



**SCIENTIFIC TERRESTRIAL SERVICES**

## **Terrestrial Biodiversity Assessment**

**AS PART OF THE ENVIRONMENTAL  
AUTHORISATION PROCESS FOR THE  
PROPOSED DEVELOPMENT OF A VENT  
SHAFT, OVERHEAD POWERLINES AND  
A SUBSTATION AT THE DWARSRIVER  
CHROME MINE, LIMPOPO PROVINCE.**

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Part of the SAS Environmental Group of Companies

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## EXECUTIVE SUMMARY

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Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Impact Assessment (EIA) in order to obtain Environmental Authorisation (EA) for the proposed development of vent shafts, overhead powerlines and a substation associated with the Dwarsrivier Chrome Mine (DCM), near Steelpoort, Limpopo Province. The proposed vent shafts and substation are to be developed within the study area and proposed powerline. The DCM is located in the Dwars River Valley, approximately 13 km south of the town of Steelpoort and approximately 5.5 km west of the Mpumalanga/Limpopo Province border within the Greater Tzaneen Local Municipality and the Greater Sekhukhune District Municipality, Limpopo Province. The R555 is situated approximately 10 km northwest of the DCM, with the R37 situated approximately 19 km east of the DCM.

No site assessment was undertaken for this project. Data from previous studies undertaken by STS for the mine, notably the Biodiversity Action Plan and Monitoring Program (2018, 2021, 2022) as well as the Protected Plant Marking for the for the Truck Parking Area (2018) were used to develop this report.

### **Desktop assessment results:**

The study area is located within the Savanna Biome (and Central Bushveld Bioregion) and is associated with the Sekhukhune Mountain Bushveld. Both the 2018 National Biodiversity Assessment (NBA) and the 2021 updated Red List of Ecosystems database indicates that the Sekhukhune Mountain Bushveld is of Least Concern (LC), poorly protected, and endemic to South Africa.

The majority of the proposed development is located within an Ecological Support Area (ESA) 1, with only a small portion being located in an area listed as No Natural Areas Remaining.

### **Habitat and Species Summaries:**

The below broad habitat units could be distinguished within the study area:

- **Mixed Bushveld;**
- **Secondary Bushveld; and**
- **Transformed Habitat.**

From a floral and faunal perspective, the proposed activities will result in the clearance of vegetation that is of moderately high sensitivity, of moderately low sensitivity and low sensitivity. With mitigation measures implemented, no significant or residual loss of floral or faunal communities are anticipated. Furthermore, given the small extent of ESA 1 habitat impacted and the already fragmented state of the study area from the adjacent natural areas, the loss of ESA 1 habitat is not regarded significant.

The proposed activities are unlikely to impact on RDL species; however, a walkdown of the study area is recommended, to confirm the indicated positions of the floral SCC as per Section 3, as these points represent historical data and inaccuracies and changes may have occurred over time. No faunal SCC were observed during the site assessment, however, it remains possible that faunal SCC may, periodically, forage within the study area, though this is likely to be relatively infrequent. Given the small extent of the study area and the low likelihood of faunal SCC being present, the proposed development is unlikely to pose a significant threat to faunal SCC.

It is the opinion of the ecologists that the proposed development is unlikely to result in significant impacts to the receiving environment provided all mitigation measures are implemented. This study is deemed to provide 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 and proposed powerline will be made in support of the principle of sustainable development.

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## DOCUMENT GUIDE

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

Theme-Specific Requirements as per Government Notice No. 320		
Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
2	<b>Terrestrial Biodiversity Specialist Assessment</b>	
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	<b>The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:</b>	
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
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: <ul style="list-style-type: none"> <li>a) main vegetation types;</li> <li>b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;</li> <li>c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and</li> <li>d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;</li> </ul>	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	<b>The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:</b>	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: <ul style="list-style-type: none"> <li>a) the reasons why an area has been identified as a CBA;</li> <li>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;</li> <li>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);</li> <li>d) the impact on ecosystem threat status;</li> <li>e) the impact on explicit subtypes in the vegetation;</li> <li>f) the impact on overall species and ecosystem diversity of the site; and</li> <li>g) the impact on any changes to threat status of populations of species of conservation concern in the CBA;</li> </ul>	Section 3 (desktop analysis) and 4
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including:	





	<ul style="list-style-type: none"> <li>a) <i>the impact on the ecological processes that operate within or across the site;</i></li> <li>b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i></li> <li>c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i></li> </ul>	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2003 including- <ul style="list-style-type: none"> <li>a) <i>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;</i></li> </ul>	Section 3 (desktop analysis)
2.3.7.4	Priority areas for protected area expansion, including- <ul style="list-style-type: none"> <li>a) <i>the way in which the proposed development will compromise or contribute to the expansion of the protected area network;</i></li> </ul>	Section 3 (desktop analysis)
2.3.7.5	SWSAs including: <ul style="list-style-type: none"> <li>a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i></li> <li>b) <i>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);</i></li> </ul>	Section 3 (desktop analysis)
2.3.7.6	FEPA sub catchments, including- <ul style="list-style-type: none"> <li>a) <i>the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;</i></li> </ul>	Not Applicable
2.3.7.7	Indigenous forests, including: <ul style="list-style-type: none"> <li>a) <i>impact on the ecological integrity of the forest; and</i></li> <li>b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i></li> </ul>	Not Applicable
<b>2.4</b>	<b>The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.</b>	
	Results of the <b>Floral Assessment</b> as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities and the results of the <b>Faunal Assessment</b> as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities are in <b>Sections 4 – 6</b> .	
<b>3</b>	<b>Terrestrial Biodiversity Specialist Assessment Report</b>	
<b>3.1</b>	<b>The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:</b>	
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
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 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
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
	<b>Impact Assessment Requirements</b> <ul style="list-style-type: none"> <li>3.1.7 Additional environmental impacts expected from the proposed development;</li> <li>3.1.8 Any direct, indirect and cumulative impacts of the proposed development;</li> <li>3.1.9 The degree to which impacts and risks can be mitigated;</li> <li>3.1.10 The degree to which the impacts and risks can be reversed;</li> <li>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;</li> </ul>	Section 6



	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;	<b>Not Applicable to this report</b>
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 6
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.	



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## GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson et al. (2011), Hui and Richardson (2017), Wilson et al. (2017), Skowno et al. (2019), and SANBI (2016), 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), and the associated Alien and Invasive Species Regulations, 2020].

<b>Alien species</b> (syn. <b>exotic species</b> ; <b>non-native species</b> )	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.
<b>Baseline</b> (IEM Series)	Conditions that currently exist. Also called “existing conditions”.
<b>Baseline information</b> (IEM Series)	Information derived from data that: <ul style="list-style-type: none"> <li>- records the existing elements and trends in the environment; and</li> <li>- records the characteristics of a given project proposal.</li> </ul>
<b>Biological diversity or Biodiversity (as per the definition in NEMBA)</b>	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.
<b>Biodiversity priority areas</b>	<p>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 Focus Areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future.</p> <p>The different categories <i>are not mutually exclusive</i> and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be <i>complementary</i>, with overlaps <i>reinforcing the importance</i> of an area.</p>
<b>Biome - as per Mucina and Rutherford (2006)</b>	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).
<b>Bioregion (as per the definition in NEMBA)</b>	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act.
<b>Carrying Capacity</b>	The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.
<b>Community Characterisation</b>	<p>Comparisons can be made among communities using attributes such as species-richness, species diversity, and evenness.</p> <ul style="list-style-type: none"> <li>- <b>Species-richness</b> is simply the number of species in a community.</li> <li>- <b>Species diversity</b> is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species.</li> <li>- <b>Species evenness</b> 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.</li> </ul> <p>Source: <a href="https://tinyurl.com/2p9yr3j8">https://tinyurl.com/2p9yr3j8</a></p>



<b>Corridor</b>	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
<b>Critical Biodiversity Area (CBA)</b>	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
<b>Critically Endangered (CR) (IUCN<sup>1</sup> Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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.
<b>Development footprint (as per the NEMA definition)</b>	"in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity"
<b>Degradation</b>	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.
<b>Disturbance</b>	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.
<b>Driver (ecological)</b>	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.
<b>Ecological Condition</b>	<p>"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".</p> <p>Various terminology can be used for precision of language:</p> <ul style="list-style-type: none"> <li>- <u>Fair ecological condition</u>: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem.</li> <li>- <u>Good ecological condition</u>: Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem.</li> <li>- <u>Poor ecological condition</u>: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.</li> </ul>
<b>Ecological processes</b>	The functions and processes that operate to maintain and generate biodiversity. In order to include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped.
<b>Ecological Support Area (ESA)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Ecoregion</b>	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
<b>Endangered (EN) (IUCN Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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.

<sup>1</sup> International Union for Conservation of Nature (IUCN)



<b>Endemic species</b>	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.
<b>Fatal flaw (IEM Series)</b>	Any problem, issue, or conflict (real or perceived) that could result in proposals being rejected or stopped.
<b>Faunal Class</b>	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.
<b>Ground-truth</b>	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.
<b>Habitat (As per the definition in NEMBA)</b>	A place where a species or ecological community naturally occurs.
<b>Habitat loss</b>	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.
<b>Impact (IEM Series, draft Offset policy, and NEMA)</b>	<p>The positive or negative effects on human well-being and/or on the environment.</p> <p>Impact-related terminology:</p> <ul style="list-style-type: none"> <li>- <u>Cumulative impact</u>: Past, current and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.</li> <li>- <u>Impact Significant/significance</u>: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts.</li> <li>- <u>Residual negative impacts</u>: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years (<i>It is acknowledged that the time it takes for full restoration differs from ecosystem type to ecosystem type, as well as the local conditions. Given that there is no readily accessible information on the recovery times of the different ecosystem types in South Africa, a general timeframe had to be used. The 30-year general timeframe in the definition of "residual impact" reflects that the difficulty in restoring South African ecosystems once they have been disturbed. It is based on the risk-averse and cautious approach.</i>).</li> <li>- <u>Significant impact</u>: An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds, or targets.</li> </ul>
<b>Important Bird and Biodiversity Area (IBA)</b>	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.
<b>Indigenous vegetation (As per the definition in NEMA)</b>	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.
<b>Integrity (ecological)</b>	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.



<b>Invasive species</b>	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.
<b>Listed invasive species</b>	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
<b>Least Threatened</b>	Least threatened ecosystems are still largely intact.
<b>Native species (syn. indigenous species)</b>	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).
<b>Near Threatened (according to IUCN)</b>	Close to being at high risk of extinction in the near future.
<b>Niche (ecological)</b>	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.
<b>Protected</b>	Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA.
<b>Red Data Listed (RDL) species</b>	According to the Red List of South African plants ( <a href="http://redlist.sanbi.org/">http://redlist.sanbi.org/</a> ) 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.
<b>Refugia (ecological)</b>	Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting.
<b>Resource (ecological)</b>	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.
<b>Species of Conservation Concern (SCC)</b>	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.
<b>Termitaria</b>	Colonies of termites, typically within a tall mound of cemented earth.
<b>Threatened ecosystem</b>	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.
<b>Threatened species</b>	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.
<b>Trophic (ecological)</b>	Refers to feeding and nutrition.
<b>Vulnerable (VU) (Red List category)</b>	<b>Applied to both species/taxa and ecosystems:</b> 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

AIP	Alien and Invasive Plant
BAP	Biodiversity action plan
BGIS	Biodiversity Geographic Information Systems
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
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
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
FMP	Fire Management Plan
GIS	Geographic Information Systems
GN	Government Notice
Ha	Hectares
HGM	Hydrogeomorphic
IBA	Important Bird and Biodiversity Area
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
km	kilometre
LC	Least Concern
LEMA	Limpopo Environmental Management Act, 2003 [Act No.7 of 2003]
MAP	Mean annual precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
MRA	Mining Right Area
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]
NEMPAA	National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]
NFA	National Forest Act, 1998 [Act No. 84 of 1998]
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Area Expansion Strategy
NT	Near-threatened
NYBA	Not Yet Assessed
QDS	Quarter Degree Squares
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 Professions
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SCPE	Sekhukhune Centre of Plant Endemism





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<b>km<sup>2</sup></b>	square kilometre
<b>STS</b>	Scientific Terrestrial Services [Pty] Ltd
<b>SWSA</b>	Strategic Water Source Areas
<b>TSP</b>	Threatened Species Programme
<b>VEGMAP</b>	Vegetation Map Project
<b>VU</b>	Vulnerable
<b>WSA</b>	Water Source Area

DRAFT



# 1. INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Impact Assessment (EIA) in order to obtain Environmental Authorisation (EA) for the proposed development of vent shafts, overhead powerlines and a substation (Figure 1) associated with the Dwarsrivier Chrome Mine (DCM), near Steelpoort, Limpopo Province. The proposed vent shafts and substation are to be developed within the study area and proposed powerline (Figures 2 – 3).

The DCM is located in the Dwars River Valley, approximately 13 km south of the town of Steelpoort and approximately 5.5 km west of the Mpumalanga/Limpopo Province border within the Greater Tubatse Local Municipality and the Greater Sekhukhune District Municipality, Limpopo Province. The R555 is situated approximately 10 km northwest of the DCM, with the R37 situated approximately 19 km east of the DCM.

This report, after consideration of the description of the ecological integrity of the study area and proposed powerline, 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 proposed location of the vent shafts, substation and powerline.





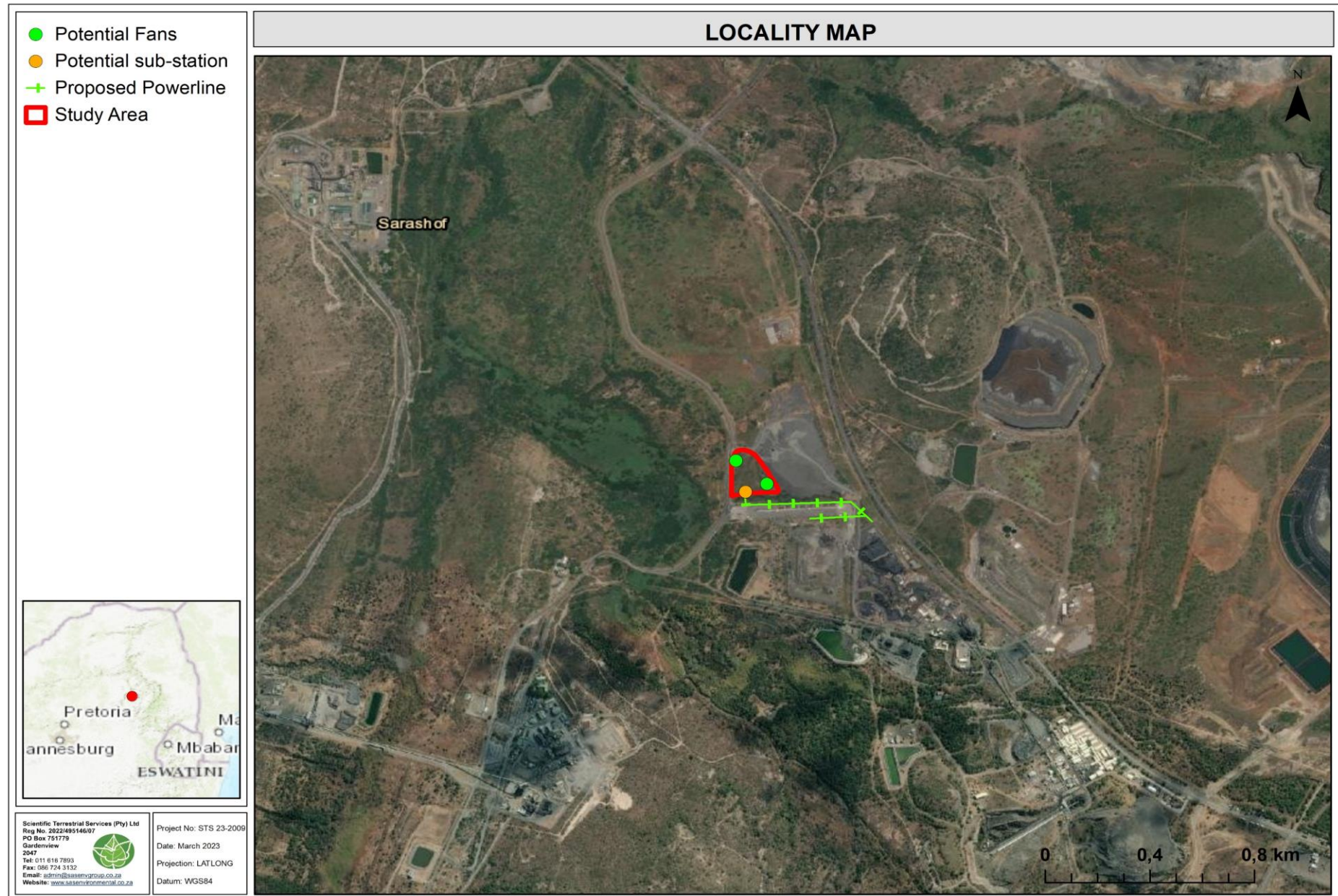


Figure 2: Digital Satellite image depicting the location of the study area and proposed powerline in relation to surrounding areas.





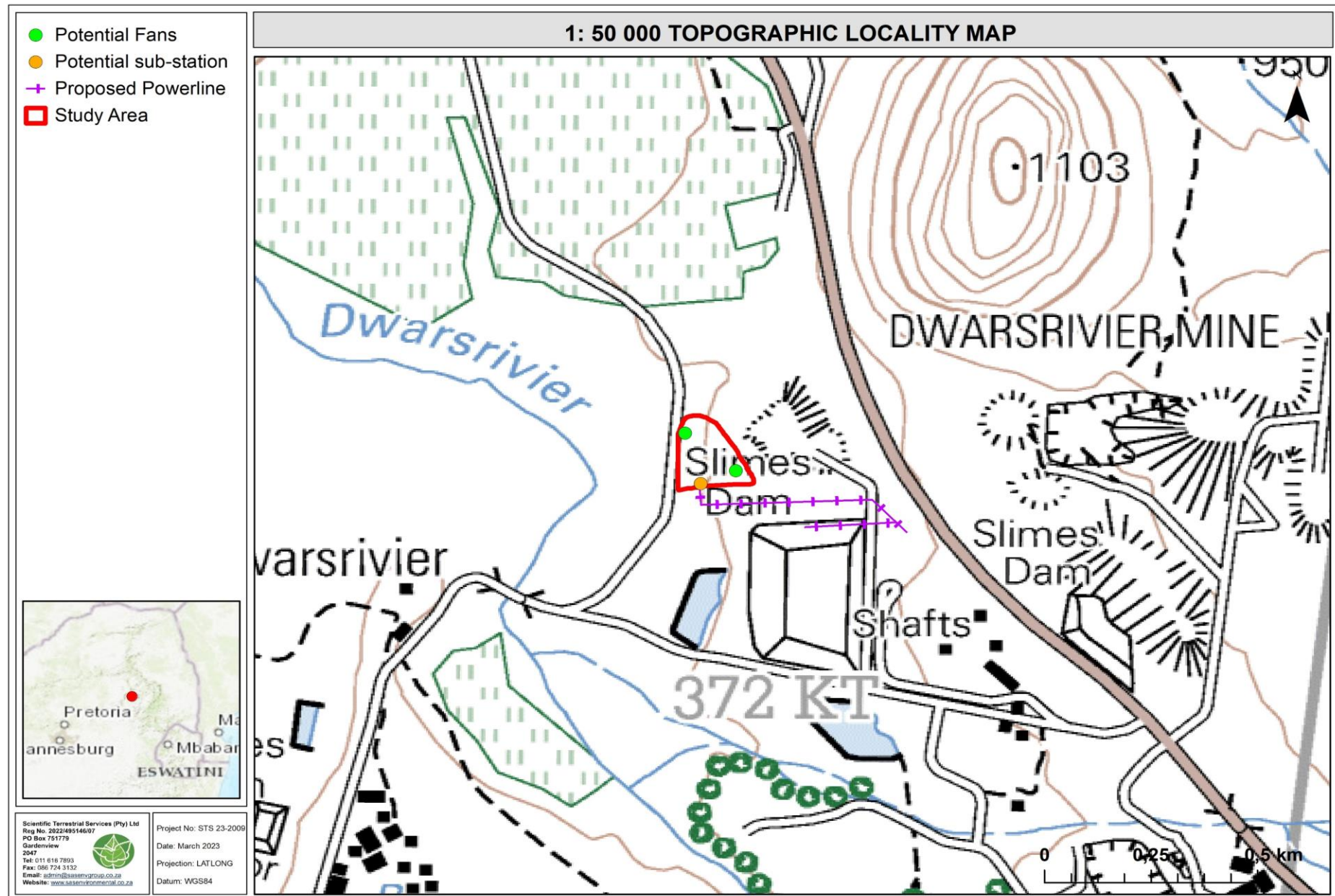


Figure 3: The study area and proposed powerline depicted on a 1:50 000 topographical map in relation to the surrounding area.





## 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's (SANBI) Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) and the Environmental Geographical Information Systems (E-GIS) website (<https://egis.environment.gov.za/>). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area and proposed powerline and proposed powerline;
- To define the Present Ecological State (PES) of the biodiversity of the study area and proposed powerline;
- To determine and describe habitats, communities and the ecological state of the study area and proposed powerline;
- To conduct a faunal and floral species of conservation concern (SCC) assessment, including the potential of suitable habitat to occur within the study area and proposed powerline 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 proposed activities might have on the biodiversity associated with the study area and proposed powerline; and
- To develop mitigation and management measures for all phases of the 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 proposed powerline, i.e., a 10 m buffer<sup>2</sup> surrounding the proposed powerline, and does not include detailed results of the surrounding areas or adjacent properties, although

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<sup>2</sup> For mapping and field assessment purposes, a 10 m buffer (i.e., 10 m on either side of the proposed activities) has been mapped to illustrate the approximate location of the study area and proposed powerline and associated habitats / zone of influence.



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 and proposed powerline 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 and proposed powerline's ecology;
- No site assessment was undertaken for this project. Data from previous studies undertaken by STS for the mine, notably the Biodiversity Action Plan and Monitoring Program (2018, 2021, 2022) as well as the Protected Plant Marking for the for the Truck Parking Area (2018) were used to develop this report;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A more comprehensive assessment would require that an onsite assessments take place, ideally in all seasons of the year. However, on-site data were augmented with all available desktop data. Together with project experience in the area, the findings of this assessment are considered an accurate reflection of the ecological characteristics of the study area and proposed powerline;
- 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 the locality of the study area and proposed powerline and the cyclical nature of many species' life stages, very few faunal species were observed. As such, background data (desktop) and literature studies (previous work undertaken in the area) were used to further infer faunal species composition and sensitivities in relation to the available habitat; and
- Some floral SCC identities will not be made known in this report (due to the limited field duration and seasonal variation), 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 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 sensitive plant.

### 1.3 Legislative Requirements

The following legislative requirements were considered during the assessment:



- The Constitution of the Republic of South Africa, 1996<sup>3</sup>;
- 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 March 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 March 2023, as it relates to the NEMBA.
- 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;
- The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA);
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries, and the Environment (DFFE's) (previously the Department of Environmental Affairs (DEA)) national environmental screening report required with an application for EA as identified in regulation 16(1)(v) of EIA Regulations, 2014, as amended:
  - GN 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
  - GN No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and

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<sup>3</sup> 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.



Terrestrial 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 sections briefly outline the approach taken for the terrestrial assessment. Detailed methodologies are provided in **Appendices C – E** of this report.

### 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 proposed powerline 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 and proposed powerline included <sup>4</sup>:

- 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 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 updated Red List of Ecosystems database (SANBI 2022a and b);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno *et al.*, 2019):
  - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
  - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).

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<sup>4</sup> 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/>



- The Mining and Biodiversity Guidelines (Department of Environmental Affairs *et al.*, 2012);
- 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 Screening Tool (accessed 2023); 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 and proposed powerline was conducted to confirm the assumptions made during the consultation of the background maps and to determine the ecological status of the habitat associated with the study area and proposed powerline.

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);





- 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 and proposed powerline 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**

The below sections present the results of the desktop database research.

## **3.1 Conservation Characteristics of the Study area and proposed powerline**

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: Database summaries of the vegetation characteristics associated with the study area and proposed powerline [Quarter Degree Squares (QDS) 2430CC].**

DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE STUDY AREA AND PROPOSED POWERLINE ACCORDING TO THE 2018 FINAL VEGETATION MAP OF SOUTH AFRICA, LESOTHO, AND SWAZILAND (SANBI 2006–2018 & SANBI, 2018A)					
BIOMES AND BIOREGIONS	The study area and proposed powerline is in the <b>Savanna Biome and Central Bushveld Bioregion</b> .				
DESCRIPTION OF THE VEGETATION TYPES ASSOCIATED WITH THE STUDY AREA AND PROPOSED POWERLINE ACCORDING TO MUCINA & RUTHERFORD (2006) - ORIGINAL EXTENT OF VEGETATION TYPE(S)					
The study area and proposed powerline occurs within one vegetation type. The below section includes description of the vegetation type as per Mucina and Rutherford (2006).					
SEKHUKHUNE MOUNTAIN BUSHVELD (SVCB 28)					
DISTRIBUTION	Limpopo and Mpumalanga Provinces.				
CLIMATE	Summer rainfall with very dry winters.				
	MAP (mm)	MAT (°C)	MFD (days)	MAPE (mm)	MASMS (%)
	609	17.5	5	2043	77
ALTITUDE (M)	900 – 1 600 m.				
GEOLOGY & SOILS	Rocks mainly ultramafic intrusive of the lower, critical, and main zones of the eastern Rustenberg Layered Suite of the Bushveld Igneous Complex (Vaalian). Three subsuites (zones), namely Croydon, Dwars River and Dsjate consist mainly of norite, pyroxenite, anorthosite and gabbro, and are characterised by localised intrusions of magnetite, diorite, dunite, bronzitite and harzburgite. Soils are predominantly shallow, rocky, and clayey. Glenrosa and Mispah soil forms are common, with lime present in low-lying areas. Rocky areas without soil are common on steep slopes. The Dwars River Valley is characterised by prismatic horizons with melanic structured diagnostic horizons. Around Steelpoort red apedal, freely drained soils occur, and these deeper soils include Hutton, Bonheim and Steendal soil forms.				
CONSERVATION	Least threatened. Target 24%. None conserved in statutory conservation areas.				
VEGETATION & LANDSCAPE FEATURES (refer also to Appendix F)	Dry, open to closed microphyllous <sup>5</sup> and broad-leaved savanna on hills and mountain slopes that form concentric belts parallel to the north-eastern escarpment. Open bushveld often associated with ultramafic soils on southern aspects. Bushveld on ultramafic soils contain a high diversity of edaphic specialists. Bushveld of mountain slopes generally taller than in the valleys, with a well-developed herb layer. Bushveld of valleys and dry northern aspects usually dense, like thicket, with an herb layer comprising many short-lived perennials. Dry habitats contain several species with xerophytic adaptations, such as succulence and underground storage organs. Both man-made and natural erosion dongas (gullies) occur on foot slopes of clays rich in heavy metals.				

<sup>5</sup> Microphyllous - having very small leaves. From micro meaning small and phyllous referring to leaves.



DESCRIPTION OF THE VEGETATION TYPES ASSOCIATED WITH THE STUDY AREA AND PROPOSED POWERLINE IN TERMS OF THE NATIONAL BIODIVERSITY ASSESSMENT (NBA) 2018 DATASET - REMAINING EXTENT OF VEGETATION TYPES (FIGURE 3)	
<b>NATIONAL BIODIVERSITY ASSESSMENT (NBA) (2018)</b>	<p>As mentioned above, one vegetation type is associated with the study area and proposed powerline. The NBA database indicates that the majority of the study area and proposed powerline is situated within the remaining extent of the vegetation type, whereas the remaining portions have been transformed. The study area and proposed powerline is associated with the <b>Sekhukhune Mountain Bushveld</b> which is listed as <b>Least Concern (LC)</b> and its threat status is currently <b>Poorly Protected</b>.</p> <p>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:</p> <ol style="list-style-type: none"> <li>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 Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or LC, based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds.</li> <li>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 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA).</li> </ol>
RED LIST OF ECOSYSTEMS FOR THE TERRESTRIAL REALM FOR SOUTH AFRICA - REMAINING EXTENT OF ECOSYSTEMS (2022) (FIGURE 4)	
<p>The updated Red List of Ecosystems database contains the current remaining natural extent (circa 2018) of each of the 458 ecosystem types assessed. This means that those portions of ecosystems that have been lost to anthropogenic activities such as mining or croplands are excluded and only the remnants are part of the dataset. The 2022 RLE largely aligns with the NBA (SANBI, 2018a) dataset presented above, but has excluded some additional transformed areas (i.e., the remaining extent of the ecosystem is smaller).</p> <p>As with the NBA dataset (in which one vegetation type is associated with the study area and proposed powerline), one ecosystem is associated with the study area and proposed powerline, namely the <b>Sekhukhune Mountain Bushveld (LC)</b>, which is <b>endemic</b> to South Africa.</p> <p>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).</p> <p>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 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.</p>	
<p>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); NBA = National Biodiversity Assessment.</p>	



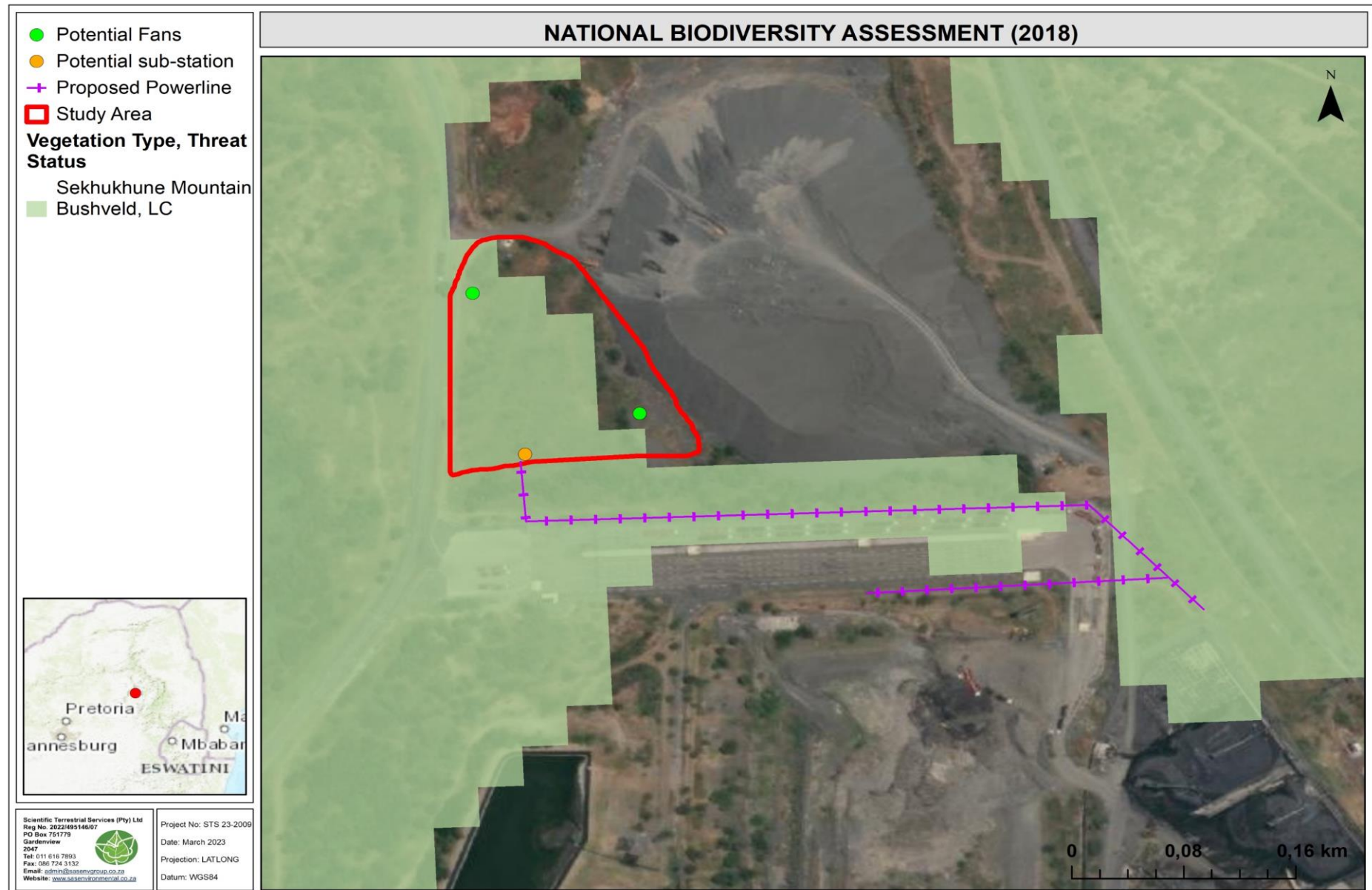


Figure 4: Remaining extent of the vegetation types, including protection level, associated with the study area and proposed powerline (SANBI, 2018b-c).







Figure 5: Remaining extent of the revised list of threatened terrestrial ecosystems (SANBI, 2021a-b).





**Table 2: Database summaries of the biodiversity and conservation characteristics associated with the study area and proposed powerline (QDS 2430CC).**

LIMPOPO CONSERVATION PLAN (2018) – FIGURE 5	
The study area and proposed powerline is associated with one ESA category according to the updated 2018 Limpopo Province Map of CBAs and ESAs.	
<b>ESA 1</b>	<p>The majority of the study area and proposed powerline is within a <b>Category 1 Ecological Support Area (ESA)</b>. ESA 1s are natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes.</p> <p><b>Land Management Recommendations:</b></p> <ul style="list-style-type: none"> <li>- Implement appropriate zoning and land management guidelines to avoid impacting on ecological processes. Avoid intensification of land use and fragmentation of natural landscapes.</li> </ul> <p><b>Incompatible Land-Use:</b></p> <p>Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining &amp; Industrial; Infrastructure (roads, power lines, pipelines). Note: <i>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.</i></p>
<b>NO NATURAL HABITAT REMAINING</b>	<p>The remaining portions of the study area and proposed powerline occur in an area considered to have <b>No Natural Remaining Habitat</b>. 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.</p> <p><b>Land Management Recommendations:</b> 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".</p>
CONSERVATION DETAILS PERTAINING TO THE STUDY AREA AND PROPOSED POWERLINE (VARIOUS DATABASES)	
<b>IBA (2015)</b>	The study area and proposed powerline does not occur within an IBA, nor are there any IBAs within 10 km thereof.
<b>SAPAD AND SACAD (2022); NPAES (2018) (Figure 7)</b>	<p>According to the SAPAD (2022)<sup>6</sup>, the De Hoop Dam Protected Environment is located approximately 7 km west of the study area and proposed powerline. The SACAD (2022)<sup>7</sup> does not indicate any conservation areas within 10 km of the study area and proposed powerline. The entire study area and proposed powerline is in the Sekhukhune Centre of Plant Endemism (SCPE).</p> <p>The study area and proposed powerline does not occur within a Priority Focus Area as per the NPAES (2018) database, a priority focus area is however located approximately 1,9 km south of the study area and proposed powerline. For Limpopo, the Priority Focus Areas include various biodiversity features to target potential protected area expansion.</p>

<sup>6</sup> **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 57 of 2003). 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 Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

<sup>7</sup> **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.



<b>STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)</b>	<p>No SWSA are associated with the study area and proposed powerline, nor were any identified within 10 km thereof.</p> <p>Surface water 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.</p>
<b>MINING AND BIODIVERSITY GUIDELINES (2012)</b>	
<b>HIGHEST BIODIVERSITY IMPORTANCE</b>	<p>The entire study area and proposed powerline is in an area of <b>Highest Biodiversity Importance</b>. These areas are regarded to pose the Highest risk for mining.</p> <p><u>Implications for mining:</u> Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features.</p>

CBA = Critical Biodiversity Areas; ESA = Ecological Support Area; IBA = Important Bird Area; SAPAD = South African Protected Areas Database; SACAD = South Africa Conservation Areas Database; NPAES = National Protected Areas Expansion Areas Strategy; SWSA = Strategic Water Source Area; WSA = Water Source Area; NFEPA = National Freshwater Ecosystem Priority Area.



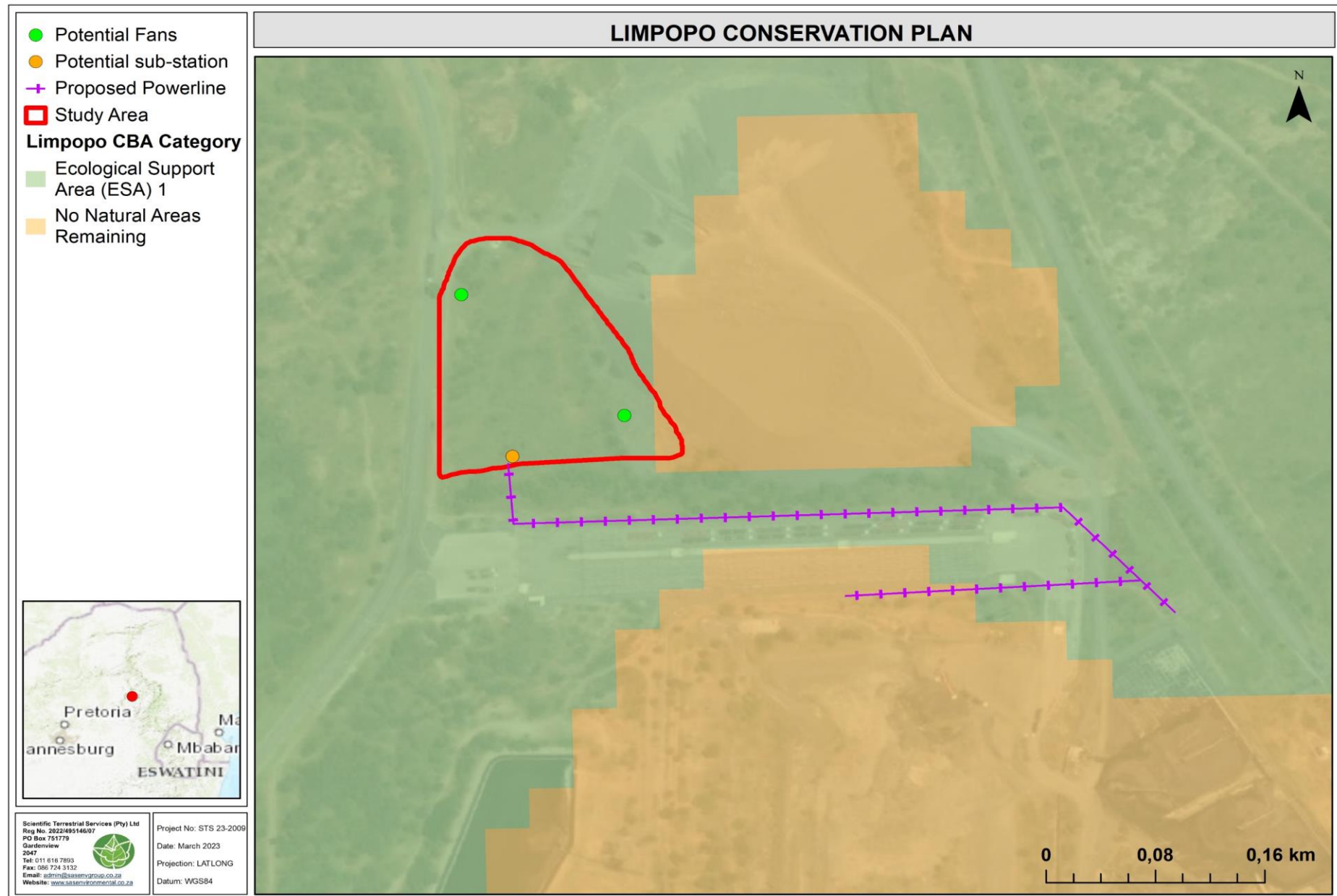


Figure 6: The study area and proposed powerline in relation to the Limpopo Conservation Plan (2018).





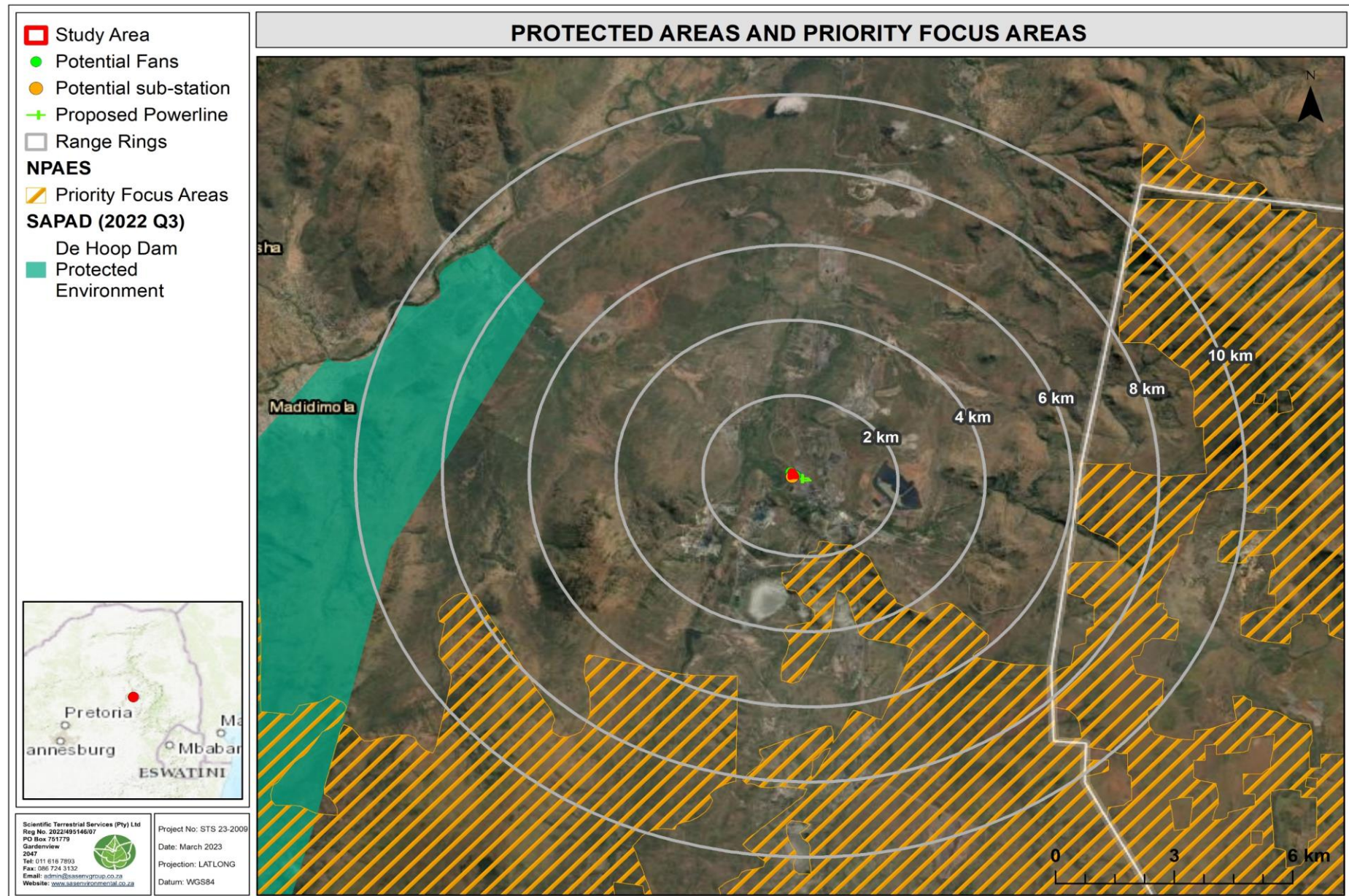


Figure 7: Priority Focus Areas and protected areas in relation to the study area and proposed powerline (NPAES, 2018 & SAPAD, 2022).



## 3.2 Outcomes of the Screening Tool

The below table and figures present the Screening Tool outcomes for the study area and proposed powerline in terms of the animal species theme, the plant species theme, and the terrestrial combined biodiversity theme. The verified results are presented in Sections 4 and 5 of this report.

**Table 3: Screening Tool outcome for the study area and proposed powerline.**

NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL	
<p>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:</p> <ul style="list-style-type: none"> <li>➤ <b>Very High:</b> 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<sup>2</sup>) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under CR, EN, or VU<sup>8</sup> 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.</li> <li>➤ <b>High:</b> Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level.</li> <li>➤ <b>Medium:</b> Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level.</li> <li>➤ <b>Low:</b> Areas where no SCC are known or expected to occur.</li> </ul> <p><b>**As per the best practise guidelines as stipulated by SANBI (i.e., the regulatory body for biodiversity within South Africa) protocol, the name of these sensitive species must remain confidential and should not be shared outside of the current report, especially into public domain.</b></p>	
<b>ANIMAL SPECIES THEME</b>	<p>For the animal species theme, the study area and proposed powerline is considered to be in an area of <b>medium sensitivity</b> (Figure 8). The triggered species are provided below.</p> <p><b>Medium Sensitivity</b> triggering species: <u>Class Avifauna</u>: <i>Aquila rapax</i> (Tawny Eagle; EN). <u>Class Mammalia</u>: <i>Crocidura maquassiensis</i> (Makwassie Musk Shrew; VU), <i>Dasymys robertsii</i> (African Marsh Rat; VU), <i>Lycaon pictus</i> (African Wild Dog; EN). <u>Class Reptilia</u>: <i>Kinixys lobatsiana</i> (Lobatse Hinge-Back Tortoise; VU).</p>
<b>PLANT SPECIES THEME</b>	<p>For the plant species theme, the study area and proposed powerline occur in a <b>medium sensitivity</b> area (Figure 9). The medium sensitivity was triggered by potential suitable habitat for <i>Combretum petrophilum</i> (Rare), <i>Polygala sekhukhuniensis</i> (VU), <i>Searsia sekhukhuniensis</i> (Rare), Sensitive species 587 (Rare), Sensitive species 124 (VU), <i>Asparagus fouriei</i> (VU) and <i>Searsia batophylla</i> (VU).</p>
<b>TERRESTRIAL BIODIVERSITY THEME</b>	<p>For the terrestrial biodiversity theme, the entire study area and proposed powerline is considered to have an overall <b>sensitivity of very high</b> (Figure 10). The trigger biodiversity themes are:</p> <ul style="list-style-type: none"> <li>- ESA 1 (refer to results of the 2018 Limpopo C-Plan); FEPA Sub-catchments; EN ecosystem (corresponding with the National Threatened Ecosystems Database; 2011. The updated 2022 dataset indicates that the ecosystem is of LC); and Protected Areas Expansion Strategy.</li> </ul>

<sup>8</sup> In the Vulnerable category, the D criteria encompass species with less than 1 000 individuals, or area of occurrence of less than 20 km<sup>2</sup>.





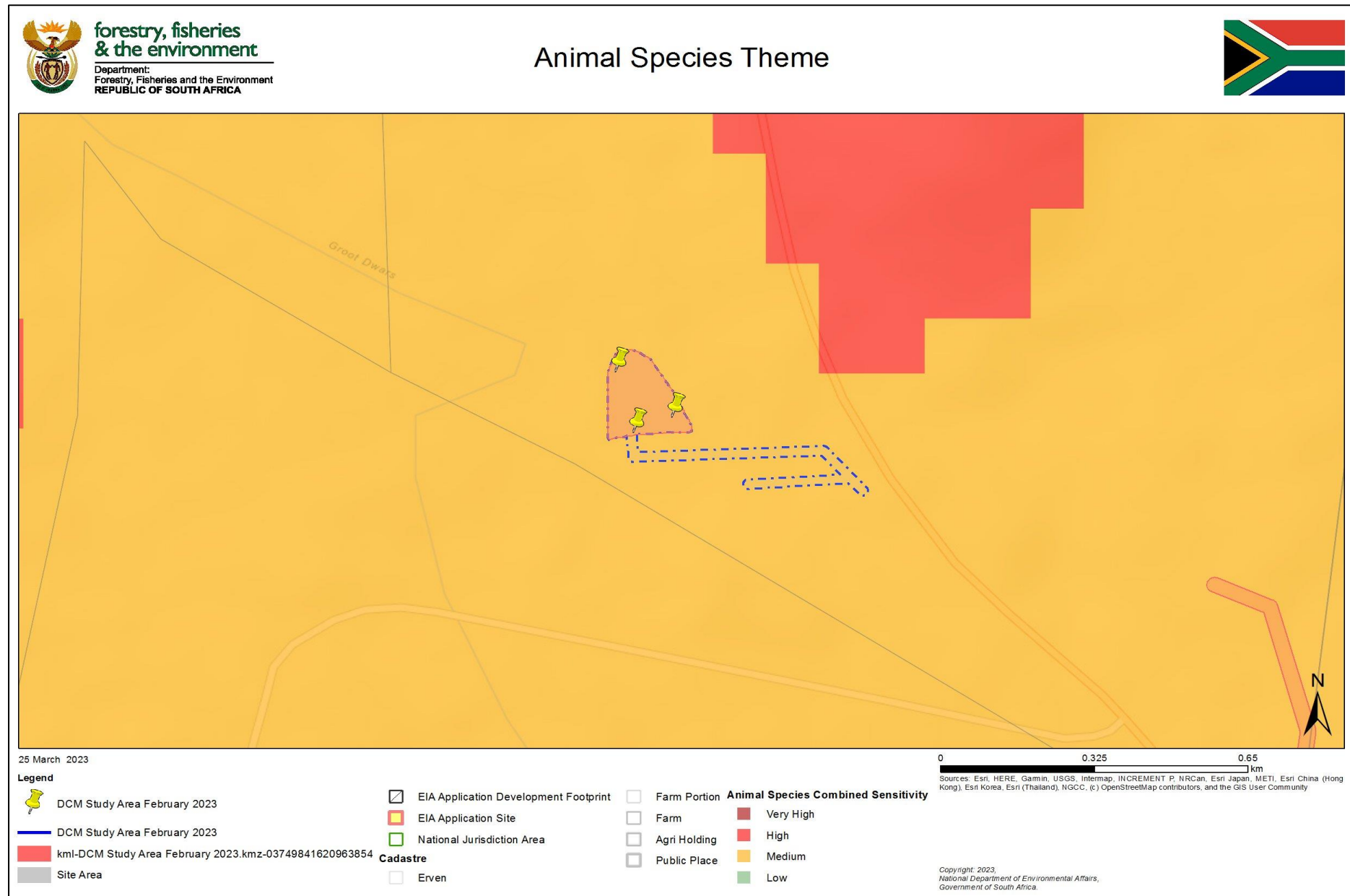


Figure 8: Screening Tool outcome for the animal species theme.



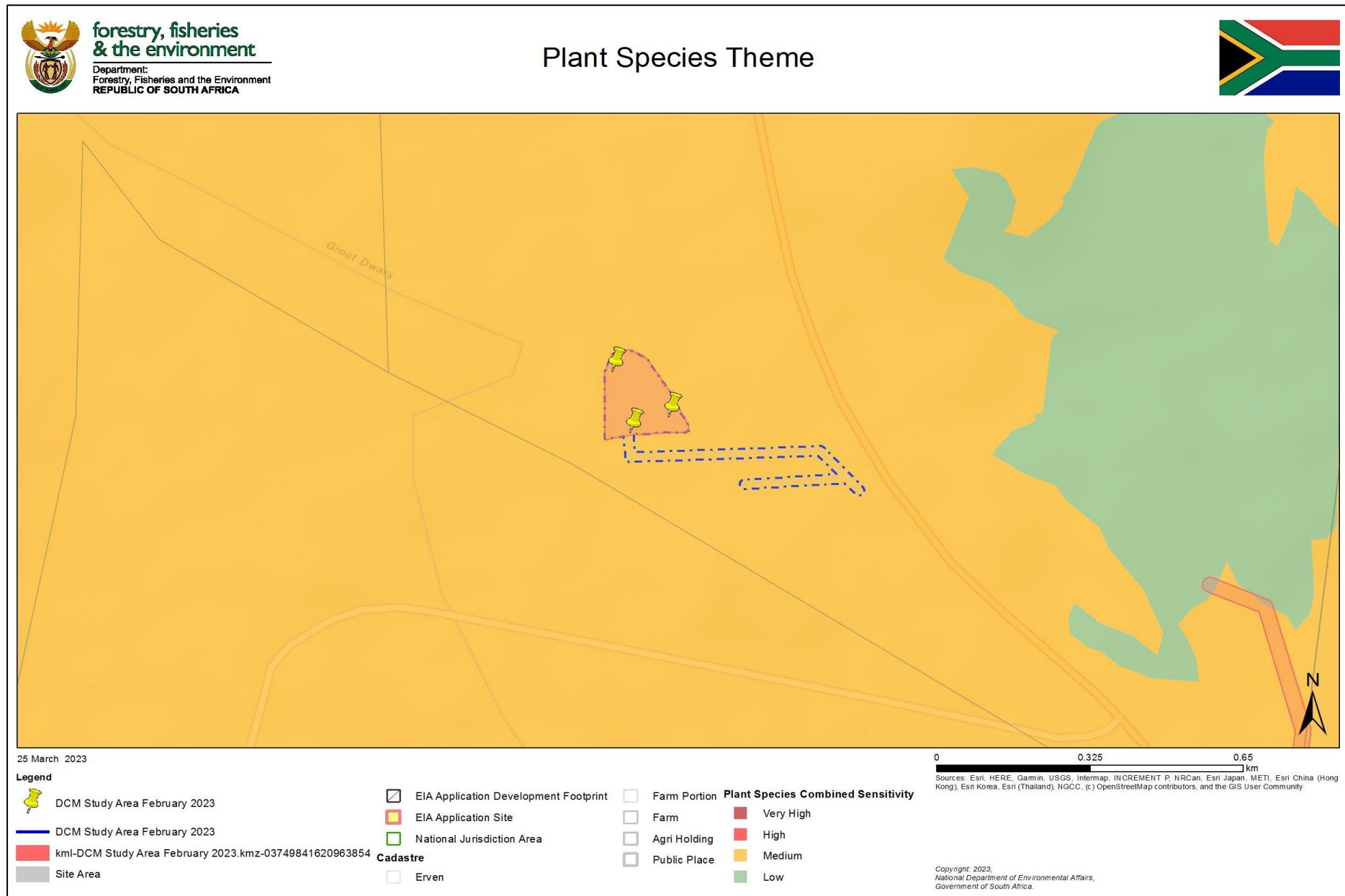


Figure 9: Screening Tool outcome for the plant species theme.



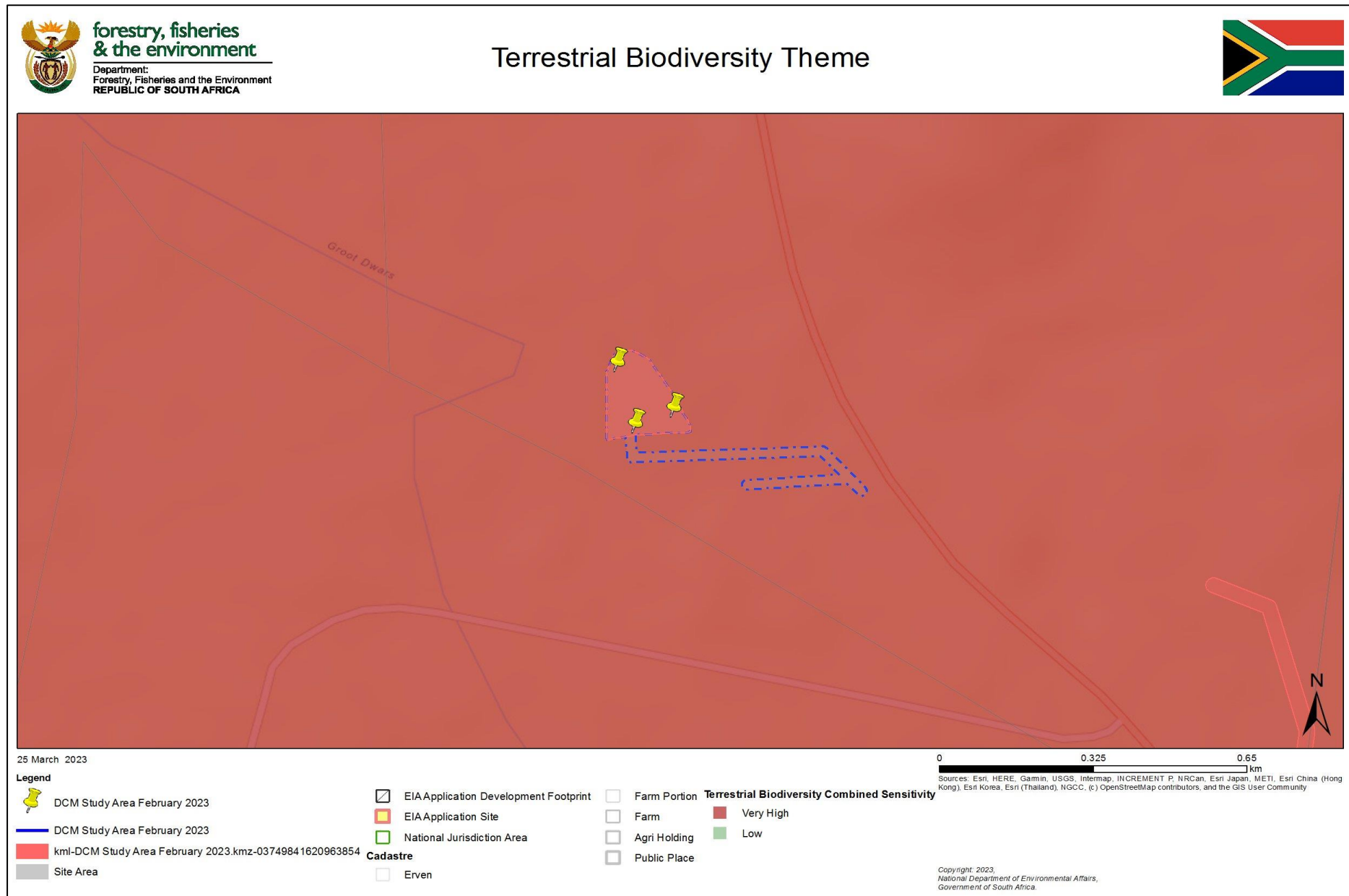


Figure 10: Screening Tool outcome for the terrestrial combined biodiversity theme.



## 4 BIODIVERSITY ASSESSMENT RESULTS

The below broad habitat units were distinguished within the study area and proposed powerline.:

- **Mixed Bushveld Habitat:** characteristic of the lower lying areas in the region that are associated with the Sekhukhune Mountain Bushveld;
- **Secondary Bushveld:** this habitat comprises of areas that have historically been transformed (e.g., as part of mining operations) but which have subsequently recovered to a vegetated landscape (albeit a modified version of the historic / reference state with low plant species diversity); and
- **Transformed Habitat:** comprises existing mining operations and areas cleared of vegetation as part of the these operational activities. Vegetation is largely absent or comprises of patchy pioneer indigenous species and alien and invasive plant (AIP) species.

The Transformed Habitat will not be discussed in detail in the below dashboards as the habitat has undergone significant transformation through clearance<sup>9</sup> of vegetation. Given the intensity of disturbances, little to no floral and faunal communities are present within this habitat unit. The habitat does not provide suitable conditions for the establishment of floral or faunal SCC and the likelihood of such species occurring in this habitat unit is very low. The indicated medium to very high animal, plant, and terrestrial sensitivities indicated for this habitat unit by the Screening Tool are thus not supported and, instead, a low sensitivity is confirmed. Example photographs of the Transformed Habitat are provided below (Figure 11):

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<sup>9</sup> **Clearance of Indigenous Vegetation Explanatory Document. May 2017:** Clearance is referred to as "Ploughing of land, bulldozing of an area, eradication or removal of vegetation cover with chemicals, amongst others, constitutes clearance of vegetation, provided that this will result in the vegetation being eliminated, removed or eradicated."





**Figure 11: Depiction of the Transformed Habitat associated with the study area and proposed powerline and surrounds.**

Of the above habitats, only the Mixed Bushveld habitat can be classified as indigenous vegetation<sup>10</sup> (per the NEMA Listing Notice definition). The above habitat units are presented in Figure 12 below. Please refer to Section 4.1 for a breakdown of the floral field-verified results and Section 4.2 for the faunal field-verified results.

It must be noted that the data presented below has been derived from previous assessments undertaken at the Dwarsrivier Mine and that no physical site assessment of the study area has been undertaken at this time.

<sup>10</sup> 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.





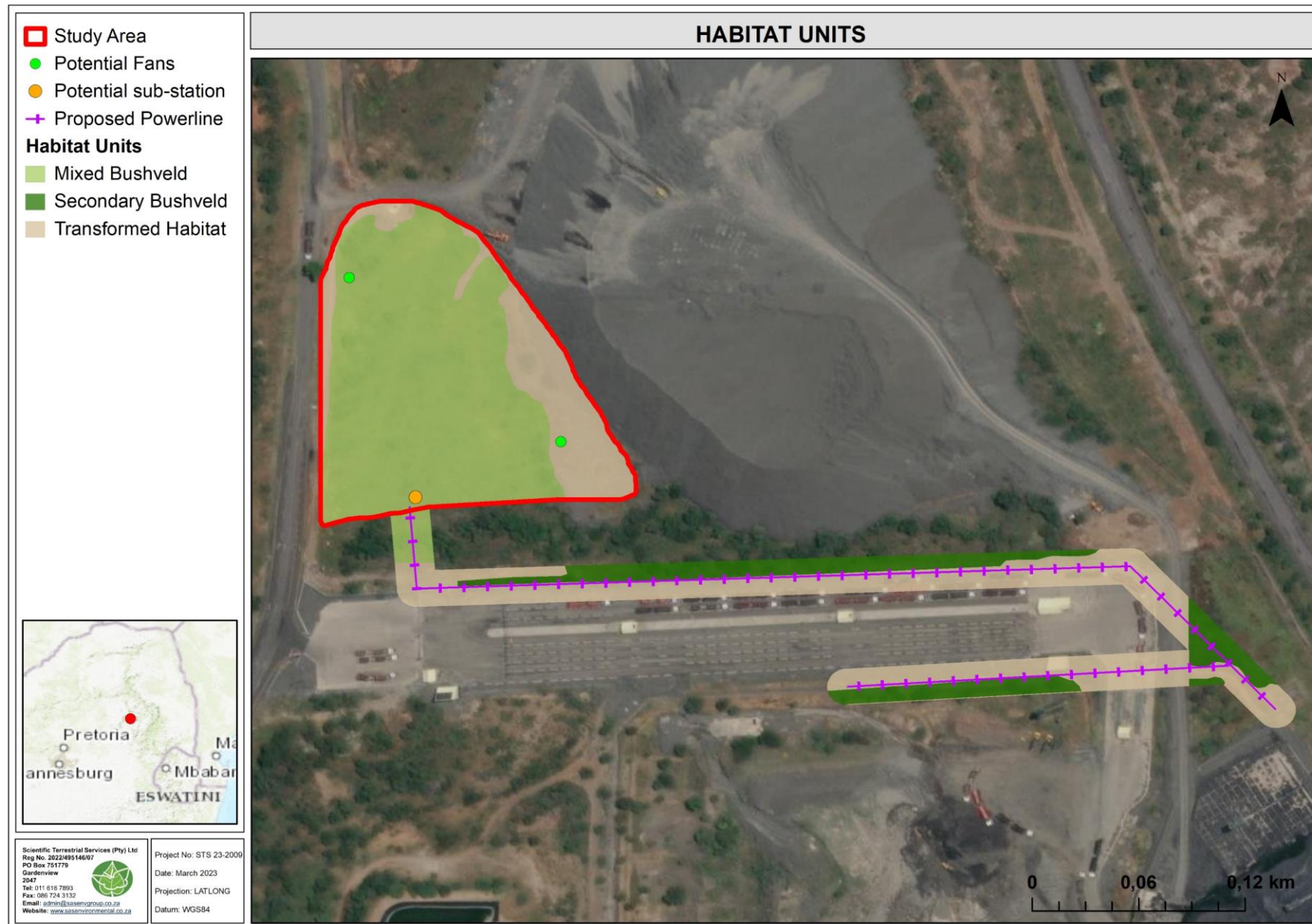



Figure 12: Map illustrating the habitat units associated with the study area and proposed powerline.





## 4.1 Floral Assessment Results

Table 4: Mixed Bushveld Habitat.

REPRESENTATIVE PHOTOGRAPHS OF THE HABITAT UNIT IDENTIFIED WITHIN THE STUDY AREA AND PROPOSED POWERLINE		
Mixed Bushveld		
		
<p>The vegetation structure is a short-to-tall open shrubland in some sections, whereas other sections take on a closed to semi-open woodland. The above photographs provide reference to the habitat type and varied vegetative structure that is evident in the Mixed Bushveld habitat. This habitat unit is the dominant habitat within the study area and is currently associated with the proposed locations of the northern most proposed fan structure as well as the proposed substation.</p>		
HABITAT OVERVIEW		
<b>Habitat Integrity and ecological processes</b>	<p>This habitat unit is relatively intact, however edge effects and sporadic and localised vegetation clearing activities in the past have degraded the overall integrity of the habitat. Mining activities, notably the development of roads and the expansion of the discard dump have impacted on the habitat, isolating it from the surrounding more natural areas leading to habitat fragmentation. Alien plant species proliferation is limited, with observed alien plant species (AIPs) being largely restricted to the ecotonal areas of the Mixed Bushveld and the Transformed habitat. Overall, this habitat unit is still considered to be in a <b>good ecological condition</b>.</p>	





Species overview (For a more comprehensive list of species, please refer to Appendix G of this report.)	Floral species diversity within the Mixed Bushveld habitat was intermediate to moderately high. Dominant species recorded within the habitat included the following: <ul style="list-style-type: none"><li>➤ <u>Woody species</u>: <i>Bolusanthus speciosus</i>, <i>Combretum apiculatum</i>, <i>Dodonaea viscosa</i> var. <i>angustifolia</i>, <i>Elephantoriza praetermissa</i>, <i>Euclea linearis</i>, <i>Grewia flava</i>, <i>Gymnosporia senegalensis</i>, <i>Sclerocarya birrea</i> subsp. <i>caffra</i>, <i>Dichrostachys cinerea</i>, <i>Dombeya rotundifolia</i>, <i>Rhynchosia komatiensis</i>, <i>Lydenburgia cassinoides</i> and <i>Searsia pyroides</i>;</li><li>➤ <u>Herbaceous species</u>: <i>Kyllinga alba</i>, <i>Leucas capensis</i>, <i>Cleome hirta</i>, <i>Hypoxis rigidula</i>, <i>Senna italica</i> subsp. <i>arachoides</i>, <i>Commicarpus pentandrus</i>, <i>Senecio latifolius</i>, <i>Gisekia africana</i> var. <i>africana</i>, and <i>Corbichonia decumbens</i>;</li><li>➤ <u>Succulent species</u>: <i>Sansevieria aethiopica</i>, <i>Cynanchum viminale</i>, and <i>Kleinia longiflora</i>; and</li><li>➤ <u>Graminoid species</u>: <i>Heteropogon contortus</i>, <i>Cenchrus ciliaris</i>, <i>Themeda triandra</i>, <i>Eragrostis rigidior</i>, <i>Loudetia simplex</i>, and <i>Cymbopogon pospischilii</i>.</li></ul>				
	PRESENCE OF UNIQUE LANDSCAPES				
Mixed Bushveld habitat					
The Mixed Bushveld habitat occurs in an ESA 1. The ESA 1 is moderately functional; however, the fragmented nature of this habitat unit has resulted in sub-optimal functioning and reduced ability of this habitat to support CBAs and protected areas. The habitat is considered to be representative of the reference vegetation type, although the fragmented nature, small extent and locality limit its importance in terms of meeting provincial biodiversity targets. From a conservation perspective, the Mixed Bushveld habitat occurs in a LC ecosystem. The medium sensitivity produced by the screening tool for this habitat unit is confirmed. The Mixed Bushveld habitat is in alignment with the classification as a Highest Biodiversity Importance area in terms of the Mining and Biodiversity Guidelines (2013) and therefore is considered of Highest Risk to Mining.					
SPECIES OF CONSERVATION CONCERN					
Several nationally protected species as well as species protected under the NFA are associated with the Mixed Bushveld habitat. One threatened (i.e., red data listed (RDL)) species was recorded within the study area whilst several others have a medium to high probability of occurring in the study area. The assessment further indicated that no TOPS-listed species were associated with this habitat unit. The below section lists the species that were either confirmed on site or that obtained a medium – high probability of occurrence (POC) for the habitats within the study area and proposed powerline. Refer to Figure 12 below for a depiction of some SCCs recorded within the study area and along proposed powerline.					
The Screening Tool identified the entire study area and proposed powerline to be in a medium sensitivity area for the Plant Species Theme. The medium sensitivity for the Plant Species Theme was confirmed for only the Mixed Bushveld, whereas for the Transformed Habitat and Secondary Bushveld Habitat a lower sensitivity is recommended.					
Refer to <b>Appendix H</b> for a more comprehensive list of species assessed as part of the SCC assessment.					
THREATENED, NEAR-THREATENED AND RARE SPECIES					
SCIENTIFIC NAME	POC	IUCN	SCIENTIFIC NAME	POC	IUCN
<i>Jamesbrittenia macrantha</i>	High	NT	<i>Polygala sekhukhuniensis</i>	Medium	VU
<i>Lydenburgia cassinoides</i>	Confirmed	NT			
NFA-PROTECTED SPECIES					
SCIENTIFIC NAME	POC	IUCN	SCIENTIFIC NAME	POC	IUCN
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	High	LC P <sup>11</sup>	<i>Lydenburgia cassinoides</i>	Confirmed	NT P
<i>Catha edulis</i>	Medium	LC P			

<sup>11</sup> P = Protected



**Table 5: Secondary Bushveld Habitat.**

REPRESENTATIVE PHOTOGRAPHS OF THE HABITAT UNIT IDENTIFIED WITHIN THE STUDY AREA AND PROPOSED POWERLINE	
Secondary Bushveld	
	
	<p>This habitat unit has a varying vegetation growth, predominantly as it is characteristic of areas that have previously been transformed/cleared of vegetation but have now been allowed to recover. Over the years, some areas have been further disturbed, resulting in varying vegetation growth rates and structure within this habitat unit. In some areas the graminoid layer has recovered well, whilst in others open bare patches remain. Similarly, woody species recovery varies, with some areas having an increased woody density whilst others a more open structure.</p>
HABITAT OVERVIEW	
<b>Habitat Integrity and ecological processes</b>	<p>The Secondary Bushveld habitat is degraded and dominated by species that are indicative of disturbed areas. As this habitat is located immediately adjacent active mining areas, activities such as bush/tree trimming and cutting/mowing of the herbaceous layer is common practice. This is often done to create a fire break around operational areas by minimising the available fuel load. The habitat varies in areas from a <b>poor to fair ecological condition</b>, i.e., moderately modified, semi-natural, where some ecological function is maintained even though composition and structure have been compromised.</p> <p>The habitat is significantly fragmented and degraded and unlikely to function optimally to support ecological processes in the area.</p>
<b>Species overview</b> (For a more comprehensive list of species, please refer to Appendix G of this report.)	<p>Floral species diversity within the Secondary Bushveld habitat is intermediate to moderately low. Dominant species recorded within the habitat included the following:</p> <ul style="list-style-type: none"> <li>Woody species: <i>Lantana rugosa</i>, <i>Ehretia rigida</i> subsp. <i>rigida</i>, <i>Gymnosporia senegalensis</i>, <i>Euclea crispa</i>, <i>Searsia keetii</i>, <i>Searsia pyroides</i>, and <i>Euclea linearis</i>;</li> <li>Herbaceous species: <i>Barleria macrostegia</i>, <i>Ipomoea crassipes</i>, <i>Leonotis nepetifolia</i> var. <i>nepetifolia</i>, <i>Corbichonia decumbens</i>, <i>Berkheya insignis</i> and <i>Polygala hottentotta</i>; and</li> <li>Graminoid species: <i>Panicum maximum</i>, <i>Aristida congesta</i> subsp. <i>congesta</i>, <i>Urochloa mosambicensis</i>, <i>Hyparrhenia hirta</i>, and <i>Melinis repens</i>.</li> </ul>





PRESENCE OF UNIQUE LANDSCAPES					
Secondary Bushveld habitat					
<p>The Secondary Bushveld habitat occurs in an ESA 1, however, due to the degraded and fragmented state of this habitat unit, it can be concluded that the Secondary Bushveld is not representative of the ESA 1. This habitat unit lacks the functionality or connectivity in order to suitably support any CBAs and protected areas in the region. The habitat unit is not considered to be representative of the reference vegetation type, does not meet provincial biodiversity targets and occurs in a LC ecosystem. The medium sensitivity produced by the screening tool for this habitat unit is not supported, nor is the listing of Highest Biodiversity Importance area in terms of the Mining and Biodiversity Guidelines (2013).</p>					
SPECIES OF CONSERVATION CONCERN					
<p>One nationally protected species as well as species protected under the NFA are associated with the Secondary Bushveld habitat. One threatened (i.e., red data listed (RDL)) species was recorded within the study area whilst several others have a medium to high probability of occurring in the study area. The assessment further indicated that no TOPS-listed species were associated with this habitat unit. The below section lists the species that were either confirmed on site or that obtained a high probability of occurrence (POC) within the habitat unit. Refer to Figure 12 below for a depiction of the SCCs recorded within the study area and along proposed powerline.</p> <p>The Screening Tool identified the entire study area and proposed powerline to be in a medium sensitivity area for the Plant Species Theme. The medium sensitivity for the Plant Species Theme was confirmed for only the Mixed Bushveld, whereas for the Transformed Habitat and Secondary Bushveld Habitat a lower sensitivity is recommended.</p> <p>Refer to <b>Appendix H</b> for a more comprehensive list of species assessed as part of the SCC assessment.</p>					
THREATENED, NEAR-THREATENED AND RARE SPECIES					
SCIENTIFIC NAME	POC	IUCN	SCIENTIFIC NAME	POC	IUCN
<i>Lydenburgia cassinoides</i>	Confirmed	NT & P			
NFA-PROTECTED SPECIES					
SCIENTIFIC NAME	POC	IUCN	SCIENTIFIC NAME	POC	IUCN
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	High	LC P	<i>Lydenburgia cassinoides</i>	Confirmed	NT P



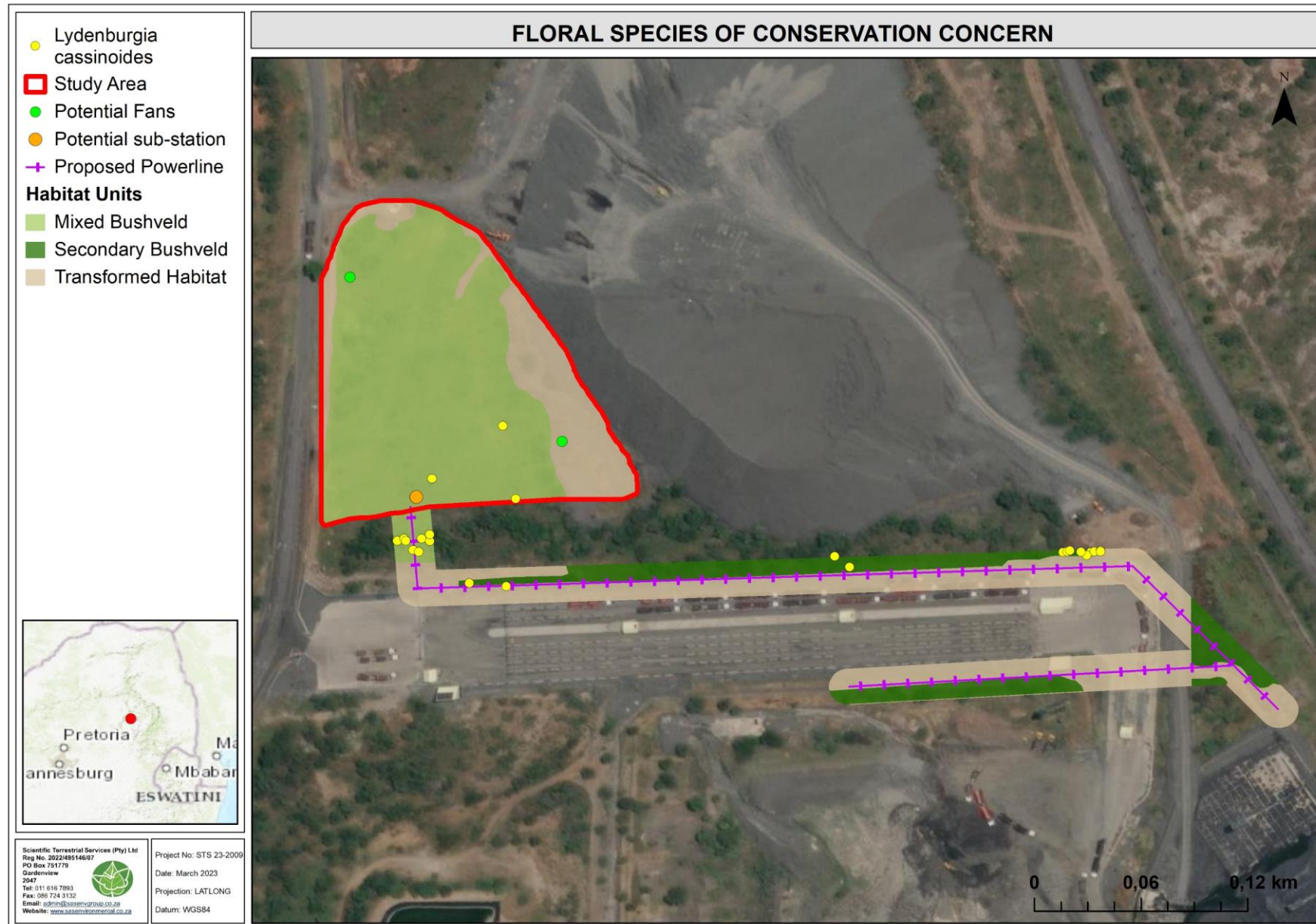


Figure 13: Localities of floral SCC within the study area and proposed powerline.



## 4.2 Faunal Assessment Results

### Selected examples of faunal habitat and species recorded within the Study area and proposed powerline



Photos from left to right: *Emberiza flaviventris* (Golden-breasted Bunting), *Milvus aegyptius* (Yellow-billed Kite) and *Byblia ilithyia* (Spotted Joker).

### Faunal Overview

The Mixed Bushveld habitat with its varied woody and herbaceous layer densities provides habitat to a moderate diversity of faunal species. Habitat structure is known to be an important driver for avifaunal diversity, whilst insect species also benefit from such. The Mixed Bushveld habitat will likely support a healthy insect population, considered of increased importance as insects serve an important ecological role in the environment. Insects not only help cycle nutrients and detrital material but also serve as important food resource for many species on higher trophic levels. Additionally, herbivorous insects are often able to feed upon plant material that is high in lignin and otherwise unpalatable to other herbivores, whilst also transporting dead plant material sub-surface (termites), helping to maintain the nutrient cycle. Species abundances within the Mixed bushveld is likely to be limited due to the overall small extent of this habitat unit, as well as the decreased habitat connectivity. The habitat is currently surrounded by roads and active mining areas, decreasing species dispersal and migration abilities. Small mammals, notably rodents are likely to occur within the mixed bushveld habitat, however larger herbivorous and predatory animals will be absent.

The Secondary Bushveld habitat comprises areas that were disturbed as a result of construction/mining activities, resulting in remnant patches of habitat that do not provide a high degree of suitable habitat for fauna. Although these areas have subsequently been left to revegetate over time, the continued exclusion of key ecological processes will further limit faunal species diversity. Vegetation within the Secondary Bushveld may provide an additional food resource to some herbivorous faunal species, however the close proximity to active mine operations is considered to be a limitation.

Both the Mixed and Secondary Bushveld habitat units provide no unique or niche areas of habitat for faunal species, nor are these habitats connected to larger more intact and suitable habitats from which faunal species may move from and into the study area.

The Transformed areas are devoid of vegetation and therefore food resources and shelter. Overall, the transformed areas are not considered important for faunal species nor do these areas provide important ecological services or functions for fauna.





Species associated with the study area will predominantly occur within the Mixed Bushveld. Species likely to occur therein include *Raphicerus campestris* (Steenbok), *Lepus capensis* (Cape Hare), *Idolomorphia dentifrons* (Cone-headed Mantid), *Dicrurus adsimilis* (Fork-tailed Drongo), *Agama aculeata distanti* (Distant's Ground Agama), *Numida meleagris* (Helmeted Guineafowl), *Trachylepis margaritifer* (Rainbow Skink) and *Prinia subflava* (Tawny-flanked Prinia) amongst others.

For a full list expected species please refer to **Appendix G**.

Species	Habitat and Resources in the MRA	RSA Status	POC	Species	Habitat and Resources in the MRA	RSA Status	POC
<i>Kinixys lobatsiana</i> (Lobatse Hinged Tortoise)	A savanna species that inhabits rocky hillsides in habitats of mixed Acacia and Combretum woodland, tropical Bushveld and Thornveld where vegetation ranges from dense, short shrubland to open tree savanna (Broadley 1989, Branch 2008, Boycott 2014) but it prefers rocky hillsides. It appears to brumate in abandoned animal burrows or rock crevices, making these important localities for the species in the dry winter season (Branch 2008).	VU	Low	<i>Aquila rapax</i> (Tawny Eagle)	Tawny Eagles are found in lightly wooded savannah and thornveld as well as semi-desert habitats. Scavenging and piracy are two of the most important foraging strategies for Tawny Eagles. The study area and proposed powerline, due to its decreased size and proximity to existing mining operations, is not considered suitable/favourable for this species. Suitable habitat for this species is however available in the surrounding landscape, and as such, individuals may periodically fly over.	EN	Low
<i>Lycaon pictus</i> (Wild Dog)	Wild Dogs were formerly distributed throughout sub-Saharan Africa, however they have disappeared from much of their former range. Although free-roaming packs are know from Limpopo, these occurrences are not in close proximity to the study area. Further, the landscape and surrounding land-use activities will likely preclude this species.	EN	Low	<i>Dasymys robertsii</i> (Robert's Shaggy Rat)	This species rely on intact wetlands where they occur specifically in reed beds and among semi-aquatic grasses or swampy areas or along rivers and streams, as well as in grassy areas close to water. No suitable habitat is available for this species in the study area.	VU	Low
<i>Crociodura maquassiensis</i> (Makwassie Musk Shrew)	This is a rare species endemic to South Africa, Swaziland and Zimbabwe, existing in rocky and moist grassland habitats in the savannah and grassland biomes. Suitable habitat is available within the study area, however the adjacent mine activities are likely to decrease the overall POC for this species.	VU	Medium				
CONCLUDING REMARKS							
The construction of the proposed fans and substation will lead to habitat loss, however as these footprints are not large, habitat loss will not be throughout the whole study area. Furthermore, whilst the Mixed Bushveld is considered to be fairly intact, it is fairly isolated with limited movement corridors available for fauna to move to and from the study area. As such, the overall abundance and diversity therein is restricted to species that will permanently inhabit the study area, or those which can easily move (avifauna) to other habitats.							





### 4.3 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<sup>12</sup>. 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).

#### 4.3.1 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.

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<sup>12</sup> 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).



Duty of care related to listed invasive species are referred to in NEMBA Section 73<sup>13</sup>. The motivation for this duty of care is both environmentally and economically driven. Management 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.

#### 4.3.2 Site Results

A total of nine (9) AIP species were recorded within the study area and proposed powerline and immediate surrounds. Overall, the Sekhukhune Mountain Bushveld associated with a low abundance and incidence of AIPs, whereas the Transformed habitat had a moderate diversity and abundance of AIPs. Within the study area and proposed powerline, the EDLs, Open Bushveld, and Wetland Habitat did not include any AIPs. Some removal of AIP species has occurred already within the Transformed Habitat over the last year.

Of the nine AIP species recorded within the study area and proposed powerline, five (5) species are listed under NEMBA category 1b, one (1) species is listed as NEMBA category 3 (where it occurs outside of a watercourse), and three (3) species are not currently listed on the NEMBA Invasive Aliens List (2020). The three non-listed species associated with the study area and proposed powerline are regarded as problem plants but were present in low to moderate abundances and do not currently pose an immediate risk of displacing native flora. Such species would need to be removed or regularly monitored to ensure their spread to surrounding habitats is prevented.

It is recommended that if the project activities are approved that the existing AIP plan be updated to include the study area and proposed powerline.

Refer to the below table for more details on the AIPs recorded within the study area and proposed powerline.

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<sup>13</sup> Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-

- 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.

**Table 6: Dominant alien vegetation likely to occur in the study area.**

Species	English name	NEMBA Category
<b>Trees/ shrubs</b>		
<i>Melia azedarach</i>	Syringa	1b
<i>Tecoma stans</i>	Yellow Bells	1b
<b>Grasses</b>		
<i>Pennisetum setaceum</i>	Fountain Grass	1b
<b>Forbs</b>		
<i>Argemone ochroleuca</i>	White-flowered Mexican Poppy	1b
<i>Datura ferox</i>	Large Thorn Apple	1b
<i>Datura stramonium</i>	Common Thorn Apple	1b
<i>Ricinus communis</i>	Castor-oil plant	2
<i>Verbena bonariensis</i>	Wild Verbena	1b

## 5 SENSITIVITY MAPPING

The Screening Tool identified the entire study area and proposed powerline to be in a **medium sensitivity** area for the Plant and Animal Species Theme and a **very high sensitivity** area for the Terrestrial Biodiversity Theme. The medium sensitivity animals and plants theme was confirmed for the Mixed Bushveld habitat unit. The Secondary and Transformed habitats are considered to be more closely aligned with low sensitivities in terms of the screening tool. The very high terrestrial biodiversity theme may be supported for the Mixed Bushveld, as this habitat is representative of the veg type and aligns with the ESA 1 designation. The remaining habitat units are considered to be of a lower sensitivity in terms of the screening tool output for the terrestrial biodiversity theme.

Based on the data collated from previous studies, the below tables present the sensitivity of each identified habitat unit along with an associated conservation objective and implications for any potential future development. These sensitivities are more refined than the sensitivities provided by the Screening Tool due to the consideration of different aspects, such as the presence or potential for SCC (both threatened species as well as protected species), habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity (compared to a reference type).

Figure 14 conceptually illustrates the areas considered to be of varying ecological sensitivity.

**Table 7: A summary of the Floral and Faunal sensitivity of each habitat unit and implications for development.**

HABITAT SENSITIVITY		CONSERVATION OBJECTIVE	HABITAT UNIT	KEY HABITAT CHARACTERISTICS
<b>Low</b>		Optimise development potential.	<b>Transformed habitat</b>	<ul style="list-style-type: none"> <li>-No indigenous vegetation (as per NEMA) present.</li> <li>-Habitat entirely transformed due to mining-related activities.</li> <li>-Native floral and fauna diversity was low to non-existent.</li> <li>-No floral or faunal SCC or protected species present.</li> <li>-No habitat of biodiversity significance (i.e., CBAs, NPAES focus areas) are associated with this habitat unit.</li> </ul>
<b>Moderately Low</b>		Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	<b>Secondary Bushveld</b>	<ul style="list-style-type: none"> <li>-No indigenous vegetation (as per NEMA) present.</li> <li>-Habitat entirely transformed due to mining-related activities.</li> <li>-Native floral and fauna diversity was low to non-existent.</li> <li>-No faunal SCC species present.</li> <li>-Floral SCC present.</li> <li>-No habitat of biodiversity significance (i.e., CBAs, NPAES focus areas) are associated with this habitat unit.</li> </ul>
<b>Moderately-High</b>		Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.	<b>Mixed Bushveld</b>	<ul style="list-style-type: none"> <li>-Indigenous vegetation (as per NEMA) present.</li> <li>-Habitat unit is considered to be representative of the vegetation type.</li> <li>-Meets the definition of an ESA 1.</li> <li>-Fair to moderately high floral and faunal species diversity.</li> <li>-Floral SCC present within the habitat unit.</li> <li>-Habitat present for fauna, though likely for foraging only.</li> </ul>





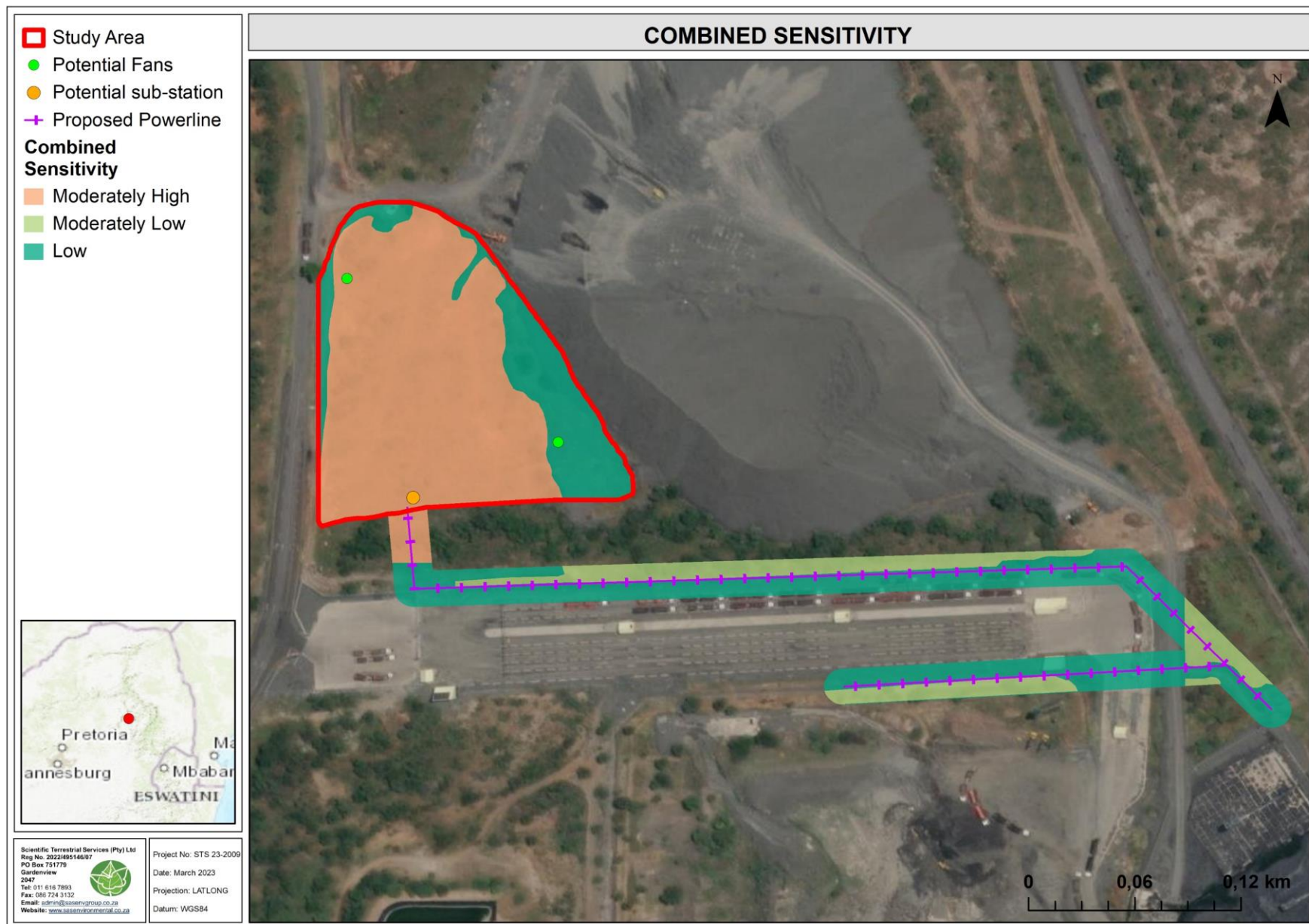


Figure 14: Floral and faunal sensitivity map of the study area and proposed powerline.



## 6 IMPACT ASSESSMENT

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

An impact discussion and assessment of all potential pre-construction, construction, operational and maintenance phase impacts are provided in Section 6.1. All mitigatory measures required to minimise the perceived impacts are presented in Section 6.2. Mitigation relating to the impacts are presented in a combined table in Section 6.3.

**Table 8: Activities and Aspects likely to impact on the faunal and floral resources associated with the Projects.**

ACTIVITIES AND ASPECTS REGISTER	
Pre-Construction Phase	
-	Potential failure to conduct a walkdown of the sites prior to construction activities to identify floral SCC locations.
-	Potential failure to obtain permits and to relocate floral SCC to suitable habitat outside the five proposed projects footprint.
-	<b>Impact:</b> Loss of faunal or floral SCC within the five proposed projects.
-	Inconsiderate planning, infrastructure placement and design, leading to the loss of potential sensitive floral and faunal species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the five proposed projects footprint.
-	<b>Impact:</b> Degradation and modification of the receiving environment, loss of faunal and floral habitat.
-	Potential failure implement an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities, resulting in the further proliferation of AIPs.
-	<b>Impact:</b> Spreads of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat.
Construction Phase	
-	Site clearing and the removal of vegetation.
-	<b>Impact:</b> Loss of faunal and floral habitat, diversity, and the possible loss of floral SCC.
-	Potential failure to monitor the success of relocated floral SCC, should this occur.
-	<b>Impact:</b> Loss of SCC individuals.
-	Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native species, including the further transformation of adjacent natural habitat.
-	<b>Impact:</b> Loss of favourable faunal and floral habitat around the development sites, including a decrease in species diversity and a potential loss of faunal and floral SCC.
-	Dumping and laydown of construction material within areas where no construction is planned thereby leading to habitat disturbance - allowing the establishment and spread of AIPs and further alteration of faunal habitat.
-	<b>Impact:</b> Loss of preferred faunal and floral habitat, diversity and SCC as AIPs outcompete the indigenous plant species in these disturbed areas.
-	Potentially poorly managed edge effects: <ul style="list-style-type: none"> <li>• Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and</li> <li>• Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation.</li> </ul>



ACTIVITIES AND ASPECTS REGISTER	
-	<b>Impact:</b> Loss of floral and faunal habitat, diversity, and SCC within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity and floral SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
-	Possible increased fire frequency during construction.
-	<b>Impact:</b> Loss or alteration of floral and faunal habitat and species diversity.
-	Dust generated during construction and operational activities accumulates on the surrounding floral individuals, altering the photosynthetic ability of plants <sup>14</sup> and potentially further decreasing optimal growing/re-establishing conditions.
-	<b>Impact:</b> Declines in plant functioning leading to loss of floral species and habitat for optimal growth.
Operational and Maintenance Phases	
-	Potential failure to monitor the success of relocated floral SCC, should floral SCC be relocated.
-	<b>Impact:</b> Loss of SCC individuals.
-	Increased introduction and proliferation of alien plant species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.
-	<b>Impact:</b> Ongoing or permanent loss of faunal and floral habitat, diversity, and potential SCC.
-	Increased ambient lighting and noise in the area.
-	<b>Impact:</b> Increased noise and ambient lighting may lead to altered faunal species movement and behavioural ecology. Altered faunal activity, notably of insects may impact on pollination rates of plant, impacting on seed development and overall growth/recovery of vegetation.
Decommissioning & Closure Phase	
-	Ineffective rehabilitation of exposed and impacted areas potentially leading to a shift in vegetation type;
-	<b>Impact:</b> Permanent loss of floral and faunal habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.
-	Potential poor management and failure to monitor rehabilitation efforts, leading to: <ul style="list-style-type: none"> <li>• Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species, reduced habitation and dispersal capabilities of faunal species, and an overall decrease in floral and faunal diversity;</li> <li>• Compacted soils limiting the re-establishment of natural vegetation; and</li> <li>• Increased risk of erosion in areas left disturbed.</li> </ul>
-	<b>Impact:</b> Long-term (or permanent) loss of floral and faunal habitat, diversity and SCC.
-	Disturbance of soils as part of demolition activities.
-	<b>Impact:</b> Loss of favourable growing conditions for floral communities and the subsequent loss of faunal habitat.
-	Insufficient aftercare and maintenance leading to erosion and sedimentation.
-	<b>Impact:</b> Loss of floral and faunal habitat and overall species diversity within the area.

## 6.1 Floral Impact Assessment

### 6.1.1 Floral Impact Assessment Results

Table 9 below indicates the perceived risks to the floral ecology associated with all phases of the proposed development. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as

<sup>14</sup> Sett, R. (2017). Responses in plants exposed to dust pollution. Horticulture International Journal, 1(2), 00010.).



stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

**Table 9: Impact on the floral ecology the proposed development.**

Impacting activities and associated habitat unit	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
PLANNING PHASE																
Floral Habitat and Diversity Project 1																
Mixed Bushveld	5	4	3	1	2	9	6	54 Medium low	5	4	2	1	1	9	4	36 Low
Secondary Bushveld	5	2	3	1	2	7	6	42 Low	5	2	2	1	1	7	4	28 Low
Transformed Habitat	3	1	1	1	2	4	4	16 Very low	2	1	1	1	1	3	3	9 Very low
Floral Species of Conservation Concern																
Floral SCC	4	4	3	1	2	8	6	48 Low	4	4	2	1	1	8	4	32 Low
CONSTRUCTION PHASE																
Floral Habitat and Diversity																
Mixed Bushveld	5	4	3	1	2	9	6	54 Medium low	5	4	2	1	2	9	5	45 Low
Secondary Bushveld	5	2	3	1	2	7	6	42 Low	5	2	2	1	2	7	5	35 Low
Transformed Habitat	3	1	1	1	2	4	4	16 Very low	2	1	1	1	2	3	4	12 Very low
Floral Species of Conservation Concern																
Floral SCC	5	4	3	1	2	9	6	54 Medium low	5	4	2	1	2	9	5	45 Low
OPERATIONAL AND MAINTENANCE PHASES																
Floral Habitat and Diversity																
Mixed Bushveld	3	4	2	1	4	7	7	49 Low	2	4	1	1	4	6	6	36 Low
Secondary Bushveld	3	2	2	1	4	5	7	35 Low	2	2	1	1	4	4	6	24 Low
Transformed Habitat	1	1	1	1	4	2	6	12 Very low	1	1	1	1	4	2	6	12 Very low
Floral Species of Conservation Concern																
Floral SCC	3	4	2	1	4	7	7	49 Low	2	4	2	1	4	6	7	42 Low
DECOMMISSIONING AND CLOSURE PHASE																
Floral Habitat and Diversity																
Mixed Bushveld	3	4	2	1	4	7	7	49 Low	2	4	1	1	4	6	6	36 Low
Secondary Bushveld	3	2	2	1	4	5	7	35 Low	2	2	1	1	4	4	6	24 Low





Impacting activities and associated habitat unit	UNMANAGED							MANAGED								
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Transformed Habitat	1	1	1	1	4	2	6	12 Very low	1	1	1	1	4	2	6	12 Very low
Floral Species of Conservation Concern																
Floral SCC	3	4	2	1	4	7	7	49 Low	2	4	2	1	4	6	7	42 Low

### 6.1.2 Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed five projects.

Direct impacts on floral habitat and species diversity will be greatest during the construction phase, with secondary impacts from poorly managed edge effects (e.g., AIP proliferation, disturbed areas left unrehabilitated and erosion) being more notable during the operational and maintenance phases. The impact footprints will be limited in their extent and the perceived effects on floral ecology can be kept to a localised scale with sufficiently implemented mitigation measures. The decommissioning and closure phase pose the opportunity for positive impacts if vegetation is adequately reinstated in these areas.

Impacts on protected floral species will be higher during the construction phase when vegetation clearance activities take place. Prior to clearance activities, permits for the relocation / destruction of any floral SCC will be required. It is important that if a species is destroyed, individuals of the same species must be propagated and at Dwarsrivier nursery and these species are to be used to reinstate habitat as part of the rehabilitation activities, both during the operational as well as the decommissioning phase. Impacts during all phases can be reduced to lower impact significances provided edge effects are managed and that all mitigation measures are implemented.

#### 6.1.2.1 Impact on Floral Habitat and Diversity

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development. The proposed development will result in the clearance of vegetation in areas of **low**, **moderately low** and **moderately high** sensitivity.



Prior to mitigation measures implemented, impact significance on floral habitat and diversity varies between **Medium-Low** and **Very Low**. With mitigation measures implemented, the direct and indirect impacts on the floral habitat and diversity can mostly be reduced to **Low** and **Very low** significances.

The most significant impacts to the floral habitat and species diversity resulting from the proposed development includes, but are not limited to, the following:

- Clearance of floral species within the proposed footprint areas;
- Further habitat fragmented and reduced dispersal opportunities for plant species as the disturbed / impacted areas will be less attractive to faunal species who are important mechanisms for seed dispersal;
- Increase risk of erosion and poor stormwater management - resulting in loss of soils, the down-slope sedimentation of habitat and the consequent loss of habitat beyond the planned footprint; and
- AIP proliferation in disturbed and adjacent areas, displacing indigenous flora and altering favourable habitat conditions for the establishment of indigenous species.

#### 6.1.2.2 Impacts on Floral SCC

The proposed development is associated with a limited number of floral SCC, which will likely be directly impacted by the proposed activities. The SCC previously recorded on site (*Lydenburgia cassinoides*) is protected under the NFA and is listed as an RDL species. Additionally, there is an increased chance that other NFA and RDL plant species may occur within the study area.

Without mitigation implemented, the anticipated impact significance on floral SCC communities varies between **Medium Low** and **Low**. The impacts on SCC are deemed to be mitigatable and thus with mitigation measures implemented, the impact significance can be reduced to **Low and Very low** significance levels.

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

- Disturbance, fragmentation and alteration of floral SCC habitat;
- Destruction, removal or harvesting of floral SCC during construction and operational activities; and
- Potentially poorly implemented and monitored rescue and relocation of SCC or not ensuring that the same species are being propagated in the Dwarsrivier nursery.



### 6.1.2.3 Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas

According to the desktop database, the proposed five projects will impact on an ESA 1. The data indicated that the Mixed Bushveld is the only habitat unit that can be considered representative of the ESA 1. The remaining habitat units have been degraded and fragmented to such an extent that they no longer meet the requirements for an ESA 1. Although the footprints of the proposed developments are not extensive, in the context of the size of the study area itself, notably the Mixed Bushveld habitat, they will result in a large portion of this habitat within the study area being cleared. As such, following the construction activities, it is unlikely that the remaining natural areas within the study area will meet the requirements for an ESA 1.

### 6.1.3 Probable Residual Impacts

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

- Further habitat fragmentation within the study area;
- Potential further loss of and altered floral species diversity outside of the footprint areas, including loss of favourable habitat for SCC if AIP proliferation is not managed; and
- Loss of NFA protected tree species as a result of vegetation clearing.

### 6.1.4 Cumulative Impacts

Significant vegetation clearance has already taken place within the local region due to mining activities and continued mine expansion. Similarly, associated mine infrastructure (roads, powerlines and pipelines) have led to further habitat clearing as well as enabling further proliferation of AIPs in these disturbed areas. The clearance of vegetation within the study area will further add to the regional cumulative loss of floral habitat. However, it is noted that the planned position of the vent shafts, substation and powerline are within the mine boundary and within an already fragmented landscape which is considered preferable to developing these structures in neighbouring intact and less fragmented habitats.



## 6.2 Faunal Impact Assessment

### 6.2.1 Faunal Impact Assessment Results

Table 10 below indicates the perceived risks to the faunal ecology associated with all phases of the proposed development. The tables also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

**Table 10: Impact on the faunal ecology for proposed development.**

Impacting activities and associated habitat unit	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
PLANNING PHASE																
Faunal Habitat and Diversity Project 1																
Mixed Bushveld	5	4	3	1	2	9	6	54 Medium low	5	4	2	1	1	9	4	36 Low
Secondary Bushveld	5	2	3	1	2	7	6	42 Low	5	2	2	1	1	7	4	28 Low
Transformed Habitat	3	1	1	1	2	4	4	16 Very low	2	1	1	1	1	3	3	9 Very low
Faunal Species of Conservation Concern																
Faunal SCC	3	3	3	1	2	6	6	36 Low	2	3	2	1	1	5	4	20 Very Low
CONSTRUCTION PHASE																
Faunal Habitat and Diversity																
Mixed Bushveld	5	4	3	1	2	9	6	54 Medium low	5	4	2	1	2	9	5	45 Low
Secondary Bushveld	5	2	3	1	2	7	6	42 Low	5	2	2	1	2	7	5	35 Low
Transformed Habitat	3	1	1	1	2	4	4	16 Very low	2	1	1	1	2	3	4	12 Very low
Faunal Species of Conservation Concern																
Faunal SCC	3	3	3	1	2	6	6	36 Low	3	3	2	1	2	6	5	30 Low
OPERATIONAL AND MAINTENANCE PHASES																
Faunal Habitat and Diversity																
Mixed Bushveld	3	4	2	1	4	7	7	49 Low	2	4	1	1	4	6	6	36 Low
Secondary Bushveld	3	2	2	1	4	5	7	35 Low	2	2	1	1	4	4	6	24 Low





Impacting activities and associated habitat unit	UNMANAGED							MANAGED								
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Transformed Habitat	1	1	1	1	4	2	6	12 Very low	1	1	1	1	4	2	6	12 Very low
Faunal Species of Conservation Concern																
Faunal SCC	3	3	2	1	4	6	7	42 Low	2	3	2	1	4	5	7	35 Low
DECOMMISSIONING AND CLOSURE PHASE																
Faunal Habitat and Diversity																
Mixed Bushveld	3	4	2	1	4	7	7	49 Low	2	4	1	1	4	6	6	36 Low
Secondary Bushveld	3	2	2	1	4	5	7	35 Low	2	2	1	1	4	4	6	24 Low
Transformed Habitat	1	1	1	1	4	2	6	12 Very low	1	1	1	1	4	2	6	12 Very low
Faunal Species of Conservation Concern																
Faunal SCC	3	3	2	1	4	6	7	42 Low	2	3	2	1	4	5	7	35 Low

## 6.2.2 Impact Discussion

Direct impacts on faunal habitat and species diversity will be greatest during the construction phase with secondary impacts stemming from poorly managed edge effects. During the operational phase, these impacts will decrease as there will be less people on site and less vehicles movement. However, habitat fragmentation, noise and light pollution leading to altered faunal behaviour patterns and habitat availability/utilisation will likely persist during this phase. The impacts will be limited in their extent and the perceived effects on faunal ecology can be kept to a local scale with sufficiently implemented mitigation measures.

Impacts to SCC are expected to be minimal, largely due to the decreased likelihood that such species will occur within the study area. Provided that all mitigation measures are implemented, impacts to these species can be suitably managed.

### 6.2.2.1 Impact on Faunal Habitat and Diversity

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected by the proposed development. The construction of the vent shafts, substation and powerline will result in the clearance of vegetation that varies from **low to moderately high sensitivity**. The loss of habitat will have a negative impact of faunal species diversity within the study area, however it is unlikely that such habitat loss will impact upon the overall species diversity and abundance levels of the region, due to the small extents of the footprints. Impacts



ranged from **medium low** to **very low** prior to mitigation. Provided all mitigation measures are implemented, these impacts can be suitably managed and reduced.

Most significant impacts that will affect faunal habitat and species diversity as a result of the five proposed projects during the construction phase include, but are not limited to, the following:

- Clearance of habitat leading to the displacement of faunal species;
- Habitat fragmented and resulting in reduced movement of species and potentially reduced dispersal opportunities;
- Light and noise pollution leading to altered faunal species behaviour patterns; and
- AIP proliferation displacing indigenous vegetation and altering favourable habitat conditions for faunal species.

#### 6.2.2.2 Impacts on Faunal SCC

The study area, due to its location and limited size has a low to medium probability of hosting faunal SCC. Of the five SCC that may be associated with the habitats therein, only one species attained a medium POC, namely *Crocidura maquassiensis* (Makwassie Musk Shrew, VU). Habitat fragmentation and the proximity to mining activities and associated impacts have lowered the overall suitability of the study area for faunal SCC.

Without mitigation implemented, the anticipated impact significance on faunal SCC is anticipated to be **Low**. The impacts on SCC are deemed to be mitigatable and thus with mitigation measures implemented, the impact significance can be reduced to **Very low** levels.

#### 6.2.3 Probable Residual Impacts

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

- Loss of / altered faunal species diversity in the footprint areas and the adjacent areas;
- Edge effects such as habitat fragmentation, AIP proliferation and bush encroachment limiting faunal species habitat utilisation;
- Potential further loss of SCC/protected faunal species and suitable habitat for such species; and



- It is unlikely that disturbed areas will be rehabilitated to an ecologically functioning state resulting in significant loss of habitat and species diversity, with reinstatement to pre-mining levels being unlikely.

## 6.2.4 Cumulative Impacts

Vegetation clearance for community expansion and mining has had a significant impact to faunal species in the region. Such development has led to notable habitat loss, lowering the carrying capacity of fauna in the region whilst decreasing the suitability of large portions of land for various species. The clearance of vegetation within the study area will further add to the regional cumulative loss of faunal habitat, however it is noted that the study area is fragmented from larger connected and intact habitat. Although habitat loss will occur, the cumulative impact of such will not be of lower significance.

## 6.3 Integrated Impact Mitigation

The table below 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 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 11: A summary of the mitigatory requirements for the biodiversity associated with the proposed development.**

<b>Project phase</b>	Construction Phase
<b>Impact Summary</b>	Loss of floral and faunal habitat, species, and SCC
<b>Proposed mitigation and management measures:</b>	
<b>Development footprint</b>	
<ul style="list-style-type: none"> <li>• Prior to any vegetation clearance activities taking place a walkdown of the footprint should be undertaken and all floral and faunal SCC encountered must be GPS marked and the necessary permits applied for with the relevant national and provincial departments. The site walk down is to be conducted prior to clearance activities and ideally post good rains between November and February when plant growth is at its peak</li> <li>• The construction footprint must be kept as small as possible to minimise impact on the surrounding environment (edge effect management);</li> <li>• Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved footprint;</li> <li>• As far as possible clearing of vegetation should take place in a phased manner moving away from fences and/or barriers. This will allow for any faunal species within the proposed footprints to flee and avoid harm;</li> <li>• Smaller species such as scorpions and reptiles will not as readily be able to move out of an area ahead of ground clearing. As such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and instructed not to kill them. Smaller scorpion species and</li> </ul>	



<p>harmless reptiles (that are likely present within the footprint areas) should be carefully relocated by a suitably nominated construction person. For larger venomous snakes, a suitably trained specialist, or on-site personnel, should be contacted to carry out the relocation of the species, should it not move off on its own;</p> <ul style="list-style-type: none"> <li>• Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;</li> <li>• No hunting or trapping of faunal species is to be allowed by construction personnel;</li> <li>• Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed;</li> <li>• Care should be taken during construction activities to limit edge effects to surrounding natural habitat. This can be achieved by: <ul style="list-style-type: none"> <li>• Demarcating all footprint areas during construction activities;</li> <li>• No dumping of litter, rubble or cleared vegetation on site should be allowed. Rubble / waste 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. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste; and</li> <li>• Manage the spread of AIP species as per the mines mine's AIP control plan.</li> </ul> </li> <li>• Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site;</li> <li>• 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 at all times. 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; and</li> <li>• 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.</li> </ul>	
<b>Alien Vegetation</b>	
<ul style="list-style-type: none"> <li>• 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 AIP species (as listed in the NEM:BA Alien species lists, 2020), in line with the NEM:BA Alien and Invasive Species Regulations (2020);</li> <li>• AIP monitoring and clearing/control should take place throughout the construction phase of the development, and a 30 m buffer surrounding the footprints should be regularly checked for AIP proliferation and to prevent inward and/or outward spread of AIPs, notably into non infested areas and newly rehabilitated areas; and</li> <li>• 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.</li> </ul>	
<b>Floral and Faunal SCC</b>	
<ul style="list-style-type: none"> <li>• Should any floral SCC be relocated, the relocation success of such species should be monitored during the construction phase to ensure immediate actions can be taken if it becomes evident that relocation is not successful;</li> <li>• No collection of floral SCC must be allowed by construction personnel without the relevant permits;</li> <li>• Edge effect control needs to be implemented to prevent further degradation and potential loss of floral and faunal SCC outside of the five proposed project footprint areas; and</li> <li>• Should the presence of any faunal or floral SCC be noted within the development footprint post walkdown and during vegetation clearance / construction activities, a suitably qualified specialist should be consulted on the best way to proceed.</li> </ul>	
<b>Project phase</b>	Operational and Maintenance Phase
<b>Impact Summary</b>	Loss of floral and faunal habitat, species, and SCC
<b>Proposed mitigation and management measures:</b>	
<b>Development footprint</b>	
<ul style="list-style-type: none"> <li>• The footprint area must be regularly inspected for sign of erosion, edge effects and any new areas of disturbance which will lead to further habitat loss and/or the proliferation of AIPs; and</li> <li>• No dumping of litter or waste must be allowed on-site.</li> </ul>	





**Alien Vegetation**

- AIP proliferation which may affect adjacent natural areas needs to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEM:BA Alien species lists, 2020), in line with the NEM:BA Alien and Invasive Species Regulations (2020);
- Ongoing AIP monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and
- 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.

**Floral and Faunal SCC**

- If any relocation of SCC took place, monitoring of relocation success should continue for at least three years after the completion of the construction phase, or until it is evident that the species have established self-sustaining populations.

DRAFT



## 7 CONCLUSION

Scientific Terrestrial Services was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Impact Assessment in order to obtain Environmental Authorisation for the proposed development of vent shafts, overhead powerlines and a substation. The proposed vent shafts and substation are to be developed within the study area and proposed powerline.

The below broad habitat units could be distinguished within the study area:

- **Mixed Bushveld;**
- **Secondary Bushveld; and**
- **Transformed Habitat.**

From a floral and faunal perspective, the proposed activities will result in the clearance of vegetation that is of **moderately high sensitivity**, of **moderately low sensitivity** and **low sensitivity**. With mitigation measures implemented, no significant or residual loss of floral or faunal communities are anticipated. Furthermore, given the small extent of ESA 1 habitat impacted and the already fragmented state of the study area from the adjacent natural areas, the loss of ESA 1 habitat is not regarded significant.

The proposed activities are unlikely to impact on RDL species; however, a walkdown of the study area is recommended, to confirm the indicated positions of the floral SCC as per Section 3, as these points represent historical data and inaccuracies and changes may have occurred over time. No faunal SCC were observed during the site assessment, however, it remains possible that faunal SCC may, periodically, forage within the study area, though this is likely to be relatively infrequent. Given the small extent of the study area and the low likelihood of faunal SCC being present, the proposed development is unlikely to pose a significant threat to faunal SCC.

It is the opinion of the ecologists that the proposed development is unlikely to result in significant impacts to the receiving environment provided all mitigation measures are implemented. This study is deemed to provide 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 and proposed powerline will be made in support of the principle of sustainable development.



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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 study area and proposed powerline 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), AS AMENDED IN SEPTEMBER 2011 (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.

## **NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED<sup>15</sup> (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.

## **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).

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<sup>15</sup> 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 June 2014. Commencement date: 2 June 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 Conservation Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the study area and proposed powerline, 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 and proposed powerline. 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<sup>16</sup>:

- **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<sup>2</sup> 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

<sup>16</sup> More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

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



the BODATSA, which contains records from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & 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 and proposed powerline is situated but where it is deemed appropriate, a larger area can be included.

## NEMBA TOPS Species

The Threatened or Protected Species (TOPS) Regulations (R 152 of 2007) under Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were taken into consideration.

## 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](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
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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 and proposed powerline. 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 and proposed powerline.

One of the problems with random sampling, another popular sampling method, is that random samples may not cover all areas of a study area and proposed powerline 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:





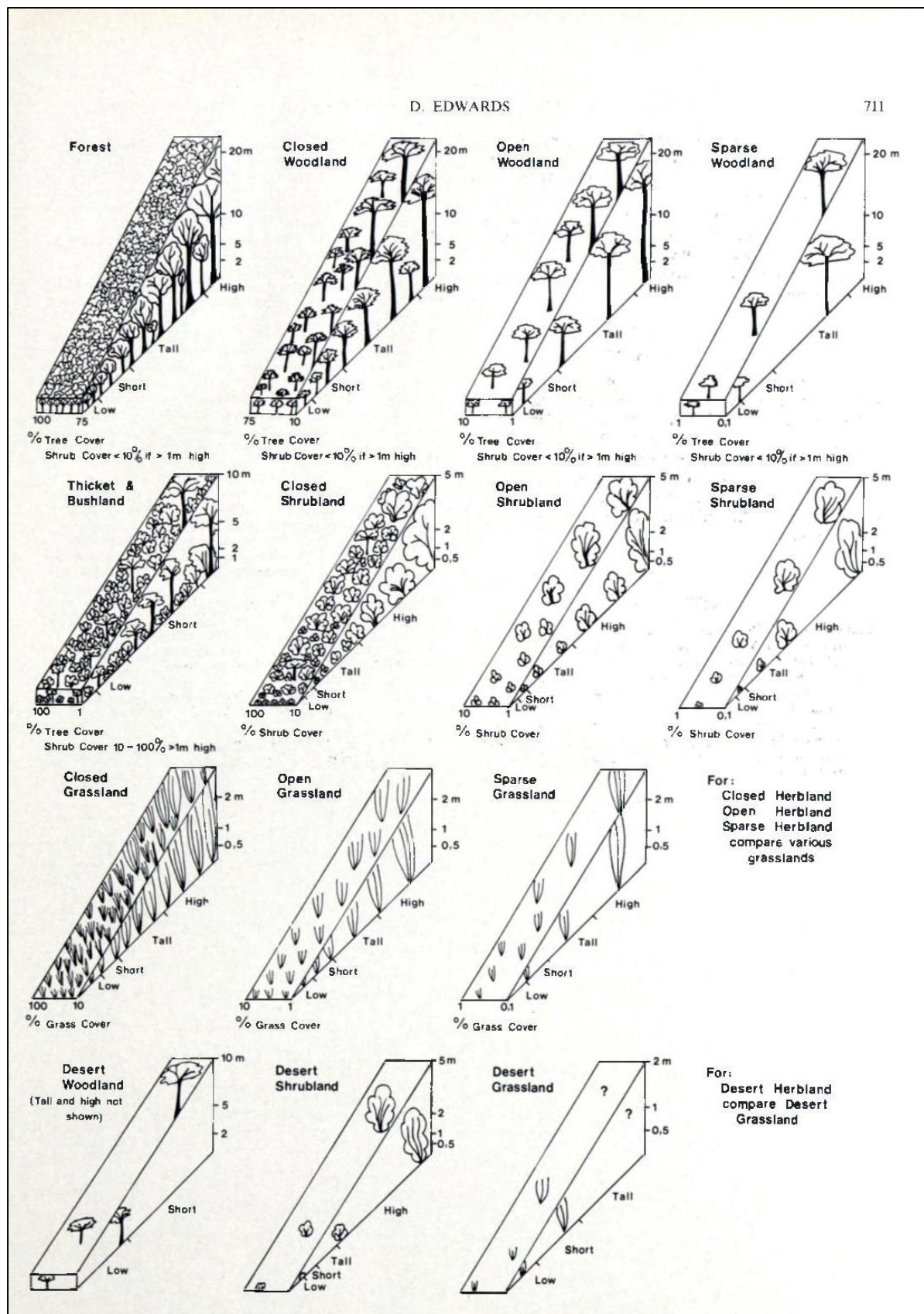


Figure C1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.



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

### **Amphibians**

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

### **Invertebrates**

Whilst conducting transects through the focus area, all insect species visually observed were identified, and where possible photographs taken.

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

## Faunal Species of Conservation Concern Assessment

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

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

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

## Faunal Habitat Sensitivity

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

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

Each of these values contributes equally to the mean score, which determines the suitability and sensitivity of the focus area for each faunal class. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilisation of the focus 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

In order for the Environmental Assessment Practitioner (EAP) to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below. The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'<sup>17</sup>. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to the Table C2. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine whether mitigation is necessary<sup>18</sup>.

The assessment of significance is undertaken twice. Initial, significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

<sup>17</sup> The definition has been aligned with that used in the ISO 14001 Standard.

<sup>18</sup> Some risks/impacts that have low significance will however still require mitigation.





The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

**Table E1: Criteria for assessing significance of impacts.**

#### LIKELIHOOD DESCRIPTORS

Probability of impact	RATING
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	RATING
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

#### CONSEQUENCE DESCRIPTORS

Severity of impact	RATING
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	RATING
Activity specific/ < 5 ha impacted / Linear developments affected < 100m	1
Development specific/ within the site boundary / < 100ha impacted / Linear developments affected < 100m	2
Local area/ within 1 km of the site boundary / < 500ha impacted / Linear developments affected > 100m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear developments affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear developments affected > 3000m	5
Duration of impact	RATING
One day to one month	1
One month to one year	2
One year to five years	3
Life of operation or less than 20 years	4
Permanent	5



Table E2: Significance Rating Matrix.

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table E3: Positive/Negative Mitigation Ratings.

Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
Very high	126-150	Critically consider the viability of proposed projects Improve current management of existing projects significantly and immediately	Maintain current management
High	101-125	Comprehensively consider the viability of proposed projects Improve current management of existing projects significantly	Maintain current management
Medium-high	76-100	Consider the viability of proposed projects. Improve current management of existing projects	Maintain current management
Medium-low	51-75	Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Low	26-50	Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Very low	1-25	Maintain current management and/or proposed project criteria and strive for continuous improvement	Maintain current management and/or proposed project criteria and strive for continuous improvement

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the client and its contractors develops or controls;



- Areas potentially impacted by cumulative impacts for any existing project or condition and other project-related developments; and
- Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
  - Risks/Impacts were assessed for all stages of the project cycle including:
- Construction; and
- Operation.
  - If applicable, transboundary or global effects were assessed.
  - Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed.
  - Particular attention was paid to describing any residual impacts that will occur after rehabilitation.

## Mitigation measure development

According to the DEA *et al.*, (2013) “Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine, and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding which is attenuated by wetlands”.

According to the DEA *et al.*, (2013) ecosystem services can be divided into 4 main categories:

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and fresh water;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;
- Regulating services are the benefits obtained from an ecosystem’s control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing, and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa’s Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (hereafter referred to as the Biodiversity Act) and is fundamental to the notion of sustainable development. In addition, international guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa (DEA *et al.*, 2013).

The primary environmental objective of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) is to give effect to the environmental right contained in the South African Constitution. Furthermore, Section 37(2) of the MPRDA states that “any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations”.

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.*, (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world.



The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including<sup>19</sup>:

- Cultivation and grazing activities;
- Rural and urban development;
- Industrial and mining activities, and
- Infrastructure development.

Impacts on biodiversity can largely take place in four ways (DEA *et al.*, 2013):

- **Direct impacts:** are impacts directly related to the project including project aspects such as site clearing, water abstraction and discharge of water from riverine resources;
- **Indirect impacts:** are impacts associated with a project that may occur within the zone of influence in a project such as surrounding terrestrial areas and downstream areas on water courses;
- **Induced impacts:** are impacts directly attributable to the project but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries; and
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing, and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous mining operations within the same drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused, and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted the definition of a clear mitigation strategy for biodiversity impacts.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et al.*, 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology, and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
  - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;

<sup>19</sup> Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.





- **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the focus area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
  - **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community or community suitable for supporting the intended post closure land use; and
  - **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.
- **Offset impact:** refers to compensating for residual or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.<sup>20</sup>

In light of the above discussion the following points present the key concepts considered in the development of mitigation measures for the proposed project:

- Mitigation and performance improvement measures and actions that address the risks and impacts<sup>21</sup> 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 where possible; and

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 wherever possible.

## 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.

<sup>20</sup> Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.

<sup>21</sup> Mitigation measures should address both positive and negative impacts



## APPENDIX F: Vegetation Type(s)

### SVcb 28 Sekhukhune Mountain Bushveld

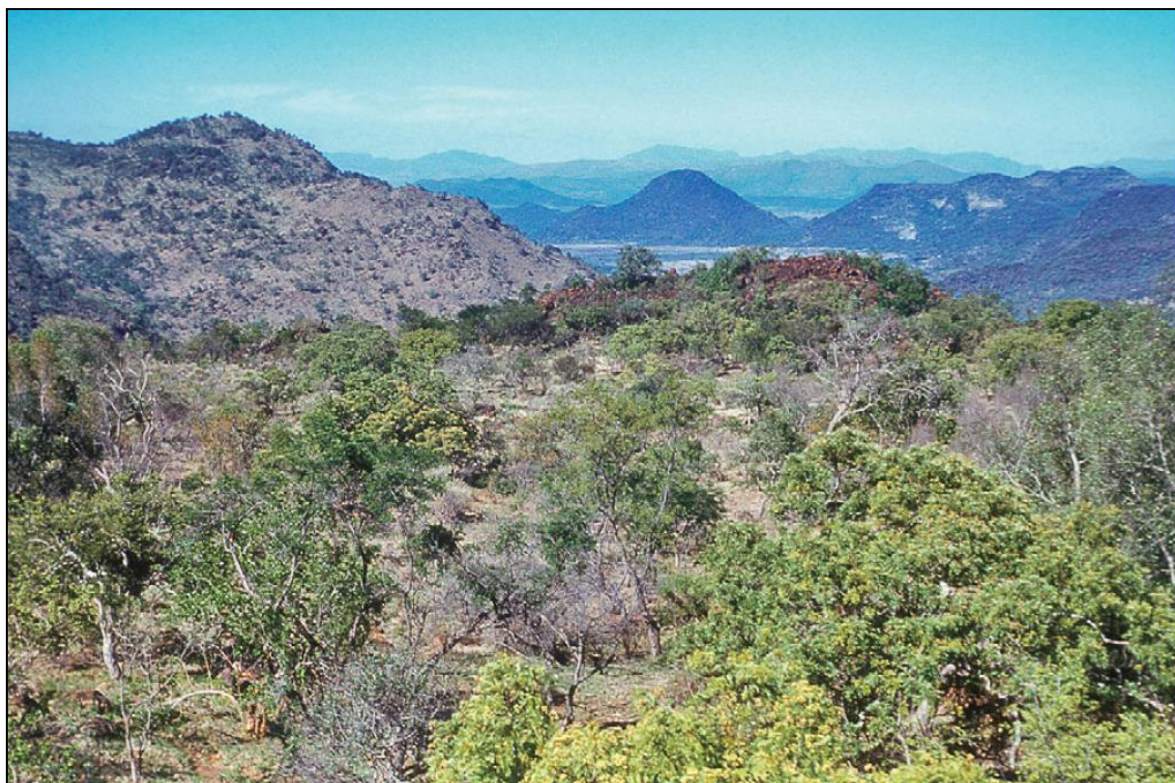


Figure F1: SVcb 28 Sekhukhune Mountain Bushveld: Moderately open bushveld on upper slopes of the Leolo Mountains, Sekhukhune District, Limpopo Province. Image source: Mucina and Rutherford (2006) Figure 9.35, page 481. © J. P. H Acocks.

### Dominant Floral Taxa

Table F1: Dominant & typical floristic species of Sekhukhune Mountain Bushveld (Mucina & Rutherford, 2012)

GROUP	SPECIES
Tall Tree	<i>Senegalia nigrescens</i>
Small Trees	<i>Senegalia senegal</i> var. <i>leiorhachis</i> (d), <i>Combretum apiculatum</i> (d), <i>Kirkia wilmsii</i> (d), <i>Terminalia prunioides</i> (d), <i>Vitex obovata</i> subsp. <i>wilmsii</i> (d), <i>Ziziphus mucronata</i> (d), <i>Bolusanthus speciosus</i> , <i>Boscia albitrunca</i> , <i>Brachylaena ilicifolia</i> , <i>Combretum molle</i> , <i>Commiphora mollis</i> , <i>Croton gratissimus</i> , <i>Cussonia transvaalensis</i> , <i>Hippobromus pauciflorus</i> , <i>Ozoroa sphaerocarpa</i> , <i>Pappea capensis</i> , <i>Schotia latifolia</i> , <i>Sterculia rogersii</i> , <i>Acacia ormocarpoides</i> (e), <i>Lydenburgia cassinoides</i> <sup>SK</sup>
Succulent Tree	<i>Aloe marlothii</i> subsp. <i>marlothii</i> , <i>Euphorbia sekukuniensis</i> (e)
Tall Shrubs	<i>Dichrostachys cinerea</i> (d), <i>Euclea crispa</i> subsp. <i>crispa</i> (d), <i>Combretum hereroense</i> , <i>Euclea linearis</i> , <i>Pavetta zeyheri</i> , <i>Tinnea rhodesiana</i> , <i>Triaspis glaucophylla</i> , <i>Rhus sekukuniensis</i> <sup>SK</sup>
Low shrubs	<i>Elephantorrhiza praetermissa</i> (d), <i>Grewia vernicosa</i> (d), <i>Asparagus intricatus</i> , <i>Barleria saxatilis</i> , <i>B. senensis</i> , <i>Clerodendrum ternatum</i> , <i>Commiphora africana</i> , <i>Hermannia glanduligera</i> , <i>Indigofera lydenburgensis</i> , <i>Jatropha latifolia</i> var. <i>angustata</i> , <i>Melhania prostrata</i> , <i>Phyllanthus glaucophyllus</i> , <i>Psiadia punctulata</i> , <i>Rhus keetii</i> , <i>Rhynchosia komatiensis</i> , <i>Euclea sekukuniensis</i> <sup>SK</sup> , <i>Petalidium oblongifolium</i> <sup>CB</sup> , <i>Plectranthus venter</i> <sup>Z</sup> , <i>Rhus batophylla</i> <sup>SK</sup>
Succulent Shrubs	<i>Aloe castanea</i> (d), <i>A. cryptopoda</i> (d).
Soft Shrub	<i>Plectranthus porcatus</i> (e)



<b>Woody climber</b>	<i>Clematis brachiata</i> (d), <i>Rhoicissus tridentata</i> (d), <i>Acacia ataxacantha</i> , <i>Asparagus sekukuniensis</i> <sup>SK</sup> , <i>Rhoicissus sekhukhuniensis</i> <sup>SK</sup>
<b>Woody Succulent Climber</b>	<i>Sarcostemma viminalis</i>
<b>Graminoids</b>	<i>Aristida canescens</i> (d), <i>Heteropogon contortus</i> (d), <i>Panicum maximum</i> (d), <i>Setaria lindenberghiana</i> (d), <i>Themeda triandra</i> (d), <i>Aristida transvaalensis</i> , <i>Cymbopogon pospischilii</i> , <i>Diheteropogon amplexans</i> , <i>Enneapogon scoparius</i> , <i>Loudetia simplex</i> , <i>Panicum deustum</i> , <i>Setaria sphacelata</i>
<b>Herb</b>	<i>Berkheya insignis</i> (d), <i>Commelina africana</i> (d), <i>Cyphostemma woodii</i> , <i>Kyphocarpa angustifolia</i> , <i>Senecio latifolius</i> .
<b>Geophytic herbs</b>	<i>Hypoxis rigidula</i> , <i>Sansevieria hyacinthoides</i> , <i>Chlorophytum cyperaceum</i> <sup>SK</sup> , <i>Raphionacme chimanimaniana</i> <sup>2</sup> .
<b>Succulent Herbs</b>	<i>Huernia stapelioides</i>

<sup>\*</sup>(d) – Dominant species for the vegetation type; (e) – Endemic Taxa, <sup>N</sup>Northern Sourveld endemic, <sup>CB</sup>Central Bushveld endemic, <sup>SK</sup>Sekhukhune endemic, <sup>2</sup>Link to Zimbabwe. (The genus for all *Senegalia* and *Vachellia* spp. were formerly *Acacia*, and the genus for all *Searsia* spp was formerly *Rhus*).



## APPENDIX G: Species List

### Observed and Expected Floral Species

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

Species	Mixed Bushveld	Secondary Bushveld	Transformed Areas
<b>Grasses</b>			
<i>Aristida congesta</i> subsp <i>congesta</i>	X	X	X
<i>Cymbopogon excavatus</i>	X	X	X
<i>Cynodon dactylon</i>	X	X	X
<i>Digitaria eriantha</i>	X	X	X
<i>Eragrostis rigidior</i>	X		
<i>Eragrostis capensis</i>	X	X	X
<i>Heteropogon contortus</i>	X	X	X
<i>Hyparrhenia hirta</i>	X	X	X
<i>Loudetia simplex</i>	X		
<i>Melinis repens</i>	X	X	X
<i>Panicum maximum</i>	X		
<i>Setaria sphacelata</i>	X		
<i>Themeda triandra</i>	X	X	X
<i>Urochloa panicoides</i>	X		
<b>Forbs and groundcovers</b>			
* <i>Bidens pilosa</i>	X	X	X
<i>Argemone ochroleuca</i> (1b)		X	X
<i>Ledebouria marginata</i>	X		
<i>Crotalaria monteiroi</i> var. <i>galpinii</i>			
* <i>Datura ferox</i> (1b)	X	X	X
<i>Stylochaeton natalensis</i>	X		
* <i>Verbena bonariensis</i> (1b)		X	X
<i>Datura stramonium</i> (1b)			X
<i>Hippobromus pauciflorus</i>	X		
<i>Hypoxis rigidula</i>			
<i>Pellaea calomelanos</i>	X		
<i>Plectranthus hadiensis</i>	X		
<i>Rhoicissus sekhukhuniensis</i>	X		
<i>Rhynchosia minima</i>	X		
<i>Sansevieria hyacinthoides</i>	X		
<b>Trees and Shrubs</b>			
<i>Bolusanthus speciosus</i>	X		
<i>Berchemia zeyheri</i>		X	X
<i>Combretum apiculatum</i>	X	X	X
<i>Combretum hereroense</i>	X	X	X
<i>Combretum molle</i>	X		
<i>Combretum zeyheri</i>	X		
<i>Dichrostachys cinerea</i>	X	X	X
<i>Euclea sekhukhuniensis</i>	X	X	
<i>Grewia flava</i>	X	X	X
<i>Leucaena leucocephala</i>			X
<i>Lydenburgia cassinoides</i>	X	X	
* <i>Melia azedarach</i> (1b)		X	X
<i>Mundulea sericea</i>	X		
<i>Peltophorum africanum</i>	X	X	
<i>Searsia lancea</i>	X	X	X
<i>Searsia keetii</i>	X		
<i>Searsia pyroides</i>	X		
<i>Vachellia karroo</i>		X	X
<i>Vachellia nilotica</i>	X	X	





Species	Mixed Bushveld	Secondary Bushveld	Transformed Areas
<i>Vachellia tortilis</i>		X	X
<i>Ziziphus mucronata</i>	X	X	

### Observed Faunal Species

**Table G2: Mammal species list.**

SPECIES OR SIGNS THEREOF OBSERVED		
Scientific Name	Common Name	Conservation Status (RSA)
<i>Sylvicapra grimmia</i>	Grey Duiker	LC
<i>Herpestes sanguinea</i>	Slender Mongoose	LC

LC = Least Concern

**Table G3: Avifaunal species list.**

SPECIES OBSERVED		
Scientific Name	Common Name	Conservation Status (RSA)
<i>Milvus aegyptius</i>	Yellow Billed Kite	LC
<i>Dicrurus adsimilis</i>	Fork-Tailed Drongo	LC
<i>Merops apiaster</i>	European Bee-Eater	LC
<i>Euplectes orix</i>	Southern Red Bishop	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Corvus albus</i>	Pied Crow	LC
<i>Streptopelia capicola</i>	Cape Turtle Dove	LC
<i>Streptopelia senegalensis</i>	Laughing Dove	LC
<i>Streptopelia semitorquata</i>	Red-Eyed Dove	LC
<i>Corythaixoides concolor</i>	Grey Go-Away Bird	LC
<i>Chrysococcyx caprius</i>	Diederik Cuckoo	LC
<i>Numida meleagris</i>	Helmeted Guineafowl	LC
<i>Apalis thoracica</i>	Bar-Throated Apalis	LC
<i>Pycnonotus tricolor</i>	Dark Capped Bulbul	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC

LC = Least Concern

**Table G4: Herpetofaunal species list.**

SPECIES OBSERVED		
Scientific Name	Common Name	Conservation Status (RSA)
<i>Trachylepis damarana</i>	Variable Skink	LC
<i>Trachylepis margaritifera</i>	Rainbow Skink	LC

LC = Least Concern

**Table G5: General invertebrate species list.**

SPECIES OR SIGNS THEREOF RECORDED IN THE MRA		
Scientific Name	Common Name	IUCN Status
<b>Insects</b>		
<i>Anthia circumscripta</i>	Ground Beetle	NYBA
<i>Anomalipus</i> sp	Darkling Beetle	NYBA
<i>Onthophagus</i> sp	Dung Beetle	NYBA
<i>Lycus</i> sp	Net Winged Beetle	NYBA
<i>Phymateus viridipes</i>	Green Stinkwood Locust	NYBA
<i>Alphocoris indutus</i>	Shield-Backed Bug	NYBA



<i>Rhachitopis</i> sp	Short Horned Grasshopper	NYBA
<i>Zonocerus elegans</i>	Elegant Grasshopper	NYBA
<i>Cyligramma latona</i>	Cream-Striped Owl Moth	NYBA
<i>Lepidochrysops patricia</i>	Patrician Giant Cupid	LC
<i>Junonia hierta</i>	Yellow Pansy	LC
<i>Byblia lithyia</i>	Spotted Joker Butterfly	LC
<i>Derocalymma</i> sp	Cockroach	NYBA
<i>Orthetrum julia</i>	Julia Skimmer Dropwing	LC
<i>Pseudagrion salisburyense</i>	Salisbury/Slate Sprite Damselfly	LC
<i>Trithemis arteriosa</i>	Red-Veined Dropwing	LC
<i>Alcimus tristigatus</i>	Robber Fly	NYBA
Family Reduviidae	Assassin Bugs	NYBA
<i>Platypleura mijburghi</i>	Cicada	NYBA
<i>Steganocerus multipusctatus</i>	Ladybird Bug	NYBA
<i>Ectrichodoia crux</i>	Millipede Assassin	NYBA
<i>Pachydactylus affinis</i>	Velvet Ant	NYBA
<b>Arachnids</b>		
<i>Leucage</i> sp.	Silver Marsh Spider	NYBA
<i>Olurunia ocellata</i>	Grass Funnel Web Spider	NYBA
<i>Selenops</i> sp	Wall Crab Spider	NYBA
<i>Argiope</i> sp	Orb Web Spiders	NYBA

LC = Least Concern; NYBA = Not Yet Assessed by the IUCN



## 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 and proposed powerline was pulled from the Botanical Database of Southern Africa (BODATSA) (<http://posa.sanbi.org/>). This list was further cross-checked with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) TOPS flora) to identify provincially protected species previously recorded for the area.

### Definitions of the national Red List categories

Categories marked with <sup>N</sup> 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.
- <sup>N</sup>**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.
- <sup>N</sup>**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 <500 km<sup>2</sup>, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy, typically smaller than 20 km<sup>2</sup>, 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.

## POC for RDL Floral SCC obtained from BODATSA

**Table H1: Red Data Listed plant species and near-threatened species (NT) associated with the QDS 2430CC. Species list obtained from the new Plants of southern Africa (new POSA) online catalogue as well as the 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>) as well as the Species Environmental Assessment Guideline (SANBI, 2020).**

SCIENTIFIC NAME	POC	HABITAT DESCRIPTION	IUCN	OCCUPIED AREA (km <sup>2</sup> )
<i>Combretum petrophilum</i>	Low	Indigenous; Endemic shrub; dwarf shrub  <b>Provincial distribution:</b> Limpopo, Mpumalanga <b>Range:</b> Sekhukhuneland.  <b>Description:</b> Rocky outcrops in mountain bushveld  **No suitable habitat in study area	NT	No data available
<i>Lydenburgia cassinoides</i>	Confirmed	Indigenous; Endemic  <b>Provincial distribution:</b> Limpopo, Mpumalanga <b>Range:</b> Roossenekal to Strydpoort Mountains. <b>Major habitats:</b> Savanna <b>Description:</b> Exposed norite bedrock and dolomite.  **Confirmed on site within the Mixed Bushveld.	NT	No data available
<i>Polygala sekhukhuniensis</i>	Medium	Indigenous  <b>Provincial distribution:</b> Limpopo <b>Range:</b> Sekhukhuneland. <b>Major habitats:</b> Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld <b>Description:</b> Sparsely vegetated heavy metal rich soils on lower slopes and valley bottoms.  **Limited suitable habitat in the Mixed Bushveld habitat. Largely associated with erosion gullies, of which there were none.	VU	No data available
<i>Searsia batophylla</i>	Low	Indigenous; Endemic shrub  <b>Provincial distribution:</b> Limpopo <b>Range:</b> Sekhukhuneland. <b>Major habitats:</b> Sekhukhune Mountain Bushveld, Sekhukhune Plains Bushveld, Ohrigstad Mountain Bushveld	VU	No data available





SCIENTIFIC NAME	POC	HABITAT DESCRIPTION	IUCN	OCCUPIED AREA (km <sup>2</sup> )
		<b>Description:</b> Dry bushveld, in low-lying areas and along watercourses, 650-975 m.		
<i>Searsia sekhukhuniensis</i>	Low	<b>South African endemic</b>  <b>Provincial distribution:</b> Limpopo <b>Range:</b> Sekhukhuneland, Roossenekal to Steelpoort. <b>Major habitats:</b> Savanna <b>Description:</b> Rocky hillsides in bushveld, on pyroxenitic substrates of the eastern rim of Bushveld Igneous Complex.  <b>**No suitable habitat in the study area.</b>	Rare	No data available
Sensitive species 587	Low	<b>South African endemic</b> <b>Description:</b> Closed woodland and thicket, in shallow norite soils on rocky outcrops among large boulders, 900-1300 m.  <b>**Typically, this species is associated with the Sekhukhune Mountain Bushveld. No suitable habitat occurs in the study area.</b>	Rare	No data available
Sensitive species 124	Low	<b>South African endemic</b> <b>Description:</b> Dry, wooded rocky norite outcrops.  <b>**Known from the Dwars and Steelpoort River valleys where it occurs on rocky outcrops. No such habitat for this species occurs in the study area.</b>	CR	No data available



## Provincially Protected Flora

**Table H2: Protected Plants (Schedule 12) for the Limpopo Province.**

COMMON NAME	SCIENTIFIC NAME	POC
<b>Trees and Shrubs</b>		
The following <i>Adenia</i> species	<i>Adenia fruticosa simpliciflora</i>	Low
Baobab	<i>Adansonia digitata</i>	Low
Beech	<i>Faurea macnaughtonii</i>	Low
Bitter False Thorn	<i>Albizia amara sericocephala</i>	Low
The following <i>Boscia</i> species	<i>Boscia angustifolia</i> var. <i>corymbosa</i>	Low
	<i>Boscia foetida minima</i>	Low
Borassus Palm	<i>Borassus aethiopicum</i>	Low
Brackenridgea	<i>Brackenridgea zanguebarica</i>	Low
Capper Bush	<i>Capparis sepiaria</i> var. <i>subglabra</i>	Low
The following <i>Combretum</i> species	<i>Combretum collinum taborense</i>	Low
	<i>Combretum padoides</i>	Low
	<i>Combretum petrophilum</i>	Low
	<i>Combretum vendae</i>	Low
The following <i>Commiphora</i> species	<i>Commiphora zanzibarica</i>	Low
Currant	<i>Allophylus ainifolius</i>	Low
The following <i>Elephantorrhiza</i> species	<i>Elephantorrhiza praetermissa</i>	Low
The following <i>Grewia</i> species	<i>Grewia rogersii</i>	Low
	<i>Hibiscus articulatus</i>	Low
The following <i>Hibiscus</i> species	<i>Hibiscus barnardii</i>	Low
	<i>Hibiscus sabiensis</i>	Low
Large Cape Myrtle	<i>Myrsine pillansii</i>	Low
Largeleaved Dragon Tree	<i>Dracaena hookerana</i>	Low
Largeleaved Saucerberry	<i>Cordia africana</i>	Low
The following <i>Maytenus</i> species	<i>Maytenus oxycarpa</i>	Low
	<i>Maytenus pubescens</i>	Low
The following <i>Ochna</i> species	<i>Ochna glauca</i>	Low
Pepperbark Tree	<i>Warburgia salutaris</i>	Low
Pincushion	<i>Leucospermum saxosum</i>	Low
The following <i>Rhus</i> species	<i>Searsia batophylla</i>	Low
Sand ironplum	<i>Drypetes mossambicensis</i>	Low
Salati Palm	<i>Borassus aethiopicum</i>	Low
Stinkwood, Black	<i>Ocotea bullata</i>	Low
Stinkwood, Transvaal	<i>Ocotea kenyensis</i>	Low
Tamboti	<i>Spirostachys africana</i>	Low
The following <i>Tarenna</i> species	<i>Tarenna zygoon</i>	Low
Transvaal Red Balloon	<i>Erythrophysa transvaalensis</i>	Low
Venda Beadstring	<i>Alchornea laxiflora</i>	Low
Wild Banana	<i>Ensete ventricosum</i>	Low
Wild Teak	<i>Pterocarpus angolensis</i>	Low
Yellowwood, Outeniqua	<i>Podocarpus latifolius</i>	Low
Yellowwood, Real	<i>Podocarpus falcatus</i>	Low
<b>Succulents</b>		
<b>All species of aloes indigenous to the province excluding the following species:</b>		
Aculeata	<i>Aloe aculeata</i>	
Aloe Catstail	<i>Aloe castanea</i>	
Aloe Krans	<i>Aloe arborescens</i>	



COMMON NAME	SCIENTIFIC NAME	POC
Aloe Mountain	<i>Aloe marlothii</i>	
Ammophilla	<i>Aloe ammophilla</i>	
Davyana	<i>Aloe davyana</i>	
Fosteri	<i>Aloe fosteri</i>	
Globuligemma	<i>Aloe globuligemma</i>	
Grandidentata	<i>Aloe grandidentata</i>	
Greatheadii	<i>Aloe greatheadii</i>	
Lutescens	<i>Aloe lutescens</i>	
Mutans	<i>Aloe mutans</i>	
Parvibracteata	<i>Aloe parvibracteata</i>	
Transvaalensis	<i>Aloe transvaalensis</i>	
Wickensii	<i>Aloe wickensii</i>	
All species of Brachystelma	<i>Brachystelma</i> spp	Low
All species of Ceropegia	<i>Ceropegia</i> spp	Low
All species of Duvalia	<i>Duvalia</i> spp	Low
	<i>Euphorbia barnardii</i>	Low
	<i>Euphorbia divicola</i>	Low
	<i>Euphorbia grandialata</i>	Low
	<i>Euphorbia groenewaldii</i>	Low
The following species Euphorbias:	<i>Euphorbia louwii</i>	Low
	<i>Euphorbia restricta</i>	Low
	<i>Euphorbia rowlandii</i>	Low
	<i>Euphorbia tortirama</i>	Low
	<i>Euphorbia waterbergensis</i>	Low
Ghaap	<i>Hoodia lugardii</i>	Low
All species of Ghaap	<i>Tavaresia</i> spp	Low
All species of Huernia	<i>Huernia</i> spp (i.e., <i>Huernia zebrina</i> subsp. <i>insigniflora</i> known from the lager Der brochen MRA)	Low
All species of Huerniopsis	<i>Huerniopsis</i> spp	Low
The following Impala Lilies	<i>Adenium multiflorum</i>	Low
Multiflorum en Oleifolium	<i>Adenium olefolium</i>	Low
Kudu Lily	<i>Pachypodium saundersii</i>	Low
All species of Orbeanthus	<i>Orbeanthus</i> spp	Low
All species of Orbeas	<i>Orbea</i> spp	Low
All species of Orbeopsis	<i>Orbeopsis</i> spp	Low
All species of Pachycymbiums	<i>Pachycymbium</i> spp	Low
All species of Riocreuxias	<i>Riocreuxia</i> spp	Low
All species of Stapeliads	<i>Stapelia</i> spp (i.e., <i>Stapelia gigantea</i> )	Low
Stone Plant	<i>Lithops lesliei</i>	Low
<b>Other Plants</b>		
The following Agapanthus species	<i>Agapanthus coddii</i> , <i>A. dyeri</i>	Low
The following Anacampseros species	<i>Anacampseros bemenkampii</i> (now <i>A. rhodesica</i> )	Low
All species of Anomatheca	<i>Anomatheca</i> spp	Low
The following Anthericum species	<i>Anthericum cyperaceum</i>	Low
The following Arum Lilies:		Low
Jucunda, Pentlandii and Rehmannii	<i>Zantedeschia jucunda</i> , <i>Z. pentlandii</i> , <i>Z. rehmannii</i>	Low
The following Babiana Species	<i>Babiana hypogaea</i> var. <i>longituba</i>	Low
Batesiana Gasteria	<i>Gasteria batesiana</i>	Low
Blue Squill	<i>Scilla natalensis</i> (= <i>Merwillia plumbea</i> )	Low
Clivia	<i>Clivia caulescens</i>	Low
The following Cyathula species	<i>Cyathula natalensis</i>	Low



COMMON NAME	SCIENTIFIC NAME	POC
The following <i>Eragrostis</i> species	<i>Eragrostis arenicola</i>	Low
The following <i>Eriosema</i> species	<i>Eriosema transvaalense</i>	Low
The following <i>Eulophia</i> species	<i>Eulophia coddii</i>	Low
	<i>Eulophia leachii</i>	Low
The following <i>Felicia</i> species	<i>Felicia fruticosa brevipendunculata</i>	Low
The following <i>Festuca</i> species	<i>Festuca dracomontana</i>	Low
All species of Fire Lily	<i>Cyrtanthus</i> spp	Low
The following <i>Freylinia</i> species	<i>Freylinia tropica</i>	Low
The following <i>Gladiolus</i> species	<i>Gladiolus macneillii</i>	Low
The following <i>Habernaria</i> species	<i>Habernaria kraenzliniana</i>	Low
The following <i>Heinsia</i> species	<i>Heinsia crinita</i>	Low
The following <i>Hermstaedtia</i> species	<i>Hermstaedtia capitata</i>	Low
The following <i>Hippocratea</i> species	<i>Hippocratea parvifolia</i>	Low
The following <i>Hymenodictyon</i> species	<i>Hymenodictyon parvifolium parvifolium</i>	Low
The following <i>Hyptis</i> species	<i>Hyptis spicigera</i>	Low
The following <i>Inula</i> species	<i>Inula paniculata</i>	Low
The following <i>Jasminum</i> species	<i>Jasminum abyssinbicum</i>	Low
The following <i>Kalanchoe</i> species	<i>Kalanchoe crundallii</i>	Low
	<i>Kalanchoe rogersii</i>	Low
	<i>Kniphofia coralligemma</i>	Low
The following <i>Kniphofia</i> species	<i>Kniphofia crassifolia</i>	Low
	<i>Kniphofia rigidifolia</i>	Low
The following <i>Kotschya</i> species	<i>Kotschya thymodora</i>	Low
The following <i>Melinus</i> species	<i>Melinus tenuissima</i>	Low
The following <i>Mondia</i> species	<i>Mondia whitei</i>	Low
The following <i>Monsonia</i> species	<i>Monsonia lanuginosa</i>	Low
The following <i>Neobulosia</i> species	<i>Neobulosia tysonii</i>	Low
The following <i>Nervillia</i> species	<i>Nervillia umbrosa</i>	Low
The following <i>Nymphaea</i> species	<i>Nymphaea lotus</i>	Low
The following <i>Oberonia</i> species	<i>Oberonia distichia</i>	Low
The following <i>Oreosyce</i> species	<i>Oreosyce africana</i>	Low
Paint Brush	<i>Haemanthus montanus</i>	Low
	<i>Peristrophe cliffordii</i>	Low
The following <i>Peristrophe</i> species	<i>Peristrophe gililandorum</i>	Low
	<i>Peristrophe transvaalensis</i>	Low
The following <i>Phyllanthus</i> species	<i>Phyllanthus pinnatus</i>	Low
The following <i>Pilea</i> species	<i>Pilea rivularis</i>	Low
The following <i>Plinthus</i> species	<i>Plinthus rehmannii</i>	Low
The following <i>Polycarpea</i> species	<i>Polycarpea eriantha</i> var. <i>effusa</i>	Low
The following <i>Polystachya</i> species	<i>Polystachya albescens imbricata</i>	Low
The following <i>Portulaca</i> species	<i>Portulaca foliosa</i>	Low
	<i>Portulaca trianthemoides</i>	Low
The following <i>Rhyncosia</i> species	<i>Rhyncosia vendae</i>	Low
Royal Paint Brush (Blood lily)	<i>Scadoxys puniceus</i>	Low
The following <i>Sartidia</i> species	<i>Sartidia jucunda</i>	Low
The following <i>Schizagyrium</i> species	<i>Schizagyrium brevifolium</i>	Low
All species of South African Orchid	Family Orchidaceae	Low
The following <i>Stadmania</i> species	<i>Stadmania oppositifolia</i>	Low
The following <i>Streptocarpus</i> species	<i>Streptocarpus decipiens</i>	Low
The following <i>Strophanthus</i> species	<i>Strophanthus luteolus</i>	Low



COMMON NAME	SCIENTIFIC NAME	POC
The following <i>Sutera</i> species	<i>Sutera maerantha</i>	Low
The following <i>Thorncroftia</i> species	<i>Thorncroftia media</i>	Low
All species of Tree Ferns	<i>Cyathea</i> spp	Low
All species of Tree Moss	<i>Porothamnium</i> , <i>Pilotrichella</i> and <i>Papillaria</i> spp	Low
The following <i>Trilepisium</i> species	<i>Trilepisium madagascariensis</i>	Low
The following <i>Tristachya</i> species	<i>Tristachya trifaria</i>	Low
The following <i>Turbina</i> species	<i>Turbina shirensis</i>	Low
	<i>Watsonia densiflora</i>	Low
The following <i>Watsonia</i> species	<i>Watsonia transvaalensis</i>	Low
	<i>Watsonia wilmsii</i>	Low
Wild Ginger	<i>Burmannia madagascariensis</i>	Low
Wild Ginger	<i>Siphonochilus aethiopicus</i>	Low
The following <i>Xylopia</i> species	<i>Xylopia parviflora</i>	Low

Table H3: NFA plant list for species with a known distribution range falling within the study area.

SCIENTIFIC NAME	HABITAT & DISTRIBUTION <sup>22</sup> & <sup>23</sup>	NATIONAL RED LIST STATUS	POC
<b><i>Boscia albitrunca</i></b>	Habitat mainly includes dry, open woodland and bushveld, mostly in hot, arid, semi-desert areas, often on termite mounds. 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 P	Low
<b><i>Catha edulis</i></b>	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 P	Low
<b><i>Lydenburgia cassinoides</i></b>	Endemic to Limpopo, Mpumalanga. EOO < 2500 km <sup>2</sup> and declining due to habitat degradation and harvesting. However, there are still more than 10 locations and subpopulations are not severely fragmented. Found in Savanna: Exposed norite bedrock and dolomite (SANBI).	NT P	Confirmed
<b><i>Prunus africana</i></b>	<i>Prunus africana</i> 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 is a moderately fast-growing tree which is sensitive to heavy frost, preferring areas where there is regular rain; it will tolerate moderate frosts.	VU P	Low
<b><i>Sclerocarya birrea</i> subsp. <i>caffra</i></b>	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 P	High
<b><i>Vachellia erioloba</i></b>	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 P	Low

CR= Critically Endangered, EN = Endangered, LC = Least Concern; NT = Near Threatened, P= Protected, POC = Probability of Occurrence; R = Rare

<sup>22</sup> <http://pza.sanbi.org/>

<sup>23</sup> <http://redlist.sanbi.org/index.php>





## 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
<i>Diceros bicornis</i>	Black Rhinoceros	CR	CR	L
<i>Neamblysomus julianae</i>	Juliana's golden mole	CR	VU	L
<i>Loxodonta africana</i>	African elephant	VU	VU	L
<i>Lycaon pictus</i>	African wild dog	EN	EN	L
<i>Amblysomus gunningi</i>	Gunning's golden mole	VU	EN	L
<i>Lutra maculicollis</i>	Spotted-necked otter	VU	LC	L
<i>Acinonyx jubatus</i>	Cheetah	VU	VU	L
<i>Felis lybica</i>	African Wild Cat	VU	NYBA	L
<i>Panthera leo</i>	Lion	VU	VU	L
<i>Ceratotherium simum</i>	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
<i>Gyps coprotheres</i>	Cape Vulture	T	VU	L
<i>Ciconia nigra</i>	Black Stork	T	LC	L
<i>Falco naumanni</i>	Lesser Kestrel	T	LC	L
<i>Certhilauda chuana</i>	Short-clawed Lark	T	LC	L
<i>Pterocles gutturalis</i>	Yellow throated Sandgrouse	T	LC	L
<i>Anthropoides paradiseus</i>	Blue Crane	T	VU	L
<i>Gyps africanus</i>	White backed Vultures	T	EN	L
<i>Ardeotis kori</i>	Kori Bustard	T	LC	L
<i>Scotopelia peli</i>	Pel's Fishing Owl	T	LC	L
<i>Bucorvus leadbeateri</i>	Southern Ground Hornbill	T	VU	L
<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	T	LC	L
<i>Terathopius ecaudatus</i>	Bateleur	T	NT	L
<i>Polemaetus bellicosus</i>	Martial Eagle	T	NT	L
<i>Aquila rapax</i>	Tawny Eagle	T	LC	L
<i>Torgos tracheliotos</i>	Lappet faced Vulture	T	VU	L
<i>Trionocephs occipitalis</i>	White headed Vulture	T	VU	L
<i>Buphagus africanus</i>	Yellow billed Oxpecker	T	LC	L
<i>Stephanoaetus coronatus</i>	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
<i>Breviceps sylvestris</i>	Transvaal forest rain frog	VU	EN	L
<i>Ptychadena uzungwensis</i>		P	LC	L
<i>Leptopelis bocagii</i>		P	LC	L
<i>Hemius guineensis</i>	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
<i>Homoroselaps dorsalis</i>	Striped Harlequin snake	R	NT	L
<i>Xenocalamus transvaalensis</i>	Transvaal Quill-snout snake	R	DD	L
<i>Lamprophis swazicus</i>	Swazi Rock Snake	R	NT	L
<i>Python natalensis</i>	African Python	VU	NYBA	L
<i>Lygodactylus methueni</i>	Methuen's Dwarf Gecko	VU	VU	L
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	L
<i>Lycophidion variegatum</i>	Variegated Wolf snake	P	NYBA	L
<i>Psammophis jallae</i>	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
<i>Taurhina splendens</i>	Splendid fruit chafer *	T	NYBA	L
<i>Charaxes marieps</i>	Marieps Charaxes butterfly *	T	NYBA	L
<i>Trichostetha fascicularis</i>	Protea beetle *	T	NYBA	L
<i>Ischnestoma ficqui</i>	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).



## APPENDIX J: Declaration and Specialists CV's

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

Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Samantha-Leigh Daniels	PhD Plant Science (University of Pretoria)
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

<b>Company of Specialist:</b>	<b>Scientific Terrestrial Services</b>
<b>Name / Contact person:</b>	Chris Hooton
E-mail:	<a href="mailto:chris@sasenvgroup.co.za">chris@sasenvgroup.co.za</a>
Qualifications	BTech Nature Conservation (Tshwane University of Technology) National Diploma Nature Conservation (Tshwane University of Technology)
<b>Name / Contact person:</b>	Samantha-Leigh Daniels
E-mail:	<a href="mailto:samantha@sasenvgroup.co.za">samantha@sasenvgroup.co.za</a>
Qualifications	PhD (Plant Science) (University of Pretoria) MSc (Plant Science) (University of Pretoria) BSc (Hons) Zoology & Entomology (University of Pretoria) BSc Zoology & Entomology (University of Pretoria)
Registration / Associations	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)
<b>Name / Contact person:</b>	Stephen van Staden
E-mail:	<a href="mailto:stephen@sasenvgroup.co.za">stephen@sasenvgroup.co.za</a>
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)
Registration / Associations	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)



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

I, Christopher 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.



Specialist Signature

I, Samantha Daniels, 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, 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



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Signature of the Specialist

DRAFT







## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF **CHRISTOPHER HOOTON**

#### PERSONAL DETAILS

Position in Company	Senior Scientist, Member 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, Zambia

#### 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 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 **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

