yet within the study area, faunal species are unlikely to move from neighbouring areas of increased habitat suitability, through the communities to access the study area itself. The study area may at times be used as a transitory area (movement corridor), however this is likely to be less common, notably as habitat degradation in the surrounding area occurs at an increasing rate.

No mammal activity or signs of mammal presence were noted within the study area. The presence of surrounding communities and associated domestic dogs and cats are likely to have led to this decline, through uncontrolled predation of mammals. Invertebrate species were observed in limited abundance and diversity throughout the study area. This is likely attributable to the limited breadth of available food resources, with only a limited number of insects able to feed on the herbaceous material available, which in turn limits available food resources for arachnid species.

In terms of faunal species occurrences, it is considered possible that *Lepus saxatilis* (Scrub hare) and Duiker (*Sylvicapra grimmia*) may traverse or sporadically make use of the study area, though these species are unlikely to occur therein on a permanent basis. No reptile species were noted during the field investigation, however, common species such as *Trachylepis varia* (Variable Skink) are likely to occur throughout. Amphibian abundances and diversity are expected to be low due to the lack of suitable habitat and food resources. The freshwater habitat located outside of the study area is largely ephemeral and due to increased erosion, incision of the channels and lack of permanent surface water, provides limited areas where ponding may. These factors further limit breeding opportunities for even the hardiest water independent amphibian species, as they rely on these temporary ponds for mating and egg laying.

Overall, limited faunal species were observed, and given the condition of the habitat, faunal utilisation of the study areas is expected to be limited, and the study area is unlikely to form part of any important movement corridors.

## FAUNAL SCC

During the site assessment, no faunal SCC were observed. As part of the background studies, the National Screening Tool was consulted in terms of potentially occurring SCC, with the following species being listed with a medium sensitivity for the study area: *Crocidura maquassiensis (*Makwassie musk shrew (**VU**)*), Aroegas fuscus* (Brown False Shieldback (**EN**)) and *Kinixys lobatsiana* (Lobatse hinge-backed tortoise (**VU**)). Taking into account the degraded state of the habitat, increased anthropogenic activities, lack of suitable food resources and limited habitat connectivity, it is considered unlikely that these three, and any other faunal SCC will make use of or be reliant on the study area.

## CONCLUDING REMARKS

Habitat availability within the study area has been compromised largely due to the homogenous and encroached nature of the vegetative structure. The lack of structural diversity and importantly, a viable herbaceous layer limits faunal species habitation and available food resources.

Key considerations:

- No faunal SCC were observed during the site assessment. Further investigation have determined that it is unlikely that faunal SCC will reside within the study area.
- Animal Species Theme: A medium sensitivity was assigned to the study area, however given the unsuitability of the habitat and lack of food resources for SCC, this theme is not supported.
- It is advised that infrastructure placement and construction activities remain within the designated footprint areas and do not encroach upon the regulated zones of the freshwater habitat.

## 4.5 Alien and Invasive Plant (AIP) Species

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation[13]. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to "escape" from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that South Africa's diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

### 4.5.1 Legal Context

South Africa has released several articles of legislation that are applicable to the control of alien species. Currently, invasive species are controlled by the NEMBA – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 October 2020. AIP species defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

- **Category 1a** species are those targeted for urgent national eradication;
- **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g., invasive tree species can still be used in commercial forestry, providing a permit is issued that specifies where they may be grown and that permit holders "*Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3*"); and
- **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be considered a Category 1b species if they occur in riparian zones.

Duty of care related to listed invasive species are referred to in NEMBA Section 73[14]. The motivation for this duty of care is both environmentally and economically driven. Management

[13] Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 October 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).
[14] Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-

of alien species in South Africa is estimated to cost at least ZAR 2 billion (US$142 million) each year - this being the amount currently spent by the national government's DFFE - i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

### 4.5.2 Site Results

A total of 16 AIP species were recorded within the study area. Of the 16 AIP species recorded within the study area, nine species are listed under NEMBA category 1b, and two species are listed under NEMBA Category 2. The remaining five species are not currently listed in the NEMBA Alien and Invasive Species List of 2020 and thus are not regarded as invasive species. However, several of these species are rather seen as problem plants, especially *Bidens pilosa, Tagetes minuta*, and *Zinnia peruviana*. Although these species may not pose an immediate risk of displacing native flora, they can become problematic after disturbance events and due to their pioneering nature, will colonise disturbed habitat more readily than native flora. It is recommended that the study area be targeted for AIP control. Refer to table 3 for more details on the AIPs recorded within the study area.

**Table 2: Alien and invasive alien species associated with the study area.**

| SCIENTIFIC NAME (COMMON NAME, ORIGIN) | NEMBA CATEGORY | DEGRADED BUSHVELD | MODIFIED HABITAT |
|---|---|---|---|
| **Woody Species** | | | |
| *Lantana camara* (Common Lantana, American tropics) | 1b | | x |
| *Ricinus communis* (Castor bean, Africa) | 2 | x | x |
| *Senna didymobotrya* (Peanut butter cassia, Africa) | 1b | | x |
| **Herbaceous Speices** | | | |
| *Argemone Mexicana* (Mexican prickly poppy), Mexico | 1b | x | |
| *Argemone ochroleuca* (Mexican poppy, Mexico) | 1b | x | x |
| *Bidens pilosa* (Blackjack, South America) | NL | x | x |
| *Flaveria bidentis* (Smelter's bush, South America) | 1b | x | x |
| *Gomphrena cetosoides* (Globe Amaranth flower, Central America) | NL | x | x |
| *Hibiscus trionum* (Flower-of-an-hour, Old World tropics) | NL | x | |
| *Solanum elaeagnifolium* (Silverleaf nightshade, Americas) | 1b | x | x |
| *Vinca major* (Greater periwinkle, Mediterranean) | 1b | x | x |

a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and
c) take all the required steps to prevent or minimise harm to biodiversity.

| SCIENTIFIC NAME (COMMON NAME, ORIGIN) | NEMBA CATEGORY | DEGRADED BUSHVELD | MODIFIED HABITAT |
|---|---|---|---|
| *Xanthium strumarium* (Large cocklebur, North Amercia) | 1b | x | x |
| *Tagetes minuta* (Khakibos, South America) | NL | x | x |
| *Zinnia peruviana* (Peruvian zinnia, Peru) | NL | x | |
| **Succulent Species** | | | |
| *Agave sisalana* (Sisal, Mexico) | 2 | x | x |
| *Opuntia ficus-indica* (Prickly Pear, Mexico) | 1b | x | x |

# 5 SENSITIVITY MAPPING

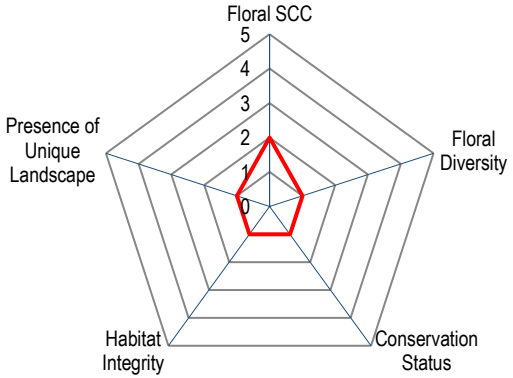
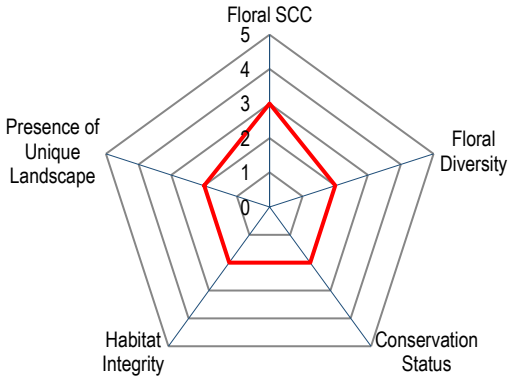
The Screening Tool identified the study area to be in (1) areas of **low** and **medium sensitivity** for the Plant Species Theme, (2) areas of **medium sensitivity** for the Animal Species Theme, and (3) areas of **low** and **very high sensitivity** area for the Terrestrial Biodiversity Theme. Based on the *ground-truthed* results of the site visit, the following was established for each theme:

- Terrestrial Biodiversity Theme: the very high sensitivity as assigned by the screening tool to the Terrestrial Biodiversity Theme was supported within the Degraded Habitat (ESA2 habitat present);
- Plant Species Theme: no suitable habitat to support RDL species was identified within the study area. As no suitable habitat to support RDL species was identified within the Degraded Bushveld and Modified Habitats, the medium sensitivity for the Plant Species Theme as assigned by the screening tool was supported not supported within these habitats. Thus, a low sensitivity is instead recommended for the Degraded Bushveld and the Modified Habitat.; and
- Animal Species Theme: Increased habitat disturbance and anthropogenic activities has led to the increased suitability of the habitat within the study area for faunal species. As such, the medium sensitivity of the animal species theme for this triggered species is not supported.

Table 3 and 4 below presents the sensitivity of each identified habitat unit for flora and fauna along with an associated conservation objective and implications for development. Figures 16 and 17 conceptually illustrate areas of ecological sensitivity – depicting the sensitivity for flora and fauna respectively. The study area is depicted according to its sensitivity in terms of the

presence or potential for SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity.

**Table 3: A summary of the floral sensitivity of each habitat unit and implications for development.**

| HABITAT SENSITIVITY | CONSERVATION OBJECTIVE | HABITAT UNIT | KEY HABITAT CHARACTERISTICS |
|---|---|---|---|
| Low   | Optimise development potential. | Modified Habitat | - Indigenous floral diversity was low.<br>- Vegetation largely lacking, homogenous and / or AIP species present.<br>- Floral SCC are lacking – although medicinally/culturally important species (NFA protected) are present within the Modified Habitat. The potential for the habitat to support viable populations of other SCC, or the establishment of new SCC individuals is deemed low.<br>- No significant biodiversity features (e.g., ESA1s or ESA2s) present. |
| Moderately low   | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. | Degraded Bushveld Habitat | - Indigenous vegetation present.<br>- Habitat has been degraded (i.e., encroached) due to historic anthropogenic disturbances.<br>- The floral communities have shifted away from the reference vegetation type.<br>- Several floral SCC (e.g., LEMA and NFA protected species) are present within this habitat and the potential for the habitat to support viable populations of SCC is deemed moderately low.<br>- Owing to the large deviation from the reference vegetation type and thus lowered capacity to support SCC, important biodiversity features such as ESA1 habitat are absent. However, ESA2 habitat was confirmed for the habitat. |

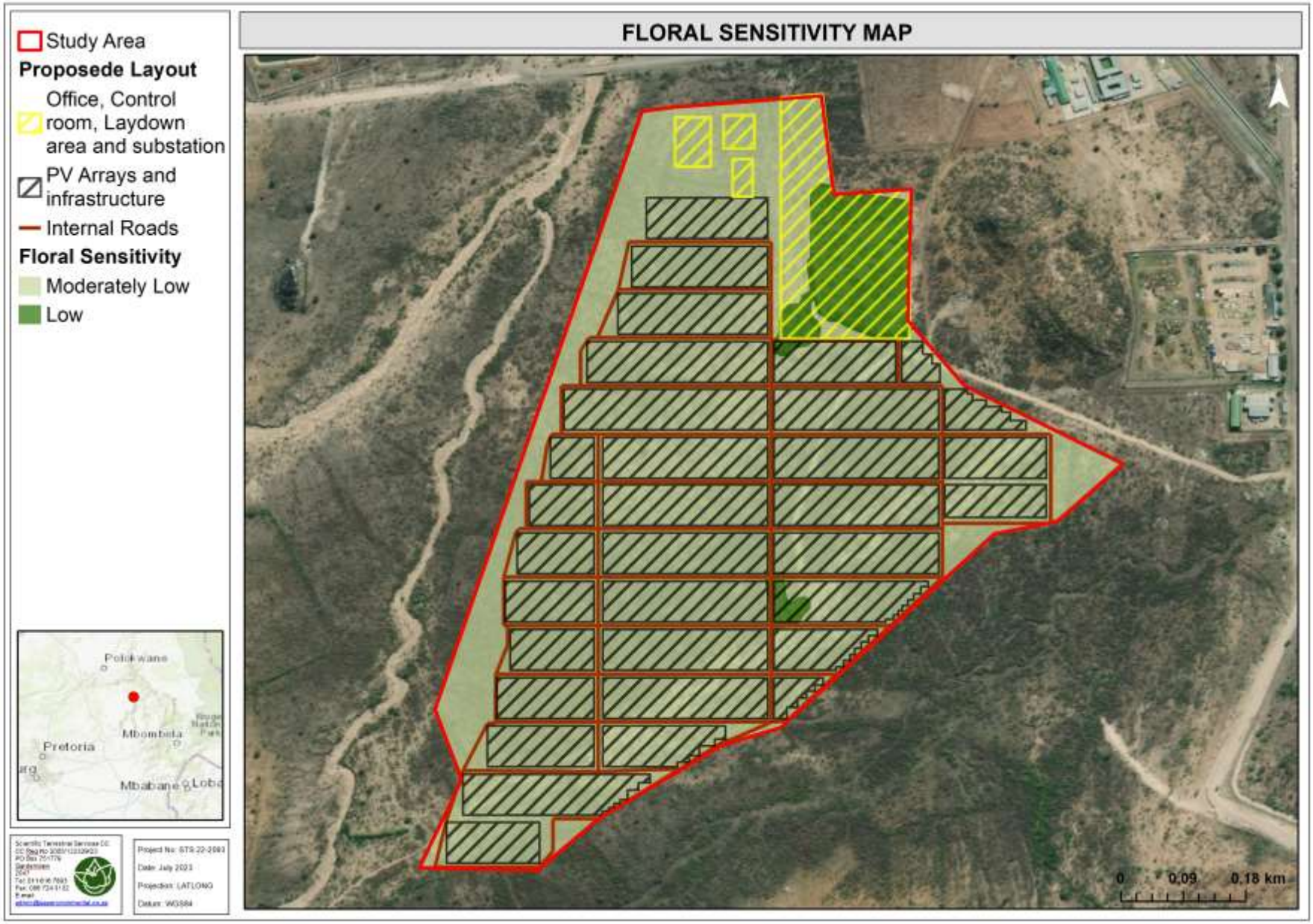
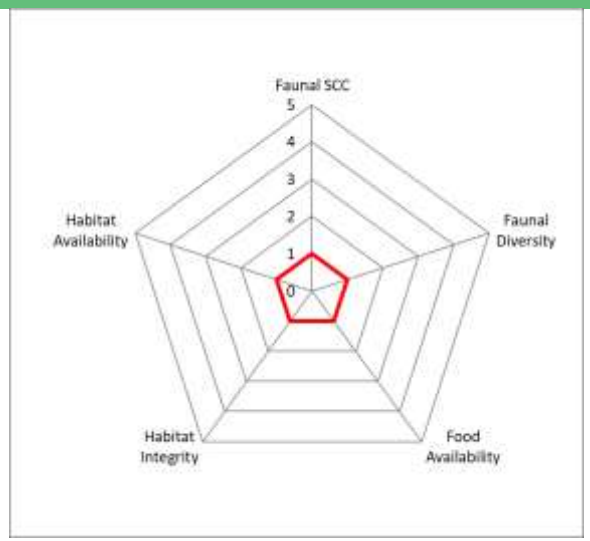
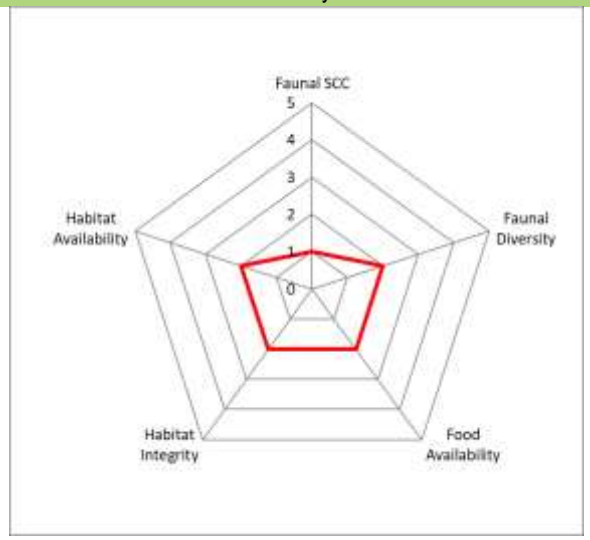



**Figure 16: Floral sensitivity of the study area.**

**Table 4: A summary of the faunal sensitivity of each habitat unit and implications for development.**

| HABITAT SENSITIVITY | CONSERVATION OBJECTIVE | HABITAT UNIT | KEY HABITAT CHARACTERISTICS |
|---|---|---|---|
| Low   | Optimise development potential. | Modified Habitat | - Limited habitat for common faunal species as well as SCC.<br>- Habitat degradation has resulted in a low level of food resource availability;<br>- No faunal species were observed within this habitat unit during the assessment.<br>- Limited ecological functioning. |
| Moderately low   | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. | Degraded Bushveld Habitat | - Heavily encroached across much of the habitat with a homogenous woody layer.<br>- Limited to no herbaceous layer decreasing food resource availability and cover for smaller terrestrial species.<br>- Lack of heterogeneity in the woody layer limits food resources and structural diversity, limiting habituating provisioning for different faunal species. |

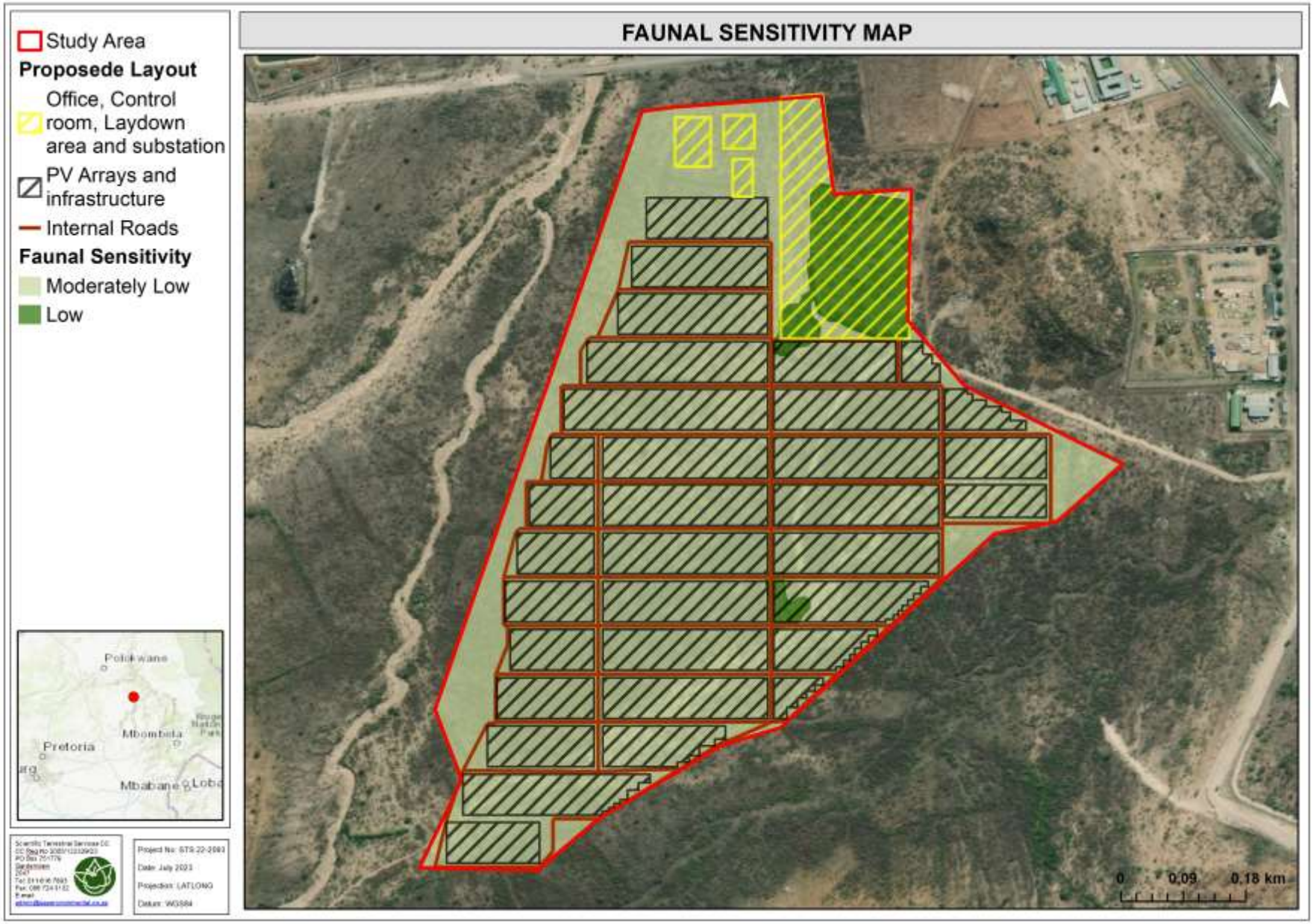



**Figure 17: Faunal sensitivity of the study area.**

# 6 IMPACT ASSESSMENT

The following sections and associated tables define and discuss the perceived impacts associated with the terrestrial ecology of the study area, according to the method described in Appendix E (as provided by the proponent).

An impact discussion and assessment of all potential i) Construction Phase, and ii) Operational & Maintenance Phase impacts are provided in Section 6.2. For the impact assessment, it is assumed that the Solar PV Plant will not be decommissioned when the mine goes into its closure phase. All mitigatory measures required to minimise the perceived impacts are presented in Section 6.4.

## *6.1 Impact Assessment Tables*

The below section provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented (**Section 6.4)**. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The tables below provide the results of the terrestrial biodiversity impact assessment for flora and fauna respectively. A discussion is provided for flora and fauna separately in **Sections 6.2** and **6.3** respectively.

Proposed development activities:

The proposed PV facility will include the construction of PV panels and associated infrastructure including internal roads, offices, control room, laydown area and substation (Figure 3). At the time of assessment, a BESS was proposed; although it is not known if the proponent will make use of such technology. Furthermore, the battery type (Sodim Sulphur Battery, Lithium Ion Battery, Redox (Vanadium) Flow Battery, etc)) and location of the BESS was not known. It is however, assumed that the BESS (if utilised will be within the study area footprint). The impact assessment has been undertaken under the assumption that the remaining areas were the BESS could be placed (within the footprint area) will be cleared and transformed (as no location has been provided for such infrastructure).

## 6.2 Floral Impact Assessment

The below tables indicate the perceived risks to the floral ecology associated with all phases of the proposed development. The tables below present the perceived impact on each of the habitat units for the i) Construction Phase, and ii) Operational & Maintenance Phase associated with the proposed infrastructure development in terms of floral species loss, both prior to and post-mitigation measures.

This impact assessment was undertaken with a focus (for each habitat unit) on 1) impacts to habitat and species diversity, and 2) impacts to SCC. Given the degraded nature of the Degraded Bushveld and Modified Habitat, together with the fact that the Modified habitat is located within Degraded Bushveld, the associated impacts on these habitats have been grouped.

### 6.2.1 IMPACT: Loss of Floral Habitat and Species Diversity in the Degraded Bushveld & Modified Habitat units during the Construction Phase.

The Degraded Bushveld is of moderately low floral sensitivity and the Modified Habitat is of low floral sensitivity. Neither of these habitat units were considered to be representative of the reference vegetation type (because of anthropogenic activities).

**Impacts Associated with the Construction Phase**: this phase will result in the direct and indirect impacts to the associated habitats:

- Direct Impacts: clearing of vegetation for the proposed solar PV facility (including associated infrastructure). This will lead to the loss of floral species in these habitats; and
- Indirect Impacts: Furthermore, the loss of favourable floral habitat and species diversity within as well as outside of the direct development footprint may result during the construction phase if:
    i. Potential failure to demarcate sensitive habitat (e.g., surrounding Freshwater Habitat) occurring outside of the direct project footprint as “No-Go” areas before construction commences, resulting in unnecessary habitat and species lost within the surrounding areas;
    ii. Fire frequency and intensity increases because of construction activities;
    iii. Edge effects are poorly managed, including ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to the continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas (may result in the alteration of floral habitat and/or the compaction of soils outside of the study area);

iv. Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs;

v. Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[15] and potentially further decreasing optimal growing /re-establishing conditions; and

vi. Indiscriminate driving of construction vehicles through natural vegetation is not managed. Vehicles must remain within designated roads only.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be medium (for both direct and indirect impacts), and ii) post mitigation is expected to be low and very low for direct and indirect impacts respectively (Table 5).

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

**Table 5: Impact on the floral habitat and diversity from the proposed development activities within the DEGRADED BUSHVELD and MODIFIED HABITAT for the CONSTRUCTION PHASE.**

| Description of Impact | | | | |
|---|---|---|---|---|
| **Type of Impact** | Direct | | Indirect | |
| **Nature of Impact** | Negative | | Negative | |
| **Phases** | Construction | | Construction | |
| **Criteria** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Moderate change (Medium) | Minor change (Low) | Moderate change (Medium) | Minor change (Low) |
| **Duration** | Permanent (> 20 years) | Permanent (> 20 years) | Short-term (1 to 5 years) | Short-term (1 to 5 years) |
| **Extent** | Whole site and nearby surroundings | Whole site and nearby surroundings | Whole site and nearby surroundings | Whole site and nearby surroundings |
| **Consequence** | Medium | Low | Medium | Low |
| **Probability** | Definite / Continuous (Very high) | Definite / Continuous (Very high) | Probable (High) | Possible / frequent (Medium) |
| **Significance** | **Medium -** | **Medium -** | **Medium -** | **Very Low -** |
| **Additional Assessment Criteria** | | | | |
| **Degree to which impact can be reversed** | Not reversable: direct habitat transformation will occur regardless of mitigation measure implementation. | | Partially reversable: The impact can be managed in the construction phase and partially reversed during the operational phase if management measures are put in place and strictly adhered to | |
| **Degree to which impact may cause irreplaceable loss of resources** | High (i.e., loss of ESA 2 habitat in Degraded Bushveld) | | Medium (edge effects may continue to result in habitat loss within surrounding areas) | |
| **Degree to which impact can be avoided** | Low | | Medium | |
| **Degree to which impact can be mitigated** | Low (direct habitat transformation will occur regardless of mitigation measure implementation) | | High provided mitigation measures are strictly implemented | |
| **Cumulative Impact** | | | | |
| **Extent to which a cumulative impact may arise** | Likely | | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| | **Medium -** | **Low -** | **Medium -** | **Low -** |

### 6.2.2 IMPACT: Loss of Floral SCC in the Degraded Bushveld and Modified Habitats during the Construction Phase.

The Degraded Bushveld is of moderately low floral sensitivity and the Modified Habitat is of low floral sensitivity. Suitable habitat for SCC was available within these habitats, albeit not extensively.

**Impacts Associated with the Construction Phase**: this phase will result in the direct and indirect impacts to the associated habitats in terms of SCC:

- Direct Impacts: clearing of vegetation for the proposed solar PV facility (and associated infrastructure). This will lead to the loss of floral SCC (e.g., *Aloe cryptopoda, Boscia albitrunca*, and *Sclerocarya birrera* subsp. *caffra*) within these habitats; and
- Indirect Impacts: Furthermore, the loss of favourable SCC floral habitat and SCC diversity within as well as outside of the direct development footprint may result during the construction phase. The following impacts are anticipated for SCC:
    i. Loss of SCC because of failure to conduct a floral walk through of the study area prior to the commencement of construction activities and identify species for possible rescue and/or relocation activities;
    ii. Failure to comply with national and regional legislation regarding permit applications for the potential removal, destruction, and/or relocation of floral SCC and/or protected floral species (nationally and provincially) within footprint areas (depending on the outcome of the walkdown);
    iii. Failure to conduct rescue and relocation activities prior to the commencement of construction activities leading to a loss of SCC;
    iv. A loss of SCC during failure to monitor the success of relocation activities occurs;
    v. Over exploitation through the removal and/or collection of SCC beyond the direct footprint which will result in the loss of SCC abundance and diversity;
    vi. Potential failure to demarcate sensitive habitat (e.g., surrounding Freshwater Habitat) occurring outside of the direct project footprint as “No-Go” areas before construction commences resulting in unnecessary habitat and species lost within the surrounding areas;
    vii. Additional pressures associated with increased human presence within the study area resulting in an increase in the potential spread of AIP species which could result in the loss of SCC individuals and associated habitat; and
    viii. Poorly managed edge effects - including ineffective rehabilitation of bare areas and the subsequent spread of AIP species into surrounding areas which may result in the degradation of habitat and SCC individuals.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be low and very low for the direct and indirect impacts respectively, and ii) post mitigation is expected to be low and very low for direct and indirect impacts respectively (Table 6).

**Table 6: Impact on the floral SCC from the proposed development activities within the DEGRADED BUSHVELD & MODIFIED HABITAT for the CONSTRUCTION PHASE.**

| **Description of Impact** | | | | |
|---|---|---|---|---|
| **Type of Impact** | Direct | | Indirect | |
| **Nature of Impact** | Negative | | Negative | |
| **Phases** | Construction | | Construction | |
| **Criteria** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Minor change (Low) | Negligible change (Very low) | Minor change (Low) | Negligible change (Very low) |
| **Duration** | Medium-term (5 to 10 years) | Short-term (1 to 5 years) | Medium-term (5 to 10 years) | Short-term (1 to 5 years) |
| **Extent** | Part of site/property | Part of site/property | Part of site/property | Part of site/property |
| **Consequence** | Low | Low | Low | Low |
| **Probability** | Definite / Continuous (Very high) | Definite / Continuous (Very high) | Probable (High) | Possible / frequent (Medium) |
| **Significance** | **Low -** | **Very Low -** | **Low -** | **Very Low -** |
| **Additional Assessment Criteria** | | | | |
| **Degree to which impact can be reversed** | Reversable: The impact can be managed through the strict implementation of mitigation measures (e.g., conduct floral walk down of the study area). | | Reversable: The impact can be managed through the strict implementation of mitigation measures (e.g., implement AIP control). | |
| **Degree to which impact may cause irreplaceable loss of resources** | Medium (i.e., loss of ESA 2 habitat in Degraded Bushveld) | | Medium (edge effects may continue to result in SCC loss within surrounding areas) | |
| **Degree to which impact can be avoided** | High (SCC can be rescued and relocated) | | Medium (edge effects are still likely but can be managed) | |
| **Degree to which impact can be mitigated** | High (SCC can be rescued and relocated) | | High (edge effects can be managed) | |
| **Cumulative Impact** | | | | |
| **Extent to which a cumulative impact may arise** | Likely | | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| | **Medium -** | **Low -** | **Medium -** | **Low -** |

### 6.2.3 IMPACT: Loss of Floral Habitat and Species Diversity in the Degraded Bushveld and Modified Habitats during the Operational & Maintenance Phase.

The proposed development will have a notably decreased impact during this phase. This is because no further vegetation clearing (aside form clearing of vegetation within the servitude), or construction is anticipated to take place. However, ongoing, or permanent loss of floral habitat and diversity is anticipated during the Operational & Maintenance Phase if:

- Direct Impacts: clearing of vegetation within the demarcated servitude associated with the proposed solar PV facility area. This will lead to the loss of floral habitat and diversity; and
- Indirect Impacts: Furthermore, the loss of favourable floral habitat and diversity within as well as outside of the direct development footprint may result during the operational phase. The following impacts are anticipated:
    i. AIP Management and/or bush encroachment control programmes are poorly implemented and/or monitored. Failure to implement such control plans may lead to ongoing displacement of natural vegetation outside of the footprint area;
    ii. Inadequate implementation of safety standards for the BESS (especially the implementation of appropriate standards for the various battery types) which can result in unknown leaks of the BESS into the surrounding environment which will have a negative impact on the receiving environment; and
    iii. Poorly implemented management and failure to appropriately monitor rehabilitation efforts may lead to: landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and a decrease in floral diversity, increases in compacted soils and increased AIP cover limiting the re-establishment of natural vegetation and an increased risk of erosion in areas left disturbed.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be medium for both direct and indirect impacts, and ii) post mitigation is expected to be very low for both direct and indirect impacts (Table 7).

**Table 7: Impact on the floral habitat and diversity from the proposed development activities within the DEGRADED BUSHEVLD & MODIFIED HABITAT for the OPERATIONAL & MAINTENANCE PHASE.**

| Description of Impact | | | | |
|---|---|---|---|---|
| **Type of Impact** | Direct | | Indirect | |
| **Nature of Impact** | Negative | | Negative | |
| **Phases** | Operational & Maintenance | | Operational & Maintenance | |
| **Criteria** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Minor change (Low) | Negligible change (Very low) | Moderate change (Medium) | Minor change (Low) |
| **Duration** | Permanent (> 20 years) | Permanent (> 20 years) | Permanent (> 20 years) | Permanent (> 20 years) |
| **Extent** | Whole site and nearby surroundings | Part of site/property | Whole site and nearby surroundings | Part of site/property |
| **Consequence** | Medium | Low | Medium | Low |
| **Probability** | Probable (High) | Possible / frequent (Medium) | Probable (High) | Possible / frequent (Medium) |
| **Significance** | **Medium -** | **Very Low -** | **Medium -** | **Very Low -** |
| **Additional Assessment Criteria** | | | | |
| **Degree to which impact can be reversed** | Reversable: The impact can be managed if management measures are put in place and strictly adhered to | | Reversable: The impact can be managed if management measures are put in place and strictly adhered to | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low | | Medium (edge effects may continue to result in habitat loss within surrounding areas) | |
| **Degree to which impact can be avoided** | High | | Medium | |
| **Degree to which impact can be mitigated** | High provided mitigation measures are strictly implemented | | High provided mitigation measures are strictly implemented | |
| **Cumulative Impact** | | | | |
| **Extent to which a cumulative impact may arise** | Likely | | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| | **Low -** | **Very low -** | **Medium -** | **Low -** |

### 6.2.4 IMPACT: Loss of Floral SCC in the Degraded Bushveld and Modified Habitats during the Operational & Maintenance Phase.

This phase of the proposed development should have fewer impacts to the receiving environment for SCC provided that all mitigation measures are in place and that edge effects are suitably managed. However, ongoing, or permanent loss of floral habitat and diversity is anticipated during the Operational & Maintenance Phase if:

- Direct Impacts: clearing of vegetation within the associated Habitats but outside of the demarcated servitude associated with the proposed solar PV facility. This will lead to the loss of floral SCC; and
- Indirect Impacts: Furthermore, the loss of favourable floral habitat and diversity within as well as outside of the direct development footprint may result during the operational phase. The following impacts are anticipated:
    i. Poorly managed edge effects such as potentially poorly implemented and monitored AIP Management programmes and/or bush enchainment control plans can lead to the reintroduction and proliferation of AIP species and/or encroacher species within the area which can lead to the permanent loss of SCC and associated surrounding natural floral habitat;
    ii. Inadequate implementation of safety standards for the BESS (especially the implementation of appropriate standards for the various battery types) which can result in unknown leaks of the BESS into the surrounding environment which will have a negative impact on the receiving environment (i.e., impacting SCC habitat); and
    iii. Ineffective monitoring of relocated SCC can result in the loss of SCC from the study area and poorly reinstated and represented floral SCC within rehabilitated sites.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be low for both direct and indirect impacts, and ii) post mitigation is expected to be very low for both direct and indirect impacts (Table 8).

**Table 8: Impact on the floral SCC from the proposed development activities within the DEGRADED BUSHVELD & MODIFIED HABITAT for the OPERATIONAL & MAINTENANCE PHASE.**

| Description of Impact | | | | |
|---|---|---|---|---|
| **Type of Impact** | Direct | | Indirect | |
| **Nature of Impact** | Negative | | Negative | |
| **Phases** | Operational & Maintenance | | Operational & Maintenance | |
| **Criteria** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Minor change (Low) | Negligible change (Very low) | Minor change (Low) | Negligible change (Very low) |
| **Duration** | Permanent (> 20 years) | Permanent (> 20 years) | Permanent (> 20 years) | Permanent (> 20 years) |
| **Extent** | Part of site/property | Part of site/property | Part of site/property | Part of site/property |
| **Consequence** | Low | Low | Low | Low |
| **Probability** | Probable (High) | Possible / frequent (Medium) | Probable (High) | Possible / frequent (Medium) |
| **Significance** | **Low -** | **Very Low -** | **Low -** | **Very Low -** |
| **Additional Assessment Criteria** | | | | |
| **Degree to which impact can be reversed** | Reversable: The impact can be managed if management measures are put in place and strictly adhered to | | Reversable: The impact can be managed if management measures are put in place and strictly adhered to | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low (direct habitat transformation should not occur) | | Medium (edge effects may continue to result in habitat loss within surrounding areas) | |
| **Degree to which impact can be avoided** | High (impacts can be managed) | | Medium (edge effects are still likely but can be managed) | |
| **Degree to which impact can be mitigated** | High (rescued and relocated SCC can be monitored) | | High (edge effects can be managed) | |
| **Cumulative Impact** | | | | |
| **Extent to which a cumulative impact may arise** | Likely | | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** | **Without Mitigation** | **With Mitigation** |
| | **Low -** | **Very low -** | **Medium -** | **Low -** |

### 6.2.5 Impact Discussion

The direct impact of the proposed development on the floral ecology of the study area is anticipated to vary between high and very low for the habitats prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the study area can be reduced.

**Impact on Floral Habitat and Diversity**

The proposed development is predominantly located within areas of moderately low and low floral sensitivity (i.e., the Degraded Bushveld and the Modified Habitat, respectively).

The historic and current disturbances within the study area, (i.e., grazing pressures, bush encroachment, AIP proliferation, etc) has resulted in a decreased habitat integrity and floral communities that have shifted away from the reference vegetation type, especially within the Degraded Bushveld and the Modified Habitat. Nether the Degraded Bushveld and the Modified Habitat are considered representative of the EN threatened ecosystem. AIP proliferation across the study area was moderate, and bush encroachment (specifically within the Degraded Bushveld habitat) was prolific, thus leading to an ongoing decline in preferred habitat for native floral species. Impacts associated with the proposed development are anticipated to be localised within the footprint area and no regional impacts on floral communities are anticipated.

Negative impacts likely to be associated with the floral ecology within study area includes, but are not limited to, the following:

- Development footprint creep and placement of infrastructure within natural habitat outside of the authorised footprint;
- Destruction of floral habitat during construction activities;
- AIP proliferation, bush encroachment, and erosion in disturbed areas; and
- Increased human movement, leading to greater pressure on natural floral habitat and increasing the potential for harvesting of protected and medicinal floral species.

**Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas**

The proposed activities will not impact on any CBAs. However, the proposed activities will impact on confirmed ESA2 habitat. ESAs are important features in the greater landscape and provide unique conditions for flora and important ecological functionality within the ecosystem.

Due to their ecological importance, it is recommended that impacts to ESAs be avoided or minimised as far as possible and kept to approved areas only. ESA2 habitat was identified within the Degraded Bushveld Habitat. It should be ensured that layouts are designed in such a way to retain habitat connectivity, e.g., by maintaining a vegetation layer between the solar panels, vegetation connectivity can be maintained. Ensure vegetation is maintained in servitudes and/or buffers (e.g., buffers associated with the Freshwater Habitat) to allow for habitat connectivity. Rehabilitation activities (i.e., within the Freshwater buffer) will be advantageous to maintaining connectivity (especially ESA habitat) within the landscape.

Although the proposed development layout overlap with red list ecosystem habitat (i.e., the EN Sekhukhune Plains Bushveld ecosystem), neither the Degraded Bushveld, nor the Modified Habitat units observed within the study area are considered representative of the EN ecosystem (in terms of species composition and structure). Thus, impacts to red list ecosystem habitat within the study area is not anticipated.

Important/unique features located within the surrounding areas include several freshwater features. It is recommended that the proposed activities be kept within the approved areas only and outside of these features (i.e., not dumping within these features, etc).

**Impacts on Floral SCC**

Placement of the proposed construction activities will have an unfavourable impact on protected floral species (including nationally protected species (e.g., NFA species) and provincially protected species (e.g., as listed under LEMA)). Although SCC are not abundant within the Degraded Bushveld and the Modified Habitat, several NFA-protected species do remain (because of their cultural and/or medicinal importance, namely *Boscia albitrunca* and *Sclerocarya birrea* subsp. *caffra*).

The diversity of (recorded) SCC ranged across the habitats within the study area:

- The Degraded Bushveld was associated with a moderately low abundance of SCC. Species recorded included LEMA-protected species (e.g., *Aloe cryptopoda*) and NFA-protected trees (e.g., *Boscia albitrunca,* and *Sclerocarya birrea* subsp. *caffra*); and
- Although no SCC were recorded within the Modified Habitat, the habitat does have the propensity to support SCC (e.g., *Aloe cryptopoda, Boscia albitrunca* and *Sclerocarya birrea* subsp. *caffra*) is such species were to disperse and successfully establish within the habitat.

Activities which are likely to negatively affect floral SCC within and around the study area include, but are not limited to, the following:

- Placement of infrastructure within habitat favoured by the recorded protected floral species;
- Irreversible destruction of favourable floral habitat during construction and operational activities;
- Increased harvesting of floral SCC;
- Failure to relocate/rescue SCC and failure to implement monitoring of such species; and
- Poorly managed AIP proliferation and unchecked bush encroachment with subsequent displacement of floral SCC.

A walkdown of the footprint area prior to construction activities should be conducted and all SCC marked for possible relocation to suitable habitat outside of the direct footprint area. For LEMA and NFA protected species, rescue, and relocation activities should be conducted by a suitably qualified specialist and species should be either relocated to suitable habitat within the study area outside of the development footprint or moved to registered nurseries such as the Agricultural Research Council (ARC), the SANBI, or an on-site nursery where species can be propagated (especially for future use in rehabilitation activities). The necessary permits (e.g., LEDET for provincially protected species and DFFE for nationally protected species) should be applied for before any construction activities commence. Large trees, which are difficult to relocate, will need to be destroyed. The proponent could advocate to plant more of the same species in nearby areas as a compensation (liaison with the permitting authorities will be required).

It should be noted that for RDL species (if recorded), rescue and relocation activities are not recommended. Instead, SANBI recommends avoidance.

**Probable Residual Impacts**

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

- Permanent loss of and altered floral species diversity;
- Loss of habitat and species associated with the Sekhukhune Centre of Endemism;
- Edge effects such as further habitat fragmentation, AIP proliferation, and bush encroachment;
- Fragmentation and/or loss of ESA habitat;

- Permanent loss of protected floral species and suitable habitat for such species; and
- The proposed development may impact freshwater systems within the study area (and subsequently within the surrounding areas). As such recommendations, and setback buffers as per the Freshwater Assessment (SAS 220156, 2023) should be strictly adhered to (i.e., a 32 m buffer should be implemented).

**Cumulative Impacts**

Currently, the current greatest threat to the floral ecology (and the centre of endemism) that are likely to contribute to cumulative impacts on the floral communities within the surrounding areas is the continued expansion of mining activities (including expansion of the MPM itself) and the continued expansion of mining activities (and resultant expansion of nearby communities), the proliferation of AIP species, and the continued bush encroachment resulting in the overall loss of native floral communities within the local area.

## *6.3 Faunal Impact Assessment*

The table and sections below indicate the perceived risks to the faunal ecology associated with all phases of the proposed development. The tables below present the perceived impact on each of the habitat units for the i) Construction Phase, and ii) Operational & Maintenance Phase associated with the proposed infrastructure development in terms of faunal species loss, both prior to and post-mitigation measures.

This impact assessment was undertaken with a focus (for each habitat unit) on 1) impacts to habitat and species diversity, and 2) impacts to SCC. Given the degraded nature of the Degraded Bushveld and Modified Habitat, together with the fact that the Modified habitat is located within Degraded Bushveld, the associated impacts on these habitats have been grouped. The Freshwater habitat was not assessed in terms of impacts as no development activities are currently planned or encroach into this habitat.

### 6.3.1 IMPACT: Loss of Faunal Habitat and Species Diversity in the Degraded Bushveld & Modified Habitat units during the Construction Phase.

The Degraded Bushveld is of moderately low faunal sensitivity and the Modified Habitat is of low faunal sensitivity. Both these habitat units provided limited habitat and food resources to faunal species, whilst the increased anthropogenic activities in and surrounding the habitats further decreased faunal habitation suitability.

**Impacts Associated with the Construction Phase**: this phase will result in the direct impacts to the associated habitats:

- Vegetation clearance within the footprint area for the proposed PV facility and associated infrastructure, leading to loss of faunal habitat;
- Loss of remaining faunal species diversity, albeit already low;
- Potential mortalities of small faunal species due to collisions with construction equipment;
- Human – wildlife conflict during resulting in faunal mortalities / injuries; and
- Potential hunting/trapping of faunal species by construction personnel within the study area as well as the adjacent areas.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be medium and ii) post mitigation is expected to be low (Table 9).

**Table 9: Impact on the faunal habitat and diversity from the proposed development activities within the DEGRADED BUSHVELD and MODIFIED HABITAT for the CONSTRUCTION PHASE.**

| Description of Impact | | |
|---|---|---|
| **Type of Impact** | Direct | |
| **Nature of Impact** | Negative | |
| **Phases** | Construction | |
| **Criteria** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Moderate change (Medium) | Minor change (Low) |
| **Duration** | Long-term (10 to 20 years) | Long-term (10 to 20 years) |
| **Extent** | Whole site and nearby surroundings | Part of site/property |
| **Consequence** | Medium | Low |
| **Probability** | Definite / Continuous (Very high) | Definite / Continuous (Very high) |
| **gnificance** | **Medium -** | **Low -** |
| **Additional Assessment Criteria** | | |
| **Degree to which impact can be reversed** | Partially reversable. Upon removal of solar facility habitat could be re-instated overtime through rehabilitation (revegetation) efforts. | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low: No important or niche habitat is located within the study area. | |
| **Degree to which impact can be avoided** | Low: Not avoidable but rehabilitation efforts in the remaining footprint extent whilst ensuring that a short herbaceous layer is sustained below the panels will minimise impacts. | |
| **Degree to which impact can be mitigated** | Low: Direct habitat transformation will occur within the demarcated footprint area regardless of mitigation. Mitigation can however limit impacts to areas not planned for development. | |
| **Cumulative Impact** | | |
| **Extent to which a cumulative impact may arise** | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** |
| | **Low -** | **Low -** |

### 6.3.2 IMPACT: Loss of Faunal SCC in the Degraded Bushveld and Modified Habitats during the Construction Phase.

The Degraded Bushveld is of moderately low faunal sensitivity and the Modified Habitat is of low faunal sensitivity. These habitat units did not provide suitable habitat or resources that would support faunal SCC populations or individuals.

**Impacts Associated with the Construction Phase**:

- Clearance of vegetation within the study area, however, the degraded and modified habitats are considered largely unsuitable for faunal SCC.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be insignificant, and ii) post mitigation is expected to be insignificant (Table 10).

**Table 10: Impact on the faunal SCC from the proposed development activities within the DEGRADED BUSHVELD & MODIFIED HABITAT for the CONSTRUCTION PHASE.**

| Description of Impact | | |
|---|---|---|
| **Type of Impact** | Direct | |
| **Nature of Impact** | Negative | |
| **Phases** | Construction | |
| **Criteria** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Negligible change (Very low) | Negligible change (Very low) |
| **Duration** | Short-term (1 to 5 years) | Short-term (1 to 5 years) |
| **Extent** | Part of site/property | Part of site/property |
| **Consequence** | Very low | Very low |
| **Probability** | Unlikely / improbable (Very low) | Unlikely / improbable (Very low) |
| **Significance** | Insignificant - | Insignificant - |
| **Additional Assessment Criteria** | | |
| **Degree to which impact can be reversed** | Partially reversable. Impacted areas can be rehabilitated, however surrounding anthropogenic activities will likely still preclude faunal SCC occurrences in the study area. | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low: No important or niche habitat is located within the study area. | |
| **Degree to which impact can be avoided** | High: Habitat in the study area is not considered suitable for faunal SCC habitation, as such, direct impacts to faunal SCC in the region are avoidable. | |
| **Degree to which impact can be mitigated** | High: Faunal SCC are unlikely to occur within the study area. | |
| **Cumulative Impact** | | |
| **Extent to which a cumulative impact may arise** | Unlikely | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** |
| | **Very low -** | Insignificant |

### 6.3.3 IMPACT: Loss of Faunal Habitat and Species Diversity in the Degraded Bushveld and Modified Habitats during the Operational & Maintenance Phase.

The solar PV facility, once operational will have a notably decreased impact on the habitat units. This is largely attributable to the fact that no further, or very limited vegetation clearing or construction is anticipated to take place. However, impacts to faunal habitat and species are likely to continue given the following:

- Continued, uncontrolled clearing of vegetation outside of demarcated solar PV facility footprint;
- Failure to implement suitable health and safety standards for the BESS (based on the various battery types) resulting in potential leaks or battery failures impacting on the receiving environment and faunal species therein;
- Excessive use of outside lighting, leading to insects being attracted to the lights and similarly, insectivorous species such as small reptiles and bats. External lighting may lead to altered insect movement patterns in the landscape and may impact of breeding activities / opportunities, leading to a decline in insect species abundances; and
- Predatory species being attracted to the solar area due to increased insect activities may get electrocuted as they climb over transformers/exposed wires or in the case of bats, collide with parts of the solar facility infrastructure, leading to increased mortality rates.

If mitigation measures as presented in section 6.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be very low, and ii) post mitigation is expected to remain very low (Table 11).

**Table 11: Impact on the faunal habitat and diversity within the DEGRADED BUSHEVLD & MODIFIED HABITAT for the OPERATIONAL & MAINTENANCE PHASE.**

| Description of Impact | | |
|---|---|---|
| **Type of Impact** | Direct | |
| **Nature of Impact** | Negative | |
| **Phases** | Operational | |
| **Criteria** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Minor change (Low) | Minor change (Low) |
| **Duration** | Long-term (10 to 20 years) | Long-term (10 to 20 years) |
| **Extent** | Part of site/property | Part of site/property |
| **Consequence** | Low | Low |
| **Probability** | Conceivable (Low) | Conceivable (Low) |
| **Significance** | **Very low -** | **Very low -** |
| **Additional Assessment Criteria** | | |

| | | |
|---|---|---|
| **Degree to which impact can be reversed** | Partially reversable. Upon removal of solar facility habitat could be re-instated overtime through rehabilitation (revegetation) efforts. Use of correct lighting measures at night to decrease impacts to nocturnal insects (see mitigation measures). | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low: No important or niche habitat is located within these habitat units. | |
| **Degree to which impact can be avoided** | Low: Not avoidable but mitigation measures will help to minimise impacts. | |
| **Degree to which impact can be mitigated** | Low: Impacts can be minimised through the implementation of mitigation measures during the operational phase. | |
| **Cumulative Impact** | | |
| **Extent to which a cumulative impact may arise** | Possible | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** |
| | **Very low -** | **Very low -** |

### 6.3.4 IMPACT: Loss of Faunal SCC in the Degraded Bushveld and Modified Habitat during the Operational & Maintenance Phase.

With the exception of potential leaks occurring from a failed BESS (though considered unlikely provided all safety measures are in place), the operation phase of the proposed solar facility is unlikely to impact upon any faunal SCC, as no SCC are currently expected to occur in the study area, and it is unlikely that this will change during the operational phase of the project.

The impact significance i) prior to mitigation measures is expected to be insignificant, and ii) post mitigation is expected remain insignificant (Table 12).

**Table 12: Impact on the faunal SCC within the DEGRADED BUSHVELD & MODIFIED HABITAT for the OPERATIONAL & MAINTENANCE PHASE.**

| **Description of Impact** | | |
|---|---|---|
| **Type of Impact** | Direct | |
| **Nature of Impact** | Negative | |
| **Phases** | Construction | |
| **Criteria** | **Without Mitigation** | **With Mitigation** |
| **Intensity** | Negligible change (Very low) | Negligible change (Very low) |
| **Duration** | Short-term (1 to 5 years) | Short-term (1 to 5 years) |
| **Extent** | Part of site/property | Part of site/property |
| **Consequence** | Very low | Very low |
| **Probability** | Unlikely / improbable (Very low) | Unlikely / improbable (Very low) |
| **Significance** | Insignificant - | Insignificant - |
| **Additional Assessment Criteria** | | |
| **Degree to which impact can be reversed** | Activities unlikely to result in any impacts to faunal SCC, however, degraded areas should be rehabilitated as and where necessary regardless. | |
| **Degree to which impact may cause irreplaceable loss of resources** | Low: No important or niche habitat is located within the study area. | |

| | | |
|---|---|---|
| **Degree to which impact can be avoided** | High: Habitat in the study area is not considered suitable for faunal SCC habitation, as such, direct impacts to faunal SCC in the region are avoidable. | |
| **Degree to which impact can be mitigated** | High: Faunal SCC are unlikely to occur within the study area. | |
| **Cumulative Impact** | | |
| **Extent to which a cumulative impact may arise** | Unlikely | |
| **Rating of cumulative impacts** | **Without Mitigation** | **With Mitigation** |
| | Insignificant | Insignificant |

### 6.3.5 Impact Discussion

The direct impact of the proposed development on the faunal ecology of the study area is anticipated to vary between medium and insignificant for the habitats prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the study area can be reduced.

**Impact on Faunal Habitat and Diversity**

The proposed solar PV facility will be located within areas of moderately low and low faunal sensitivity (i.e., the Degraded Bushveld and the Modified Habitat, respectively).

Historic and current land-use activities, significant bush encroachment and extensive degradation of the herbaceous layer (absent in most places), has led to a notable reduction in faunal habitat suitability. Additionally, the surrounding landscape has experienced significant transformation as a result of the development of mines and extensive community sprawl. This has led to notable reduction in habitat connectivity whilst placing increased pressure of faunal communities, both from hunting and as a result of domestic species grazing and browsing in the area, reducing food resources faster than the vegetation can recover.

As a result of these impacts, species abundance and diversity is limited within the study area, resulting in low to insignificant impacts post mitigation to the faunal communities arising from the proposed solar PV facility development.

**Impacts on Faunal SCC**

As previously discussed, the habitat in the study area has been notably degraded, whilst habitat connectivity has been impacted upon as a result of community and mining expansion in the region. Anthropogenic expansion and the lack of suitable habitat has resulted in a low likelihood that any faunal SCC will occur within the study area. As such, impacts to faunal SCC as a result of the development and operation of the solar PV facility are considered

insignificant and are unlikely to impact upon faunal SCC habitat or species conservation efforts in the region.

**Probable Residual Impacts**

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

- Permanent loss of and altered faunal species diversity;
- Loss of habitat and species from within the study area; and
- Edge effects such as further habitat fragmentation, AIP proliferation, and bush encroachment.

**Cumulative Impacts**

At present, the greatest threat to faunal species in the region is that of habitat loss and persecution through hunting and human-wildlife conflicts. Such impacts are ever increasing as a result of community expansion and the development and ongoing operations of mining enterprises in the region. The development of the solar farm will result in further vegetation loss in the region, albeit of decreased sensitivity for faunal species. The loss will likely lead to increased pressure on the remaining natural areas which will be utilised by the local communities for wood harvesting and grazing of livestock. As such, faunal species within these areas will be subjected to further habitat disturbances and degradation, reducing the carrying capacity and suitability of these areas for faunal species. Faunal species abundances and diversity is likely to continue to decrease in the region as a result of such activities.

## *6.4 Integrated Impact Mitigation*

The table below (Table 13) highlights the key, general integrated mitigation measures that are applicable to the proposed development in order to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed development. Provided that all management and mitigation measures are implemented, as stipulated in this report, the overall risk to floral and faunal diversity, habitat and SCC can be mitigated and minimised.

**Table 13: A summary of the mitigatory requirements for biodiversity resources.**

| | |
|---|---|
| **Project phase** | Construction Phase |
| **Impact Summary** | Loss of floral and faunal habitat, species, and SCC |
| **Proposed mitigation and management measures:** | |

**Development footprint**

- Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as any other specialist studies;
- The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment (edge effect management);
- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction and maintenance activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC (if encountered);
- Associated infrastructure must be designed in such a way that habitat fragmentation is minimised;
- If possible, it is recommended that solar panels be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundation to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity[16];
- Avoid soil sealing (i.e., the destruction or covering of the ground by an impermeable material). Ensure that a vegetation layer is maintained below PV panels to promote soil health, vegetation establishment, reduced habitat fragmentation, and resources for fauna. In this regard, where a vegetation layer is maintained below and between the PV panels, use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes;
- Maintain vegetation corridors between the PV panels. Contribution towards conserving the regional genetic diversity of plants and fauna in these areas must be ensured through revegetating with indigenous species from the area. AIP control in revegetated sections must take place. By using native seeds/propagules and plants that are suitable for the site and that have been collected from within a defined source region, it is possible to reduce loss of regional plant genetic diversity;
- Ensure fire management is in place. Use of firebreaks is recommended or trimming of vegetation around the boundary fence;
- No hunting/trapping/snaring/collecting of faunal species construction personnel is to be allowed;
- Where small snakes, scorpions or spiders are encountered during the construction phase, they are to be carefully relocated to suitable habitat outside of the proposed disturbance footprint, should they not move off on their own. Where necessary, a registered snake handler must be used for larger venomous snakes;
- Care should be taken during the construction of the proposed infrastructure development to limit edge effects to surrounding natural habitat. This can be achieved by:
  - Demarcating all footprint areas during construction and maintenance activities;
  - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
  - All soils compacted as a result of construction activities should be ripped and profiled and reseeded;
  - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Specific mention in this regard is made to Category 1b and 2 species identified within the development footprint areas (refer to section 4.5 of this report); and
  - No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction and maintenance activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. Waste disposal containers and bins should be provided during the construction and maintenance phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility.
- If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil;

[16] **Science for Environment Policy (2015).** Wind & Solar Energy and nature conservation. Future Brief 9 produced for the European Commission DG Environment. (No. 9). Bristol, U.K.: Science Communication Unit. Science Communication Unit. Available at: https://ec.europa.eu/environment/integration/research/newsalert/pdf/wind_solar_energy_nature_conservation_FB9_en.pdf & **Peschel (2010).** Solar parks - opportunities for biodiversity. A report on biodiversity in and around ground-mounted photovoltaic plants (Report No. 45; p. 19). Berlin, Germany: German Renewable Energies Agency. German Renewable Energies Agency [website]. Available at: http://irishsolarenergy.org/wp-content/uploads/2019/11/Solarparks-Opportunities-for-Biodiversity.pdf

- Suppress dust to mitigate the impact of dust on flora within a close proximity of construction activities (Sett 2017) – any chemicals used for this purpose must not be permitted to enter the Freshwater habitats within the surrounding area; and
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.

**Alien Vegetation & Woody Encroachment**

- Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation:
  - Removal of AIPs should preferably commence before the construction and maintenance phase and continue throughout the Mining and Decommissioning & Rehabilitation Phases. AIPs should be cleared within the study area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble, or soils contaminated with AIP seeds during the construction & maintenance phase;
  - An AIP Management/Control Plan should be implemented by a qualified professional. No use of uncertified chemicals may be used for chemical control of AIPs. Only trained personnel are to use chemical and mechanical control methods of AIPs. Chemical control may not be used within any nearby freshwater features;
  - A bush encroachment Management/Control Plan should be implemented by a qualified professional to prevent the encroachment of natural surrounding areas;
  - Edge effects arising from the proposed development, such as erosion, encroachment, and AIP proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 3.8 of this report). Ongoing monitoring and clearing/control should take place throughout the Construction and Operational & Maintenance Phase of the development;
  - Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards; and
  - Develop an 'action plan' for implementation in the case that the BESS (if utilised) leaks. Appropriate measures as guided by a suitably qualified individual should be drawn up prior to the use of the BESS (i.e., during the operational and maintenance phase) (e.g., procedure to be followed following a leak to ensure 1) clean up, 2) limit spread of toxins into the surrounding environment). The action plan should be in line with the proposed battery type to be used.

**Floral SCC**

- A site walk through of the study area should be conducted prior to the commencement of construction activities and all SCC identified and marked for potential rescue and relocation activities.
- For the removal, destruction, or relocation of protected flora in terms of the LEMA, a license is required from the LEDET. For the removal of nationally protected tree species, as per the NFA, permits will be required from the DFFE. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Permits will be required prior to the removal of any species;
- No collection of floral SCC must be allowed by construction personnel;
- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC outside of the proposed development footprint area;
- For NFA-protected tree species, attempting to relocate mature individuals are often too expensive and/or result in unsuccessful re-establishment due to unavoidable damage to their root systems during their excavation. Where possible, seedlings of affected tree species should be targeted for relocation, and seeds must be harvested prior to vegetation clearance to use in rehabilitation activities or as part of vegetation maintenance surrounding the PV footprints. It is important that seedlings and seeds be harvested within a close proximity of an area to be impacted, so as to prevent alteration of population genetics; and
- Geophytes[17] and succulents are good candidates for rescue and relocation, and these should be targeted for such initiatives.

**Fire**

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

**Rehabilitation**

- A rehabilitation plan for natural vegetation should be drawn up prior to the commencement of construction activities. This rehabilitation plan should consider all phases of the project indicating rehabilitation actions to be

[17] **Geophytes** are plants typically with underground storage organs, where the plants hold energy and water. A broad synonym for a geophyte is bulb, but they are far more diverse than that: Geophytes also include plants with tubers, corms or rhizomes.

undertaken during and once construction has been completed, ongoing rehabilitation during the Operational & Maintenance Phase of the project as well as rehabilitation actions to be undertaken after operations have ceased;
- Any natural areas beyond the direct footprint, which have been affected by the construction activities, must be rehabilitated using indigenous species;
- Rehabilitation must be implemented concurrently as per the rehabilitation plan, and disturbed areas must be rehabilitated as soon as such areas become available. This will not only reduce the total disturbance footprint but will also reduce the overall rehabilitation effort and costs associated with it; and
- All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas.

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

**Proposed mitigation and management measures:**

**Development footprint**

- No additional habitat is to be disturbed during the Operational & Maintenance Phase of the development;
- At a minimum a short herbaceous layer must be maintained around all nearby powerline towers and the PV facility so that a semblance of floral habitat is reinstated in these areas to promote connectivity;
- Ongoing monitoring of the state of the biodiversity associated with the footprint areas, the servitudes, and the vegetation surrounding the footprint areas, must continue throughout the operation and maintenance of the proposed project to ensure that detrimental residual impacts are detected early enough to be reversed/prevented;
- Night lighting must make use of yellow, fluorescent based lights or red lights and these must be downward and inward facing to minimise skyglow and the attraction of insects and their associated predators. The use of bright white and/or LED lights is not recommended;
- Monitor and maintain the vegetation corridors that were created between the PV panels and along the associated servitudes to contribute to reduced habitat fragmentation, and improved regional plant genetics;
- Fire management should be in place;
- Should any venomous snake, scorpions or spiders be encountered in the operational area and they pose a direct threat/risk to operational staff, they are to be carefully relocated to a suitable area outside of the operational footprint by a suitably qualified/trained staff member or snake handler;
- Avoid barrier effects resulting from security fencing around Solar PV Areas. It is recommended that regular passages and a ground clearance under the fence of at least 10 - 15 cm be created to allow for movement of smaller mammals through the Solar PV Areas (reducing loss of movement corridors and overall habitat fragmentation and conserving functional relationships between the fenced-in solar plant and the surrounding area). This will allow a semblance of natural herbivory and natural dispersal of plants by animals, promoting improved vegetation conditions inside and outside of the Solar PV Areas;
- No vehicles are allowed to indiscriminately drive through sensitive habitat and natural areas;
- No dumping of litter must be allowed on-site; and
- In the event that a BESS is utilised, ensure that the implemented systems are South African Bureau of Standards (SABS) approved and comply with legal standards;
- Ensure that best practice monitoring protocols and risk management procedures are in place (and routinely carried out) to ensure there are no leaks or faulty infrastructure (especially important in terms of the BESS);
- If leaks occur, mitigatory actions should occur in accordance with the type of battery used (i.e., implement action plan that was drawn up prior to the use of the BESS).

**Alien Vegetation**

- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 4.5 of this report);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the Operational & Maintenance Phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas;
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards; and
- Floral monitoring should be done annually during rehabilitation activities. Please also refer to the monitoring guidelines in section 6.5

**Floral SCC**

- Monitoring of rescued and relocated floral SCC should continue during the Operational & Maintenance phase until it is evident that the species have successfully established;

| |
|---|
| • As far as possible, no collection of floral SCC/protected or medicinal floral species within the study area or adjacent natural habitat must be allowed during the Operational & Maintenance Phase of the proposed development; and<br>• Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC/protected species or suitable habitat for such species outside of the proposed development footprint. |
| **Rehabilitation** |
| • Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible due to operational and maintenance requirements, it is recommended that at a minimum a suitable herbaceous layer (indigenous species) is maintained within the footprint of the powerline and PV facility servitude so as to ensure that no erosion occurs; and<br>• All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated as per the post-closure land-use objective |

## 6.5 Floral Monitoring

A floral monitoring plan must be designed and implemented (by the proponent) throughout all phases of the proposed development, should it be approved. The following points aim to guide the design of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements:

- Permanent monitoring plots must be established within (target areas) and surrounding (reference areas) all rehabilitated sites. Suitable reference plots should be determined once borrowing activities have ceased, or once the pits are ready to be rehabilitated. If reference plots are selected too early, there is a risk that the sites in which these plots are located may be disturbed or degraded during the course of borrowing activities. In such an event, the reference plots would no longer serve as suitable reference habitat and result in suboptimal end-goals for rehabilitation. These plots must be designed to accurately monitor the following parameters:
  - Species diversity and species abundance;
  - Recruitment of indigenous species and of alien and invasive species, including alien vs Indigenous plant ratios;
  - Erosion levels and the efficacy of erosion control measures; and
  - Vegetation community structure including species composition and diversity which should be compared to pre-development conditions and work towards the post-closure objective.
- Monitoring of all the natural areas and relocated SCC should continue throughout the operational phase, or until a suitably qualified specialists concludes that the vegetation has reached a point where assisted regeneration is no longer required, and the floral communities are stable enough to no longer be adversely affected by competition from AIPs;
- The rehabilitation plan must be continuously updated (i.e., adaptive management) in accordance with the monitoring results to ensure that optimal rehabilitation measures are employed. Adaptive management is an integral part of any rehabilitation plan as it

assesses monitoring results to allow rehabilitation measures to be revisited and to be adapted accordingly; and

- Results of the monitoring activities must be considered during all phases of the proposed project and action must be taken to mitigate impacts as soon as negative effects from mining activities become apparent.

The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

# 7 CONCLUSION

STS was appointed by SLR Consulting (Africa) to conduct a terrestrial biodiversity assessment as part of the EA process for a proposed PV facility at the MPM, which is located near Burgersfort within the Limpopo Province.

During the field assessment, two broad habitat units were identified within the study area, namely Degraded Bushveld and Modified Habitat, whilst the Freshwater Habitat was located outside of the study area. The sensitivities of each of the habitat units was as follows, from a floral and faunal perspective: the Modified Habitat was of a **low sensitivity** and the Degraded Bushveld was of a **moderately low sensitivity**.

Placement of the proposed construction activities will have an unfavourable impact on protected floral SCC (including nationally protected species (e.g., NFA species) and provincially protected species (e.g., as listed under LEMA). Although SCC are not abundant within the Degraded Bushveld and the Modified Habitat, several NFA-protected species do remain (because of their cultural and/or medicinal importance, namely *Boscia albitrunca* and *Sclerocarya birrea* subsp. *caffra*).

A walkdown of the footprint area prior to construction activities should be conducted and all SCC marked for possible relocation to suitable habitat outside of the direct footprint area. For LEMA and NFA protected species, rescue, and relocation activities should be conducted by a suitably qualified specialist and species should be either relocated to suitable habitat within the study area outside of the development footprint or moved to registered nurseries such as the ARC, the SANBI, or an on-site nursery where species can be propagated (especially for future use in rehabilitation activities). The necessary permits (e.g., LEDET for provincially protected species and DFFE for nationally protected species) should be applied for before any construction activities commence. Large trees, which are difficult to relocate, will need to be destroyed. The proponent could advocate to plant more of the same species in nearby areas as a compensation (liaison with the permitting authorities will be required).

The faunal species diversity and abundance of the study area was limited, dominated by common and widespread species. Although construction activities will result in the clearance of this habitat, given the low numbers of fauna therein and the obvious tolerant nature of these species in term of habitat degradation, they will readily relocate into surrounding areas of similar habitat condition. No faunal SCC were observed or are expected to occur within the study area. This is attributable to the impacted vegetative state and the overall unsuitability of the habitat for faunal SCC. As such, the proposed solar PV facility is unlikely to pose a significant threat to faunal SCC in the region.

The proposed activities will impact on ESA2 habitat; ESA2 was identified within the Degraded Bushveld Habitat. Furthermore, the proposed development will impact the threatened ecosystem, i.e., the EN Sekhukhune Plains Bushveld ecosystem. It is recommended that the proposed activities and associated vegetation clearing, be kept to what is absolutely necessary and kept within the approved areas only. Furthermore, strict mitigation measures should be implemented to ensure surrounding habitat (including surrounding ESA habitat and threatened ecosystem habitat) is not negatively impacted.

The direct impact of the proposed development on the floral ecology of the study area is anticipated to vary between medium and very low for the habitats prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the study area can be reduced. Impacts to the faunal ecology of the study area range from medium to insignificant prior to mitigation. With mitigation these impacts can be further reduced too low to insignificant levels.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development. Whilst the proposed activities will result in the loss of habitat, such impacts are not considered so extensive as to consider the project a No-Go.

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# APPENDIX A: Indemnity and Terms of Use of this Report

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

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# APPENDIX B: Legislative Requirements

## THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

## THE CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983 (ACT NO. 43 OF 1983) (CARA)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

## THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact.

## THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

a) A specimen of a listed threatened or protected species;
b) Specimens of an alien species; or
c) A specimen of a listed invasive species without a permit.

## GOVERNMENT NOTICE NUMBER R.1020: ALIEN AND INVASIVE SPECIES REGULATIONS, 2020 (IN GOVERNMENT GAZETTE 43735), INCLUDING GOVERNMENT NOTICE NUMBER 1003: ALIEN AND INVASIVE SPECIES LISTS, 2020 (IN GOVERNMENT GAZETTE 43726) AS IT RELATES TO THE NEMBA

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to:

- Prevent the unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimise harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act no 10 of 2004) as:

(a) A species that is not an indigenous species; or
(b) 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.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2020):

- **Category 1a**: Invasive species that require compulsory control;
- **Category 1b**: Invasive species that require control by means of an invasive species management programme;
- **Category 2**: Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and
- **Category 3**: Ornamentally used plants that may no longer be planted.

## THE NATIONAL FOREST ACT, 1998 (ACT NO. 10 OF 1998) (NFA)

According to the department of Department of Forestry, Fisheries, and the Environment (DFFE) (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (https://www.daff.gov.za/daffweb3/):

"In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilisation."

Applicable sections of the NFA pertaining to the proposed project include the below:

**Section 12:**
Declaration of trees as protected

1) The Minister may declare-
    a. particular tree,
    b. a particular group of trees,
    c. a particular woodland; or
    d. trees belonging to a particular species,
    to be a protected tree, group of trees, woodland or species.
2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.
3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

**Section 15(1):**

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.

## LIMPOPO ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 7 OF 2003) (LEMA)

The objectives of this Act are:

- to manage and protect the environment in the Province;
- to secure ecologically sustainable development and responsible use of natural resources in the Province;
- generally, to contribute to the progressive realisation of the fundamental rights contained in section 24 of the Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996), and
- to give effect to international agreements effecting environmental management which are binding on the Province.

This Act must be interpreted and applied in accordance with the national environmental management principles set out in Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

## NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED18 (NEMPAA)

The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; for the continued existence, governance and functions of South African National Parks; and for matters in connection thereof.

[18] Amendments to the NEMPAA:

- National Environmental Management: Protected Areas Amendment Act 31 of 2004 – Gazette No. 27274, No. 131. Commencement date: 1 November 2005 [Proc. No. R. 58, Gazette No, 28123]
- National Environment Laws Amendment Act 14 of 2009 – Gazette No.32267, No. 617. Commencement date: 18 September 2009 [Proc. 65, Gazette No. 32580]
- National Environmental Management: Protected Areas Amendment Act 15 of 2009 – Gazette No. 32660, No. 748. Commencement date: 23 October 2009 – except for sections 1 and 8 [Proc. No. 69, Gazette No. 32660]
- Schedule 2 amended by Government Notice R236 in Government Gazette 36295 dated 27 March 2013. Commencement date: 1 April 2013 of sections 1 and 8 (relating to Schedule 2) of the National Environmental Management Protected Areas Amendment Act, 15 of 2009 [Proc. No. 7, Gazette No. 36296]
- National Environmental Management: Protected Areas Amendment Act 21 of 2014 - Government Notice 445 in Government Gazette 37710 dated 2 July 2014. Commencement date: 2 July 2014.
- Schedule 2 amendment by General Notice 2 of 2016 in Government Gazette 39728 dated 25 February 2016. Commencement date: 25 February 2016.

# APPENDIX C: Floral Method of Assessment

## *Floral Species of Conservational Concern Assessment*

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

### The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, "*low*", "*medium*", "*high*" and "*very high*" sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below[19]:

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

### BRAHMS Online Website

The Botanical Database of Southern Africa (BODATSA) is accessed to obtain plant names and floristic details (http://posa.sanbi.org/) for species of conservation concern within a selected boundary;

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the BODATSA, which contains records from the National Herbarium in Pretoria (PRE), the

[19] More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) and Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website: https://screening.environment.gov.za/screeningtool/#/pages/welcome

Compton Herbarium in Cape Town (NBG and SAM) and the KwaZulu-Natal Herbarium in Durban (NH).
- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (http://redlist.sanbi.org/).
- Typically, data is extracted for the Quarter Degree Square (QDS) in which the study area is situated but where it is deemed appropriate, a larger area can be included.

### NEMBA TOPS Species

Threatened and Protected species (TOPS) as per Government Notice 3009: Regulations Pertaining to Threatened or Protected Terrestrial Species and Freshwater Species in Government Gazette 47984 dated 3 February 2023, as it relates to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).

### NFA Species

Tree species as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA), were included in the SCC assessment.

### Provincially Protected Species: Specially Protected and Protected Species

The Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) provides a list of Specially Protected Plants (Schedule 11) and Protected Plants (Schedule 12) for the Limpopo Province. These species formed part of the SCC assessment. The list is alliable online at the following link: https://www.unodc.org/res/cld/document/limpopo-environmental-management-act-7-of-2003_html/Limpopo_Enviro_Management_Act.pdf

Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral 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.

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

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

## *Floral Habitat Sensitivity*

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance, and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):
- **Floral SCC:** The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Unique Landscapes:** The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
- **Conservation Status:** The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional and national databases. Whether the habitat is representative of a Critical Biodiversity Area or forms part of an Ecological Support Area is also taken into consideration;
- **Floral Diversity:** The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and

- **Habitat Integrity:** The degree to which the habitat unit is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the floral habitat sensitivity class in which each habitat unit falls. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the habitat unit in question. To present the results use is made of spider diagrams to depict the significance of each aspect of floral ecology for each vegetation type. The different classes and land-use objectives are presented in the table below:

**Table C1: Floral habitat sensitivity rankings and associated land-use objectives.**

| Score | Rating significance | Conservation objective |
|---|---|---|
| 1 < 1.5 | Low | Optimise development potential. |
| ≥1.5 <2.5 | Moderately low | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. |
| ≥2.5 <3.5 | Intermediate | Preserve and enhance biodiversity of the habitat unit and surrounds while optimizing development potential. |
| ≥3.5<4.5 | Moderately high | Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance. |
| ≥4.5 ≤5.0 | High | Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered. |

## *Vegetation Surveys*

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

The vegetation survey incorporates the subjective (or stratified) sampling method. Subjective sampling is a sampling technique in which the specialist relies on his or her own professional experience when choosing sample sites within the study area. This allows representative recordings of floral communities and optimal detection of SCC. Subjective sampling is used to consider different areas (or habitat units) which are identified within the main body of a habitat/study area.

One of the problems with random sampling, another popular sampling method, is that random samples may not cover all areas of a study area equally and thus increase the potential to miss floral SCC. Random sampling methods also tend to require more time in the field to locate the amount of SCC that can be detected using subjective sampling methods - In the context of an EIA where time constraints are often restrictive, priority needs to be given to collecting data in the shortest time possible without compromising the efficiency of locating SCC (SANBI, 2020).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure C1 below:

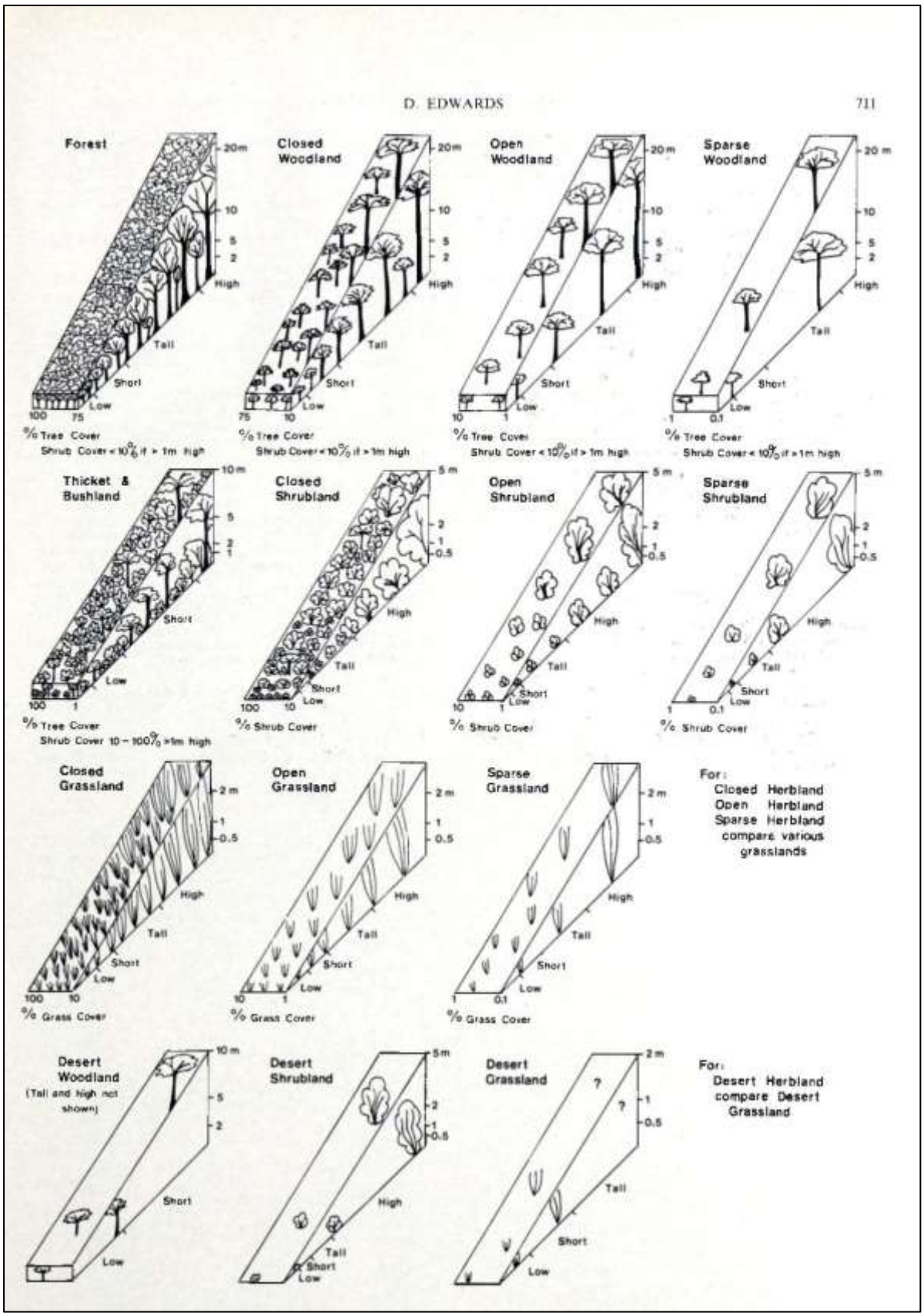



**Figure C1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.**

# APPENDIX D: 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 human habitation nearby the study area and the associated anthropogenic activities may have an impact on faunal behaviour and in turn the rate of observations.

### *Mammals*

Mammal species were recorded during the field assessment with the use of visual identification, spoor, call, and dung. Specific attention was paid to mammal SCC as listed by the IUCN, 2015.

### *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 on the study area. Field surveys were undertaken utilising visual 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*

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

### *Amphibians*

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

### *Invertebrates*

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

## Faunal Species of Conservational Concern Assessment

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

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

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

## Faunal Habitat Sensitivity

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

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

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

**Table D1: Faunal habitat sensitivity rankings and associated land-use objectives.**

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

# APPENDIX E: Impact Assessment Methodology

Impact assessment methodology as provided by the proponent (SLR Consulting).

This assessment methodology enables the assessment of biophysical, cultural, and socio-economic impacts including cumulative impacts and impact significance through the consideration of intensity, extent, duration, and the probability of the impact occurring. Consideration is also given to the degree to which impacts may cause irreplaceable loss of resources, be avoided, reversibility of impacts and the degree to which the impacts can be mitigated.

#### METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF IMPACTS

Part A (Table E1) provides the definition for determining impact consequence (combining intensity, extent, and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B (Table E2) and C (Table E3). The interpretation of the impact significance is given in Part D (Table E4). This methodology is utilised to assess both the incremental and cumulative project related impacts.

**Table E1: Part A – Definitions and Criteria.**

| PART A: DEFINITIONS AND CRITERIA | | |
|---|---|---|
| **Definition of SIGNIFICANCE** | | **Significance = consequence x probability** |
| **Definition of CONSEQUENCE** | | **Consequence is a function of intensity, extent, and duration** |
| **Criteria for ranking of the INTENSITY of environmental impacts** | **VH** | Severe change, disturbance, or degradation. Associated with severe consequences. May result in severe illness, injury, or death. Targets, limits, and thresholds of concern continually exceeded. Habitats or ecosystems of high importance for maintaining the persistence of species or habitats that meet critical habitat thresholds. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs. |
| | **H** | Prominent change, disturbance, or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits, and thresholds of concern regularly exceeded. Habitats or ecosystems which are important for meeting national/provincial conservation targets. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place. |
| | **M** | Moderate change, disturbance, or discomfort. Associated with real but not substantial consequences. Targets, limits, and thresholds of concern may occasionally be exceeded. Habitats or ecosystems with important functional value in maintaining biotic integrity. Occasional complaints can be expected. |
| | **L** | Minor (Slight) change, disturbance, or nuisance. Associated with minor consequences or deterioration. Targets, limits, and thresholds of concern rarely exceeded. Habitats and ecosystems which are degraded and modified. Require only minor interventions or clean-up actions. Sporadic complaints could be expected. |
| | **VL** | Negligible change, disturbance, or nuisance. Associated with very minor consequences or deterioration. Targets, limits, and thresholds of concern never exceeded. Species or habitats with negligible importance. No interventions or clean-up actions required. No complaints anticipated. |
| | **VL+** | Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range. |
| | **L+** | Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits. |
| | **M+** | Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits. |

| | | |
|---|---|---|
| | **H+** | Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support. |
| | **VH+** | Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected. |
| **Criteria for ranking the DURATION of impacts** | **Very Short term** | Very short, always less than a year or may be intermittent (less than 1 year). Quickly reversible. |
| | **Short term** | Short-term, occurs for more than 1 but less than 5 years. Reversible over time. |
| | **Medium term** | Medium-term, 5 to 10 years. |
| | **Long term** | Long term, between 10 and 20 years. Likely to cease at the end of the operational life of the activity or because of natural processes or by human intervention. |
| | **Very long term/ permanent** | Very long, permanent, +20 years. Irreversible. Beyond closure or where recovery is not possible either by natural processes or by human intervention. |
| **Criteria for ranking the EXTENT of impacts** | **Site** | A part of the site/property. Impact is limited to the immediate footprint of the activity and within a confined area. |
| | **Whole site** | Whole site. Impact is confined to within the project area and its nearby surroundings. |
| | **Beyond site** | Beyond the site boundary, affecting immediate neighbours. |
| | **Local** | Local area, extending far beyond site boundary. |
| | **Regional/ national** | Regional/National. Impact may extend beyond district or regional boundaries with national implications. |

**Table E2: Part B – Determining Consequence.**

| PART B: DETERMINING CONSEQUENCE – APPLIES TO POSITIVE OR ADVERSE IMPACTS | | | | | | |
|---|---|---|---|---|---|---|
| | | **EXTENT** | | | | |
| | | **Site** | **Whole site** | **Beyond the site, affecting neighbours** | **Local area, extending far beyond site** | **Regional/ National** |
| **INTENSITY = VL** | | | | | | |
| **DURATION** | **Very long term /permanent** | Low | Low | Medium | Medium | Medium |
| | **Long term** | Very Low | Low | Low | Medium | Medium |
| | **Medium term** | Very Low | Low | Low | Low | Medium |
| | **Short term** | Very low | Very Low | Low | Low | Low |
| | **Very short term** | Very low | Very Low | Very Low | Very Low | Low |
| **INTENSITY = L** | | | | | | |
| **DURATION** | **Very long term /permanent** | Low | Medium | Medium | High | High |
| | **Long term** | Low | Medium | Medium | Medium | High |
| | **Medium term** | Low | Low | Medium | Medium | Medium |
| | **Short term** | Very low | Low | Low | Medium | Medium |
| | **Very short term** | Very low | Very low | Low | Low | Low |
| **INTENSITY = M** | | | | | | |
| **DURATION** | **Very long term /permanent** | Medium | Medium | High | High | Very High |
| | **Long term** | Low | Medium | Medium | High | High |
| | **Medium term** | Low | Medium | Medium | Medium | High |
| | **Short term** | Low | Low | Medium | Medium | Medium |
| | **Very short term** | Very low | Low | Low | Low | Medium |
| **INTENSITY = H** | | | | | | |
| **DURATION** | **Very long term /permanent** | Medium | High | High | Very High | Very High |
| | **Long term** | Medium | Medium | High | High | Very High |
| | **Medium term** | Low | Medium | Medium | High | High |
| | **Short term** | Low | Medium | Medium | Medium | High |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Very short term** | Very low | Low | Low | Medium | Medium |
| **INTENSITY = VH** | | | | | | |
| **DURATION** | **Very long term /permanent** | Medium | High | Very High | Very High | Very High |
| | **Long term** | Medium | High | High | Very High | Very High |
| | **Medium term** | Medium | Medium | High | High | Very High |
| | **Short term** | Low | Medium | Medium | High | High |
| | **Very short term** | Low | Low | Medium | Medium | Medium |

**Table E3: Part C – Determining Significance.**

| PART C: DETERMINING SIGNIFICANCE - APPLIES TO POSITIVE OR ADVERSE IMPACTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PROBABILITY (of exposure to impacts)** | **Definite/ Continuous** | **VH** | Very Low | Low | Medium | High | Very High |
| | **Probable** | **H** | Very Low | Low | Medium | High | Very High |
| | **Possible/ frequent** | **M** | Very Low | Very Low | Low | Medium | High |
| | **Conceivable** | **L** | Insignificant | Very Low | Low | Medium | High |
| | **Unlikely/ improbable** | **VL** | Insignificant | Insignificant | Very Low | Low | Medium |
| | | | **VL** | **L** | **M** | **H** | **VH** |
| | | | **CONSEQUENCE** | | | | |

**Table E4: Part D – Interpretation of Significance.**

| PART D: INTERPRETATION OF SIGNIFICANCE | | |
|---|---|---|
| **Significance** | | **Decision guideline** |
| **Very High** | **Very High +** | Represents a key factor in decision-making. Adverse impact would be considered a potential fatal flaw unless mitigated to lower significance. |
| **High** | **High +** | These beneficial or adverse impacts are considered to be very important considerations and must have an influence on the decision. In the case of adverse impacts, substantial mitigation will be required. |
| **Medium** | **Medium +** | These beneficial or adverse impacts may be important but are not likely to be key decision-making factors. In the case of adverse impacts, mitigation will be required. |
| **Low** | **Low +** | These beneficial or adverse impacts are unlikely to have a real influence on the decision. In the case of adverse impacts, limited mitigation is likely to be required. |
| **Very Low** | **Very Low +** | These beneficial or adverse impacts will not have an influence on the decision. In the case of adverse impacts, mitigation is not required. |
| **Insignificant** | | Inconsequential, not requiring any consideration. |

### ADDITIONAL ASSESSMENT CRITERIA

- Additional criteria that are taken into consideration in the impact assessment process to further describe the impact and support the interpretation of significance in the impact assessment process include:
- the degree to which impacts may cause irreplaceable loss of resources;
- the degree to which impacts can be avoided;
- the degree to which impacts can be reversed;
- the degree to which the impacts can be mitigated; and
- the extent to which cumulative impacts may arise from interaction or combination from other planned activities or projects is tabulated below.

**Table E5: Additional Assessment Criteria.**

| ADDITIONAL ASSESSMENT CRITERIA | | |
|---|---|---|
| **Criteria for DEGREE TO WHICH AN IMPACT CAN BE REVERSED** | **IRREVERSIBLE** | Where the impact cannot be reversed and is permanent. |
| | **PARTIALLY REVERSIBLE** | Where the impact can be partially reversed and is temporary. |
| | **FULLY REVERSIBLE** | Where the impact can be completely reversed. |
| | **NONE** | Will not cause irreplaceable loss. |

| | | |
|---|---|---|
| **Criteria for DEGREE OF IRREPLACEABLE RESOURCE LOSS** | **LOW** | Where the activity results in a marginal effect on an irreplaceable resource. |
| | **MEDIUM** | Where an impact results in a moderate loss, fragmentation or damage to an irreplaceable receptor or resource. |
| | **HIGH** | Where the activity results in an extensive or high proportion of loss, fragmentation or damage to an irreplaceable receptor or resource. |
| **Criteria for DEGREE TO WHICH IMPACT CAN BE AVOIDED** | **NONE** | Impact cannot be avoided, and consideration should be given to compensation and offsets. |
| | **LOW** | Impact cannot be avoided but can be mitigated to acceptable levels through rehabilitation and restoration. |
| | **MEDIUM** | Impact cannot be avoided, but the significance can be reduced through mitigation measures. |
| | **HIGH** | Impact can be avoided through the implementation of preventative mitigation measures. |
| **Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED** | **NONE** | No mitigation is possible or mitigation even if applied would not change the impact. |
| | **LOW** | Some mitigation is possible but will have marginal effect in reducing the impact significance rating. |
| | **MEDIUM** | Mitigation is feasible and will may reduce the impact significance rating. |
| | **HIGH** | Mitigation can be easily applied or is considered standard operating practice for the activity and will reduce the impact significance rating. |
| **Criteria for POTENTIAL FOR CUMULATIVE IMPACTS** | **UNLIKELY** | Low likelihood of cumulative impacts arising. |
| | **POSSIBLE** | Cumulative impacts with other activities or projects may arise. |
| | **LIKELY** | Cumulative impacts with other activities or projects either through interaction or in combination can be expected. |

***Mitigation measure development***

The following points present the key concepts considered in the development of mitigation measures for the proposed development.

- *Mitigation* and *performance improvement measures* and actions that address the risks and impacts[20] are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation.
- Desired outcomes are defined and have been developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation.*

***Recommendations***

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

[20] Mitigation measures should address both positive and negative impacts.

# APPENDIX F: Vegetation Type(s)

## Sekhukhune Plains Bushveld (SVcb 27)

**Table F1: Dominant & typical floristic species of *Sekhukhune Plains Bushveld* (Mucina & Rutherford, 2006).**

| | |
|---|---|
| **WOODY LAYER** | |
| **Tall Tree** | *Vachellia erioloba, Philenoptera violacea.* |
| **Small Trees** | *Senegalia mellifera* subsp. *detinens* (d), *Vachellia nilotica* (d), *Vachellia tortilis* subsp. *heteracantha* (d), *Boscia foetida* subsp. *rehmanniana* (d), *Vachellia grandicornuta, Albizia anthelmintica, Balanites maughamii, Combretum imberbe, Commiphora glandulosa, Maerua angolensis, Markhamia zanzibarica, Mystroxylon aethiopicum* subsp. *schlechteri, Ptaeroxylon obliquum, Schotia brachypetala, Ziziphus mucronata.* |
| **Succulent Tree** | *Euphorbia tirucalli* (d) |
| **Tall Shrubs** | *Searsia engleri* (d), *Cadaba termitaria, Dichrostachys cinerea, Ehretia rigida* subsp. *rigida, Grewia bicolor, Karomia speciosa, Maerua decumbens, Rhigozum brevispinosum, R. obovatum, Tinnea rhodesiana, Triaspis glaucophylla.* |
| **Low Shrubs** | *Felicia clavipilosa* subsp. *transvaalensis* (d), *Seddera suffruticosa* (d), *Gnidia polycephala, Gossypium herbaceum* subsp. *africanum, Jamesbrittenia atropurpurea, Jatropha latifolia var. latifolia, Lantana rugosa, Melhania rehmannii, Monechma divaricatum, Myrothamnus flabellifolius, Pechuel-Loeschea leubnitziae, Plinthus rehmannii.* |
| **Succulent Shrub** | *Aloe cryptopoda* (d), *Euphorbia enormis* (d), *Kleinia longiflora* (d), *Aloe castanea, A. globuligemma.* |
| **Woody Succulent Climber** | *Cynanchum viminale* |
| **FORB LAYER** | |
| **Herbaceous Climber** | *Coccinia rehmannii, Decorsea schlechteri.* |
| **Herbs** | *Ocimum filamentosum* (d), *Phyllanthus made¬raspatensis* (d), *Blepharis integrifolia, Corchorus asplenifolius, Hibiscus praeteritus, Ipomoea magnusiana.* |
| **Geophytic Herbs** | *Drimia altissima, Sansevieria pearsonii.* |
| **GRASS LAYER** | |
| **Graminoids** | *Cenchrus ciliaris* (d), *Enneapogon cenchroides* (d), *Panicum maximum* (d), *Urochloa mosambicensis* (d), *Aristida adscensionis, A. congesta, Eragrostis barbinodis, Paspalum distichum, Schmidtia pappophoroides, Stipagrostis hirtigluma* subsp. *patula, Tragus ber¬teronianus.* |

***(d) = dominant species***

**Remarks** This semi-arid bushveld is a disturbed and degraded system with many erosion dongas. However, much of the erosion can be attributed to inherent edaphic properties. The unit is situated in the Sekhukhuneland CE (Van Wyk & Smith 2001). Several endemic taxa of this unit still require formal description (Siebert et al. 2001). It is related to SVcb 28 Sekhukhune Mountain Bushveld, SVcb 23 Polokwane Plateau Bushveld and SVcb 15 Springbokvlakte Thornveld in terms of floristic diversity, species richness and vegetation structure (Breebaart & Deutschländer 1997, Siebert et al. 2002b).

# APPENDIX G: Species List

## Observed Floral Species

**Table G1: Dominant floral species encountered in the study area. Alien species are indicated with an asterisk (*).**

| SCIENTIFIC NAME | DEGRADED BUSHVELD | MODIFIED HABITAT |
|---|---|---|
| **Woody Species** | | |
| **Lantana camara* | | x |
| **Ricinus communis* | x | x |
| **Senna didymobotrya* | | x |
| *Asparagus suaveloens* | x | x |
| *Dichrostachys cinerea* | x | x |
| *Ehretia rigida* | x | x |
| *Euclea crispa* | x | |
| *Gompohocarpus fruticosus* | x | x |
| *Gossypium herbaceum* | x | |
| *Grewia flavescens* | x | x |
| *Gymnosporia buxifolia* | x | x |
| *Mundulea sericea* | x | |
| *Psiadia punctulata* | x | |
| *Schotia brachypetala* | x | |
| *Sclerocarya birrea* subsp. *caffra* | x | |
| *Searsia leptodictya* | x | |
| *Senegalia mellifera* subsp. *Detinens* | x | x |
| *Tinnea rhodesiana* | x | |
| *Vacheliia karroo* | x | x |
| *Vachellia nilotica* | x | x |
| *Ziziphus mucronata* | x | x |
| **Argemone Mexicana* | x | |
| **Argemone ochroleuca* | x | x |
| **Bidens pilosa* | | |
| **Flaveria bidentis* | x | x |
| **Gomphrena cetosoides* | x | x |
| **Hibiscus trionum* | x | |
| **Solanum elaeagnifolium* | x | x |
| **Tagetes minuta* | | |
| **Vinca major* | | |
| **Xanthium strumarium* | x | x |
| **Zinnia peruviana* | x | |
| **Herbaceous Species** | | |
| *Abutilon angultatum* | x | x |
| *Aptosimum lineare* | x | x |
| *Barleria macrostegia* | | |
| *Barleria macrostegia* | | |

| SCIENTIFIC NAME | DEGRADED BUSHVELD | MODIFIED HABITAT |
|---|---|---|
| *Commelina africana* | x | |
| *Commicarpus pentandrus* | x | |
| *Commicarpus pentandrus* | x | |
| *Dicerocaryum senecioides* | x | x |
| *Geigeria burkei* subsp. *Burkei* | x | x |
| *Raphionacme hirsuta* | x | |
| *Senna italica* subsp. *arachoides* | x | |
| *Tribulus terrestris* | x | x |
| **Succulent Species** | | |
| **Agave sisalana* | x | x |
| **Opuntia ficus-indica* | x | x |
| *Aloe Cryptopoda* | x | |
| *Eucphrobia tirucalli* | x | |
| *Kleinia stapeliiformis* | x | |
| **Graminoid Species** | | |
| *Aristida congesta* subsp. *congesta* | x | x |
| *Cynodon dactylon* | x | x |
| *Eragrosis capensis* | x | |
| *Eragrostis rigidior* | x | x |
| *Heteropogon contortus* | x | x |
| *Panicum maximum* | x | |
| *Paspalum distichum* | | |
| *Urochloa mosambicensis* | x | x |

## Observed Faunal Species

**Table G2: Mammal species or signs thereof observed within the study area.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Lepus saxatilis* | Scrub hare | LC |
| *Galerella sanguinea* | Slender Mongoose | LC |

LC = Least Concern

**Table C3: Amphibian species recorded by SAFAP for the QDS (2430CA)**

| Scientific name | Common Name | Threat Status |
|---|---|---|
| *Sclerophrys garmani* | Toad | Least Concern |
| *Sclerophrys gutturalis* | Toad | Least Concern |
| *Poyntonophrynus fenoulheti* | Fenoulhet's Toad | Least Concern |
| *Sclerophrys capensis* | Raucous Toad | Least Concern |
| *Breviceps adspersus* | Bushveld rain frog | Least Concern |
| *Kassina senegalensis* | Bubbling Kassina | Least Concern |
| *Chiromantis xerampelina* | Foam Nest Tree Frog | Least Concern |
| *Hyperolius marmoratus* | Marbled Reed Frog | Least Concern |
| *Hyperolius pusilus* | Water Lily Reed Frog | Least Concern |
| *Ptychadena oxyrhynchus* | South African Sharp Nosed Frog | Least Concern |
| *Ptychadena porosissima* | Striped Grass Froh | Least Concern |
| *Phrynobatrachus mababiensis* | Mababe Puddle Frog | Least Concern |
| *Phrynomantis bifasciatus* | Banded Rubber Frog | Least Concern |
| *Ptychadena anchietae* | Plain Grass Frog | Least Concern |
| *Pyxicephalus edulis* | African Bull Frog | Least Concern |
| *Tomopterna natalensis* | Natal Sand Frog | Least Concern |
| *Ptychadena mossambica* | Broad banded Grass Frog | Least Concern |
| *Tomopterna cryptotis* | Tremelo Sand Frog | Least Concern |

LC = Least Concern

**Table 4: Reptile species recorded on site.**

| Scientific name | Common Name | Threat Status |
|---|---|---|
| *Trachylepis varia* | Variable Skink | NYBA |

LC = Least Concern

**Table C5: Insect species recorded (*) or expected to occur on site.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Antipus* sp. | Leaf Beetle | NYBA |
| *Trinervitermes* sp. | Snouted harvester termites | NYBA |
| *Conocephalus caudatis* | Meadow Katydid | NYBA |
| **Musca domestica* | House Fly | NYBA |
| *Spialia* sp. | Sandman | NYBA |
| **Mylabris oculata* | CMR Beetle | NYBA |
| *Creoleon* sp. | Large Grassland Antlion | NYBA |
| *Amblysterna natalensis* | Jewel beetle | NYBA |
| *Acmaeodera* sp | Jewel beetle | NYBA |
| *Mylabris* sp | Blister Beetle | NYBA |
| **Acrotylus* sp | Burrowing Grasshoppers | NYBA |
| *Lycus* sp. | Net-winged Beetle | NYBA |
| **Garreta* sp | Dung Beetle | NYBA |
| **Danaus chrysippus* | African Monarch | LC |

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Sonchia sternalis* | Four-spot Leaf Beetle | NYBA |
| *Leucocelis amethustina* | Amethyst Fruit Chafer | NYBA |
| *Eupezus natalensis* | Tree Darkling Beetle | NYBA |
| *Gymnopleurus humanus* | Small Green Dung Beetle | NYBA |
| *Anomalipus elephas* | Large Armoured Darkling Beetle | NYBA |
| **Alcimus* sp. | Robber Fly | NYBA |
| *Kheper nigroaeneus* | Large Copper Dung Beetle | NYBA |
| *Protostrophus* sp | Bearded Weevils | NYBA |
| *Pachylomerus femoralis* | Flattened Giant Dung Beetle | NYBA |
| **Thermophilum homoplatum* | Two-spotted Ground Beetle | NYBA |
| *Macrotoma palmata* | Large Brown Longhorn | NYBA |
| **Anoplocnemis* sp | Twig Wilters | NYBA |
| **Anoplolepis custodiens* | Pugnacious Ant | NYBA |

LC = Least Concern, NYBA = Not Yet Been Assessed

**Table C6: Arachnid species expected to occur on site.**

| Scientific Name | Common Name | Threat Status |
|---|---|---|
| *Argiope lobate* | Black-lobed Garden Orb-web Spider | NYBA |
| *Thomisus* sp | NA | NYBA |
| *Agelena* sp. | NA | NYBA |
| Miturgidae | NA | NYBA |
| *Euryopis* sp. | NA | NYBA |
| Lycosidae | NA | NYBA |

NYBA = Not Yet Been Assessed

# APPENDIX H: Floral SCC

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. For the POC assessment, a list of Red Data Listed (RDL) species previously recorded within the 10 km of the study area was pulled from the Botanical Database of Southern Africa (BODATSA) (http://posa.sanbi.org/). This list was further cross-checked with the NEMA TOPS flora) to identify provincially protected species previously recorded for the area.

## Definitions of the national Red List categories

Categories marked with $^{N}$ are non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- $^{N}$**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- $^{N}$**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km$^2$, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km$^2$, OR

- Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
- Small global population: Less than 10 000 mature individuals.

- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.
- **Data Deficient - Insufficient Information (DDD)** A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
- **Data Deficient - Taxonomically Problematic (DDT)** A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
- **Not Evaluated (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in **Plants of southern Africa: an online checklist** are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

The below tables present the results of the POC assessment.

## NATIONALLY PROTECTED SPECIES

**Table B1: Threatened species (including Red Data Listed plant species recorded in the QDS 2430CA and near-threatened species (NT)). Species list obtained from the new Plants of southern Africa (new POSA) online catalogue. Additional species were obtained from the National Web Based Screening Tool. Information on species distributions and conservation status were derived from the Red List of South African Plants website (http://redlist.sanbi.org/index.php).**

| SCIENTIFIC NAME | POC | HABITAT AND DIAGNOSTIC CHARACTERISTICS | Occupied Area (km2) | CONSERVATION STATUS |
|---|---|---|---|---|
| **Species obtained from the new Plants of southern Africa (new POSA) online catalogue** | | | | |
| *Asparagus sekukuniensis* | Low | **Range**: Leolo Mountains, Sekhukhuneland<br>**Major habitats**: Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld<br>**Description**: Bushveld, on rocky slopes | No recent data | EN |
| *Asparagus fourei* | Low | **Range**: Limpopo.<br>**Major habitats**: Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld, Poung Dolomite Mountain Bushveld<br>**Description**: Mixed bushveld, on rocky, dolomite outcrops. | No recent data | VU |
| *Elaeodendron transvaalense* | Low | **Range**: Widespread<br>**Major habitats**: Savanna<br>**Description**: Savanna or bushveld, from open woodland to thickets, often on termite mounds | No recent data | NT |
| *Lydenburgia cassinoides* | Medium | **Range**: Roossenekal to Strydpoort Mountains<br>**Major habitats**: Savanna<br>**Description**: Exposed norite bedrock and dolomite<br>**Suitable Habitat/s:** Sekhukhune Mountain Bushveld | 2 500 km$^2$ | NT |

| SCIENTIFIC NAME | POC | HABITAT AND DIAGNOSTIC CHARACTERISTICS | Occupied Area (km2) | CONSERVATION STATUS |
|---|---|---|---|---|
| *Polygala sekhukhuniensis* | Low | **Range**: Limpopo<br>**Major habitats**: Savanna<br>**Description**: Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld | 1313 km² | VU |
| *Searsia batophylla* | Low | **Range**: Sekhukhuneland<br>**Major habitats**: Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld, Ohrigstad Mountain Bushveld<br>**Description**: Dry bushveld, in low-lying areas and along watercourses, 650-975 m. | 945 km² | VU |
| Sensitive species 1033 | Low | Not provided to protected species identity | 0.98 (under sampled) | EN |
| Sensitive species 1252 | Low | Not provided to protected species identity | No recent data | VU |

**Table B2: NFA plant list for species with a known distribution range falling within the study area[21].**

| SCIENTIFIC NAME | HABITAT AND DISTRIBUTION[22] AND [23] | NATIONAL RED LIST STATUS | POC |
|---|---|---|---|
| ***Boscia albitrunca*** | Habitat mainly includes dry, open woodland and bushveld, mostly in hot, arid, semi-desert areas, often on termitaria. The vast distribution range covers Botswana, Limpopo, Gauteng, North-West, Swaziland, the Free State, Northern Cape, and KwaZulu-Natal. It also extends into Zambia, Zimbabwe, and Mozambique. | LC | Confirmed |
| ***Balanites maughanii*** | The plants can be found in small colonies in the bushveld, sand forest, on sandstone outcrops, along riverbanks, near springs and around pans. | LC | High |
| ***Catha edulis*** | Khat is found in woodlands and on rocky outcrops. It is scattered in KwaZulu-Natal and Eastern Cape, mostly from the mistbelt, moving inland. It is also found in the Western Cape, Mpumalanga, Swaziland, Mozambique and through to tropical Africa and the Arab countries. | LC | High |
| ***Elaeodendron transvaalense*** | Savanna or bushveld, from open woodland to thickets, often on termite mounds. | NT | High |
| ***Sclerocarya birrea* subsp. *Caffra*** | The Marula is widespread in Africa from Ethiopia in the north to KwaZulu-Natal in the south. In South Africa it is more dominant in the Baphalaborwa area in Limpopo. It occurs naturally in various types of woodland, on sandy soil or occasionally sandy loam. | LC | Confirmed |
| ***Philenoptera violacea*** | Alluvial flats in bushveld | LC | Medium |
| ***Pittosporum viridiflorum*** | *Pittosporum viridiflorum* is widely distributed in the eastern half of South Africa, occuring from the Western Cape up into tropical Africa and beyond to Arabia and India. It grows over a wide range of altitudes and varies in form from one location to another. *Pittosporum viridiflorum* grows in tall forest and in scrub on the forest margin, kloofs and along stream banks. | LC | Medium |
| ***Prunus africana*** | *Prunus africana* is confined to evergreen forests from near the coast to the mist belt and montane forests in KwaZulu-Natal, Eastern Cape, Swaziland, Mpumalanga, Zimbabwe, and tropical Africa. This | VU | Low |

[21] https://www.thetreeapp.co.za/team/
[22] http://pza.sanbi.org/
[23] http://redlist.sanbi.org/index.php

| SCIENTIFIC NAME | HABITAT AND DISTRIBUTION[22] AND [23] | NATIONAL RED LIST STATUS | POC |
|---|---|---|---|
| | It is a moderately fast-growing tree which is sensitive to heavy frost, preferring areas where there is regular rain; it will tolerate moderate frosts. | | |
| ***Vachellia erioloba*** | Found in dry woodland, bushveld, grassland, and watercourses in arid areas usually on stony or sandy soil. Widespread in the arid northern provinces of South Africa, also Namibia, Botswana, Zimbabwe, southern Angola, and south-western Zambia. | LC | Low |

**CR=** Critically Endangered**, EN=** Endangered**, EW =** Extinct in the Wild**, LC = Least Concern; NT =** Near Threatened**, VU=** Vulnerable**, P=** Protected, POC = Probability of Occurrence

# Provincially Protected Flora

**Table B3: Protected Plants (Schedule 12) for the Limpopo Province.**

| Common name | Scientific name | POC |
|---|---|---|
| **Trees and Shrubs** | | |
| The following Adenia species | *Adenia fruticosa simpliciflora* | **Low** |
| Baobab | *Adansonia digitata* | **Low** |
| Beech | *Faurea macnaughtonii* | **Low** |
| Bitter False Thorn | *Albizia amara sericocephala* | **Low** |
| The following Boscia species | *Boscia angustifolia var. corymbosa* | **Low** |
| | *Boscia foetida minima* | **Low** |
| Borassus Palm | *Borassus aethiopicum* | **Low** |
| Brackenridgea | *Brackenridgea zanguebarica* | **Low** |
| Capper Bush | *Capparis sepiaria var. subglabra* | **Low** |
| The following Combretum species | *Combretum collinum taborense* | **Low** |
| | *Combretum padoides* | **Low** |
| | *Combretum petrophilum* | **Low** |
| | *Combretum vendae* | **Low** |
| The following Commiphora species | *Commiphora zanzibarica* | **Low** |
| Currant | *Allophylus ainifolius* | **Low** |
| The following elephantorrhiza species | *Elephantorrhiza praetermissa* | **Medium** |
| The following Grewia species | *Grewia rogersii* | **Low** |
| The following Hibiscus species | *Hibiscus articulatus* | **Low** |
| | *Hibiscus barnardii* | **Low** |
| | *Hibiscus sabiensis* | **Low** |
| Large Cape Myrtle | *Myrsine pillansii* | **Low** |
| Largeleaved Dragon Tree | *Dracaena hookerana* | **Low** |
| Largeleaved Saucerberry | *Cordia africana* | **Low** |
| The following Maytenus species | *Maytenus oxycarpa* | **Low** |
| | *Maytenus pubescens* | **Low** |
| The following Ochna species | *Ochna glauca* | **Low** |
| Pepperbark Tree | *Warburgia salutaris* | **Low** |
| Pincushion | *Leucospermum saxosum* | **Low** |
| The following Rhus species | *Searsia batophylla* | **Low** |
| Sand ironplum | *Drypetes mossambicensis* | **Low** |
| Salati Palm | *Borassus aethiopicum* | **Low** |
| Stinkwood, Black | *Ocotea bullata* | **Low** |
| Stinkwood, Transvaal | *Ocotea kenyensis* | **Low** |
| Tamboti | *Spirostachys africana* | **High** |
| The following Tarenna species | *Tarenna zygoon* | **Low** |

| Common name | Scientific name | POC |
|---|---|---|
| Transvaal Red Balloon | *Erythrophysa transvaalensis* | Low |
| Venda Beadstring | *Alchornea laxiflora* | Low |
| Wild Banana | *Ensete ventricosum* | Low |
| Wild Teak | *Pterocarpus angolensis* | Low |
| Yellowwood, Outeniqua | *Podocarpus latifolius* | Low |
| Yellowwood, Real | *Podocarpus falcatus* | Low |
| **Succulents** | | |
| **All species of aloes indigenous to the Province excluding the following species:** | | **Confirmed** |
| Aculeata | *Aloe aculeata* | |
| Aloe Catstail | *Aloe castanea* | |
| Aloe Krans | *Aloe arborescens* | |
| Aloe Mountain | *Aloe marlothii* | |
| Ammophilla | *Aloe ammophilla* | |
| Davyana | *Aloe davyana* | |
| Fosteri | *Aloe fosteri* | |
| Globuligemma | *Aloe globuligemma* | |
| Grandidentata | *Aloe grandidentata* | |
| Greatheadii | *Aloe greatheadii* | |
| Lutescens | *Aloe lutescens* | |
| Mutans | *Aloe mutans* | |
| Parvibracteata | *Aloe parvibracteata* | |
| Transvaalensis | *Aloe transvaalensis* | |
| Wickensii | *Aloe wickensii* | |
| All species of Brachystelma | *Brachystelma spp* | Low |
| All species of Ceropegia | *Ceropegia spp* | Low |
| All species of Duvalia | *Duvalia spp* | Low |
| The following species Euphorbias: | *Euphorbia barnardii* | Low |
| | *Euphorbia divicola* | Low |
| | *Euphorbia grandialata* | Low |
| | *Euphorbia groenewaldii* | Low |
| | *Euphorbia louwii* | Low |
| | *Euphorbia restricta* | Low |
| | *Euphorbia rowlandii* | Low |
| | *Euphorbia tortirama* | Low |
| | *Euphorbia waterbergensis* | Low |
| Ghaap | *Hoodia lugardii* | Low |
| All species of Ghaap | *Tavaresia spp* | Low |
| All species of Huernia | *Huernia spp* | High |
| All species of Huerniopsis | *Huerniopsis spp* | Low |
| The following Impala Lilies | *Adenium multiflorum* | Low |
| Multiflorum en Oleifolium | *Adenium olefolium* | Low |
| Kudu Lily | *Pachypodium saundersii* | Low |
| All species of Orbeanthus | *Orbeanthus spp* | Low |
| All species of Orbeas | *Orbea spp* | High |
| All species of Orbeopsis | *Orbeopsis spp* | Low |
| All species of Pachycymbiums | *Pachycymbium spp* | Low |
| All species of Riocreuxias | *Riocreuxia spp* | Low |
| All species of Stapeliads | *Stapelia spp* | High |
| Stone Plant | *Lithops leslieii* | Low |
| **Other Plants** | | |

| Common name | Scientific name | POC |
|---|---|---|
| The following Agapanthus species | *Agapanthus coddii, A. dyeri* | Low |
| The following Anacampseros species | *Anacampseros bemenkampii (now A. rhodesica)* | Low |
| All species of Anomatheca | *Anomatheca spp* | Low |
| The following Anthericum species | *Anthericum cyperaceum* | Low |
| The following Babiana Species | *Babiana hypogea var. longituba* | Low |
| Batesiana Gasteria | *Gasteria batesiana* | Low |
| Blue Squill | *Merwilla plumbea* | Low |
| Clivia | *Clivia caulescens* | Low |
| The following Cyathula species | *Cyathula natalensis* | Low |
| The following Eragrostis species | *Eragrostis arenicola* | Low |
| The following Eriosema species | *Eriosema transvaalense* | Low |
| The following Eulophia species | *Eulophia coddii* | Low |
| | *Eulophia leachii* | Low |
| The following Felicia species | *Felicia fruticosa brevipendunculata* | Low |
| The following Festuca species | *Festuca dracomontana* | Low |
| All species of Fire Lily | *Cyrtanthus spp* | Low |
| The following Freylinia species | *Freylinia tropica* | Low |
| The following Gladiolus species | *Gladiolus macneilii* | Low |
| The following Habernaria species | *Habernaria kraenzliniana* | Low |
| The following Heinsia species | *Heinsia crinita* | Low |
| The following Hermstaedtia species | *Hermstaedtia capitata* | Low |
| The following Hippocratea species | *Hippocratea parvifolia* | Low |
| The following Hymenodictyon species | *Hymenodictyon parvifolium parvifolium* | Low |
| The following Hyptis species | *Hyptis spicigera* | Low |
| The following Inula species | *Inula paniculata* | Low |
| The following Jasminum species | *Jasminum abyssinbicum* | Low |
| The following Kalanchoe species | *Kalanchoe crundallii* | Low |
| | *Kalanchoe rogersii* | Low |
| The following Kniphofia species | *Kniphofia coralligemma* | Low |
| | *Kniphofia crassifolia* | Low |
| | *Kniphofia rigidifolia* | Low |
| The following Kotschya species | *Kotschya thymodora* | Low |
| The following Melinus species | *Melinus tenuissima* | Low |
| The following Mondia species | *Mondia whitei* | Low |
| The following Monsonia species | *Monsonia lanuginosa* | Low |
| The following Neobulosia species | *Neobulosia tysonii* | Low |
| The following Nervillia species | *Nervillia umbroza* | Low |
| The following Nymphaea species | *Nymphaea lotus* | Low |
| The following Oberonia species | *Oberonia distichia* | Low |
| The following Oreosyce species | *Oreosyce africana* | Low |
| Paint Brush | *Haemanthus montanus* | Low |
| The following Peristrophe species | *Peristrophe cliffordii* | Low |
| | *Peristrophe gililandorum* | Low |
| | *Peristrophe transvaalensis* | Low |
| The following Phyllanthus species | *Phyllanthus pinnatus* | Low |
| The following Pilea species | *Pilea rivularis* | Low |
| The following Plinthus species | *Plinthus rehmannii* | Low |
| The following Polycarpea species | *Polycarpia eriantha var. effusa* | Low |
| The following Polystachya species | *Polystachia albescens imbricata* | Low |

| Common name | Scientific name | POC |
|---|---|---|
| The following Portulaca species | *Portulaca foliosa* | Low |
| | *Portulaca trianthemoides* | Low |
| The following Rhyncosia species | *Rhyncosia vendae* | Low |
| Royal Paint Brush (Blood lily) | *Scadoxis puniceus* | High |
| The following Sartidia species | *Sartidia jucunda* | Low |
| The following Schizagyrium species | *Schizagyrium brevifolium* | Low |
| All species of South African Orchid | *Family Orchidaceae* | High |
| The following Stadmania species | *Stadmania oppositifolia* | Low |
| The following Streptocarpus species | *Streptocarpus decipiens* | Low |
| The following Strophanthus species | *Strophanthus luteolus* | Low |
| The following Sutera species | *Sutera maerantha* | Low |
| The following Thorncroftia species | *Thorncroftia media* | Low |
| All species of Tree Ferns | *Cyathea spp* | Low |
| All species of Tree Moss | *Porothamnium, Pilotrichella and Papillaria spp* | Low |
| The following Trilepisium species | *Trilepisium madagascariensis* | Low |
| The following Tristachya species | *Tristachya trifaria* | Low |
| The following Turbina species | *Turbina shirensis* | Low |
| The following Watsonia species | *Watsonia densiflora* | Low |
| | *Watsonia transvaalensis* | Low |
| | *Watsonia wilmsii* | Low |
| Wild Ginger | *Burmannia madagascariensis* | Low |
| Wild Ginger | *Siphonochilus aethiopicus* | Low |
| The following Xylopia species | *Xylopia parviflora* | Low |

# APPENDIX I: Faunal SCC

## Faunal Species of Conservation Concern

**Table I1: Red Data Mammal species listed in the Limpopo SoER 2004 report including IUCN status.**

| Scientific name | Common Name | Limpopo SoER 2004 Status | IUCN Red List Status | POC |
|---|---|---|---|---|
| *Diceros bicornis* | Black Rhinoceros | CR | CR | L |
| *Neamblysomus julianae* | Juliana's golden mole | CR | VU | L |
| *Loxodonta africana* | African elephant | VU | VU | L |
| *Lycaon pictus* | African wild dog | EN | EN | L |
| *Amblysomus gunningi* | Gunning's golden mole | VU | EN | L |
| *Lutra maculicollis* | Spotted-necked otter | VU | LC | L |
| *Acinonyx jubatus* | Cheetah | VU | VU | L |
| *Felis lybica* | African Wild Cat | VU | NYBA | L |
| *Panthera leo* | Lion | VU | VU | L |
| *Ceratotherium simum* | White rhinoceros | NT | NT | L |

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN.

**Table I2: Red Data Bird species listed in the Limpopo SoER 2004 report including IUCN status.**

| Scientific name | Common Name | Limpopo SoER 2004 Status | IUCN Red List Status | POC |
|---|---|---|---|---|
| *Gyps coprotheres* | Cape Vulture | T | VU | L |
| *Ciconia nigra* | Black Stork | T | LC | L |
| *Falco naumanni* | Lesser Kestrel | T | LC | L |
| *Certhilauda chuana* | Short-clawed Lark | T | LC | L |
| *Pterocles gutturalis* | Yellow throated Sandgrouse | T | LC | L |
| *Anthropoides paradiseus* | Blue Crane | T | VU | L |
| *Gyps africanus* | White backed Vultures | T | EN | L |
| *Ardeotis kori* | Kori Bustard | T | LC | L |
| *Scotopelia peli* | Pel's Fishing Owl | T | LC | L |
| *Bucorvus leadbeateri* | Southern Ground Hornbill | T | VU | L |
| *Buphagus erythrorhynchus* | Red-billed Oxpecker | T | LC | L |
| *Terathopius ecaudatus* | Bateleur | T | NT | L |
| *Polemaetus bellicosus* | Martial Eagle | T | NT | L |
| *Aquila rapax* | Tawny Eagle | T | LC | L |
| *Torgos tracheliotos* | Lappet faced Vulture | T | VU | L |
| *Trigonoceps occipitalis* | White headed Vulture | T | VU | L |
| *Buphagus africanus* | Yellow billed Oxpecker | T | LC | L |
| *Stephanoaetus coronatus* | Crowned hawk Eagle | T | NT | L |

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province

**Table I3: Red Data Amphibian species listed in the Limpopo SoER 2004 report including IUCN status.**

| Scientific name | Common Name | Limpopo SoER 2004 Status | IUCN Red List Status | POC |
|---|---|---|---|---|
| *Breviceps sylvestris* | Transvaal forest rain frog | VU | EN | L |
| *Ptychadena uzungwensis* | | P | LC | L |
| *Leptopelis bocagii* | | P | LC | L |
| *Hemisus guineensis* | Guinea Snout-burrower | P | LC | L |

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

**Table I4: Red Data Reptile species listed in the Limpopo SoER 2004 report including IUCN status.**

| Scientific name | Common Name | Limpopo SoER 2004 Status | IUCN Red List Status | POC |
|---|---|---|---|---|
| *Homoroselaps dorsalis* | Striped Harlequin snake | R | NT | L |
| *Xenocalamus transvaalensis* | Transvaal Quill-snout snake | R | DD | L |
| *Lamprophis swazicus* | Swazi Rock Snake | R | NT | L |
| *Python natalensis* | African Python | VU | NYBA | L |
| *Lygodactylus methueni* | Methuen's Dwarf Gecko | VU | VU | L |
| *Crocodylus niloticus* | Nile Crocodile | VU | LC | L |
| *Lycophidion variegatum* | Variegated Wolf snake | P | NYBA | L |
| *Psammophis jallae* | Jalla's Sand snake | P | NYBA | L |

R = Rare, DD = Data Deficient, LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

**Table I5: Red Data Invertebrates species mentioned in the Limpopo SoER 2004 report including IUCN status.**

| Scientific name | Common Name | Limpopo SoER 2004 Status | IUCN Red List Status | POC |
|---|---|---|---|---|
| *Taurhina splendens* | Splendid fruit chafer * | T | NYBA | L |
| *Charaxes marieps* | Marieps Charaxes butterfly | T | NYBA | L |
| *Trichostetha fasicularis* | Protea beetle * | T | NYBA | L |
| *Ischnestoma ficqui* | Fruit eating beetles * | T | NYBA | L |

R = Rare, DD = Data Deficient, LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province. * Very little detailed or general information exists on terrestrial invertebrates in the Limpopo Province, thus in general there is very little consolidated information regarding invertebrates (Limpopo SOER, 2004).

**Table I6: Animal species triggering the high sensitivity for the Animal Species Theme as identified by the National Web-based Screening Tool.**

| Scientific name | Common Name | IUCN | POC |
|---|---|---|---|
| *Kinixys lobatiana* | Hingeback Tortoise | VU | L |
| *Aroegas fuscus* | Brown False Shieldback | EN | L |
| *Crocidura maquassiensis* | Makwassie musk shrew | VU | L |

# APPENDIX J: Declaration and Specialists CV's

**1. 1. (a) (i) Details of the specialist who prepared the report**

| | |
|---|---|
| Samantha-Leigh Daniels | PhD Plant Science (University of Pretoria) |
| Christien Steyn | MSc Plant Science (University of Pretoria) |
| Christopher Hooton | BTech Nature Conservation (Tshwane University of Technology) |
| Stephen van Staden | MSc Environmental Management (University of Johannesburg) |

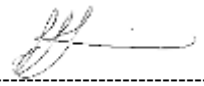
**1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae**

| Company of Specialist: | Scientific Terrestrial Services |
|---|---|
| Name / Contact person: | Stephen van Staden |
| E-mail: | stephen@sasenvgroup.co.za |
| Qualifications | MSc (Environmental Management) (University of Johannesburg)<br>BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)<br>BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) |
| Registration / Associations | Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)<br>Accredited River Health Practitioner by the South African River Health Program (RHP)<br>Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum<br>Member of the Gauteng Wetland Forum<br>Member of International Association of Impact Assessors (IAIA) South Africa<br>Member of the Land Rehabilitation Society of South Africa (LaRSSA) |
| Name / Contact person: | Samantha Leigh Daniels |
| E-mail: | samantha@sasenvgroup.co.za |
| Qualifications | PhD (Plant Science) (University of Pretoria)<br>MSc (Plant Science) (University of Pretoria)<br>BSc (Hons) Zoology & Entomology (University of Pretoria)<br>BSc Zoology & Entomology (University of Pretoria) |
| Registration / Associations | Member of the South African Association of Botanists (SAAB)<br>Member of the Botanical Society of South Africa (BotSoc)<br>Member of the Association for Tropical Biology and Conservation (ATBC) |
| Name / Contact person: | Chris Hooton |
| E-mail: | chris@sasenvgroup.co.za |
| Qualifications | BTech Nature Conservation (Tshwane University of Technology)<br>National Diploma Nature Conservation (Tshwane University of Technology) |
| Name / Contact person: | Christien Steyn |
| E-mail: | christien@sasenvgroup.co.za |
| Qualifications | MSc Plant Science (University of Pretoria)<br>BSc (Hons) Plant Science (University of Pretoria)<br>BSc (Environmental Science) (University of Pretoria) |
| Registration / Associations | Professional member of the South African Council for Natural Scientific Professions (SACNASP)<br>Member of the South African Association of Botanists (SAAB)<br>Member of the Botanical Society of South Africa (BotSoc)<br>Member of the Grassland Society of South Africa (GSSA)<br>Member of the Land Rehabilitation Society of Southern Africa (LARSSA)<br>Member of the South African Wildlife Management Association (SAWMA) |

**1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority**

I, Samantha Daniels, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



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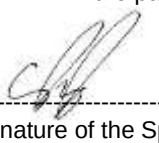
Signature of the Specialist

I, Chris Hooton, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



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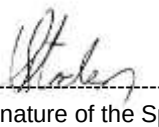
Signature of the Specialist

I, Stephen van Staden, declare that -

- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



---

Signature of the Specialist

I, Christien Steyn, declare that -

- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

---

Signature of the Specialist

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Floral Ecologist |
| Joined SAS Environmental Group of Companies | 2020 |

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)
Member of the Association for Tropical Biology and Conservation (ATBC)

### EDUCATION

**Qualifications**

| | |
|---|---|
| PhD (Plant Science) (University of Pretoria) | 2023 |
| MSc (Plant Science) (University of Pretoria) | 2017 |
| BSc (Hons) Zoology & Entomology (University of Pretoria) | 2014 |
| BSc Zoology & Entomology (University of Pretoria) | 2013 |

### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Free State. Northern Cape, Eastern cape

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Alien and Invasive Control Plan (AICP)
- Terrestrial Monitoring
- Desktop Studies, Mapping and Background Information Research

**Training**

- Plant species identification
- Herbarium usage and protocols

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF CHRISTIEN STEYN

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Floral Ecologist |
| Joined SAS Environmental Group of Companies | 2018 |

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 127823/21)
Member of the Botanical Society of South Africa (BotSoc)
Member of the Grassland Society of South Africa (GSSA)
Member of the Land Rehabilitation Society of Southern Africa (LARSSA)
Member of the South African Association of Botanists (SAAB)
Member of the South African Wildlife Management Association (SAWMA)

### EDUCATION

**Qualifications**

| | |
|---|---|
| MSc Plant Science (University of Pretoria) | 2017 |
| BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria) | 2014 |
| BSc Environmental Science (University of Pretoria) | 2013 |

**Short courses and Training**

- BotSoc Branch: Species Environmental Assessment Guidelines Course (2022).
- Advanced Grass Identification Course (2021).
- Practical Plant Identification, including Herbarium Usage and Protocols.
- Vegetation Classification and Mapping: Use of Geographic Information System for understanding vegetation pattern and biodiversity conservation.
- Introduction to Statistics for Biologists: Applications of plant ecology principles in plant conservation, i.e., species distribution modelling, alien plant invasions, conservation planning.
- International Plant Functional Trait Course: Hands-on, field-based exploration of plant functional traits, along with experience in the usage of plant traits data in climate-change research and ecosystem ecology. https://www.uib.no/en/rg/EECRG/97477/plant-functional-traits-course-2

### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Input into Terrestrial Rehabilitation Plan design with the focus on the re-establishment of vegetation
- Floral Rescue and Relocation Plans
- Alien and Invasive Plant Control and Management Plans (AIPCPs)
- Alien and Invasive Plant Identification and awareness training
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Desktop Studies, Mapping and Background Information Research

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

# CURRICULUM VITAE OF CHRISTOPHER HOOTON

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist, Member<br>Biodiversity Specialist |
| Joined SAS Environmental Group of Companies | 2013 |

### EDUCATION

**Qualifications**

| | |
|---|---|
| BTech Nature Conservation (Tshwane University of Technology) | 2013 |
| National Diploma Nature Conservation (Tshwane University of Technology) | 2008 |

### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State
**Africa** - Zimbabwe, Sierra Leone

### KEY SPECIALIST DISCIPLINES

**Biodiversity Assessments**

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

**Freshwater Assessments**

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning

## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

## CURRICULUM VITAE OF STEPHEN VAN STADEN

### PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist |
| Joined SAS Environmental Group of Companies | 2003 (year of establishment) |

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health Practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

### EDUCATION

**Qualifications**

| | |
|---|---|
| MSc Environmental Management (University of Johannesburg) | 2003 |
| BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) | 2001 |
| BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | 2000 |

**Short Courses**

| | |
|---|---|
| Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs | 2017 |
| Tools for Wetland Assessment (Rhodes University) | 2017 |
| Legal liability training course (Legricon Pty Ltd) | 2018 |
| Hazard identification and risk assessment training course (Legricon Pty Ltd) | 2018 |
| Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State) | 2018 |
| Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy) | 2018 |

### AREAS OF WORK EXPERIENCE

**South Africa** – All Provinces
**Southern Africa** – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
**Eastern Africa** – Tanzania Mauritius
**West Africa** – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
**Central Africa** – Democratic Republic of the Congo

### DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

### KEY SPECIALIST DISCIPLINES

**Legislative Requirements, Processes and Assessments**

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

**Freshwater Assessments**

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning

- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

**Aquatic Ecological Assessment and Water Quality Studies**

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

**Biodiversity Assessments**

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan

**Soil and Land Capability Assessment**

- Soil and Land Capability Assessment
- Hydropedological Assessment

**Visual Impact Assessment**

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments