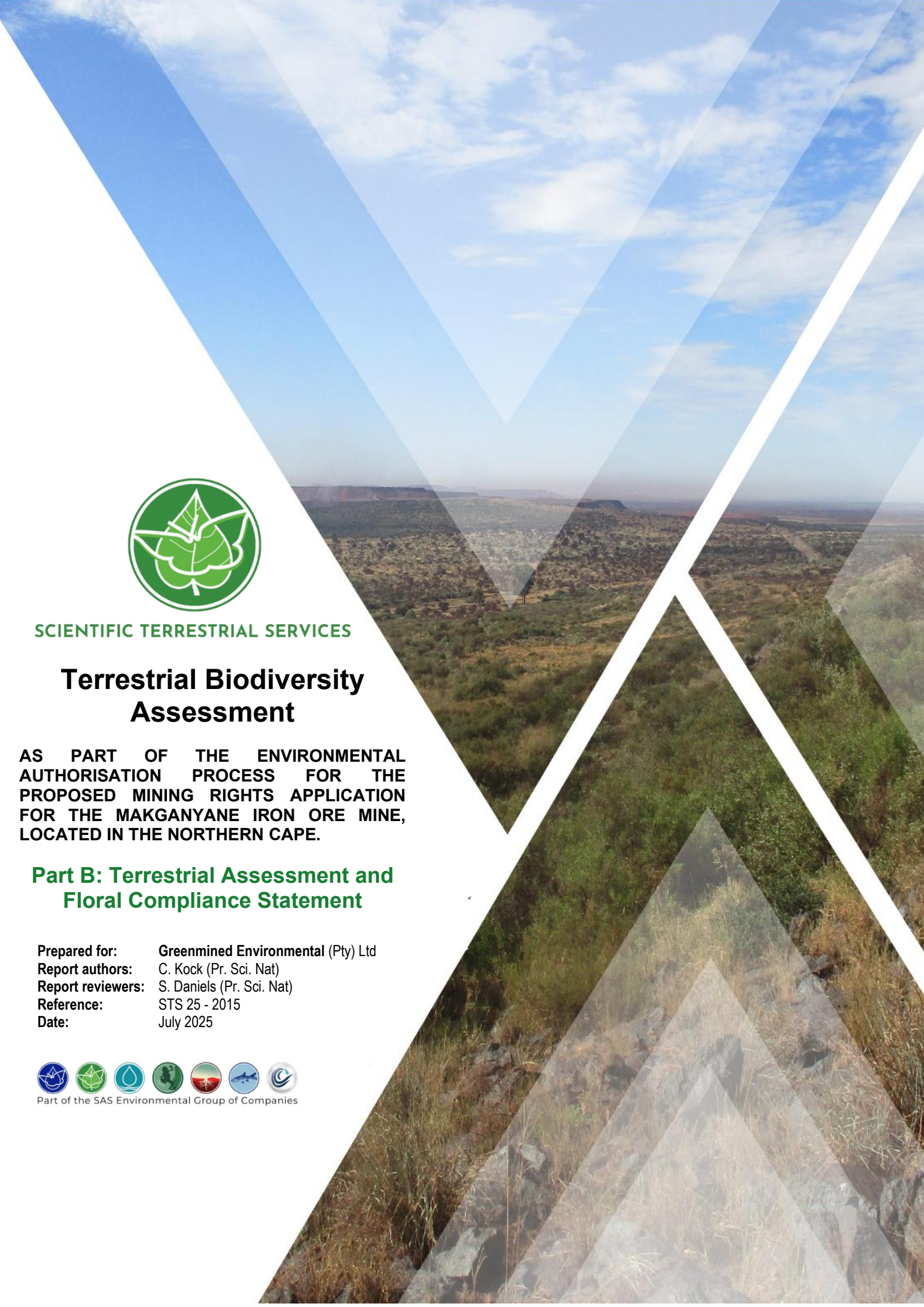

SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED MINING RIGHTS APPLICATION FOR THE MAKGANYANE IRON ORE MINE, LOCATED IN THE NORTHERN CAPE.

Part B: Terrestrial Assessment and Floral Compliance Statement

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Reference:	STS 25 - 2015
Date:	July 2025

Part of the SAS Environmental Group of Companies

DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to Government Notice 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Plant Species** as published in Government Gazette 43855 dated 30 October 2020 (as amended in Government Notice 3717 of 2023).

Theme-Specific Requirements as per Government Notice No. 1150 Plant Theme – Low Sensitivity Protocol followed (refer to Section 1)		
No.	**TERRESTRIAL PLANT SPECIES COMPLIANCE STATEMENT**	**Section in report/Notes**
5	**Terrestrial Plant Species Compliance Statement**	
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).	Part A: Appendix E
5.2	**The compliance statement must:**	
5.2.1	be applicable within the Focus Areas;	Part B: Section 1
5.2.2	confirm that the Focus Areas is of "low" sensitivity for terrestrial plant species; and	Part A: Section 4
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	Part A: Section 4 Part B Section 3, Section 6
5.3	**The compliance statement[1] must contain, as a minimum, the following information:**	
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae	Part A: Appendix E
5.3.2	a signed statement of independence by the specialist;	Part A: Appendix E
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	Part B: Section 3
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	Part B: Section 2 & 3 Part B: Appendix A
5.3.5	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr	Part B: Section 6
5.3.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	Part A: Section 1 Part B: Section 1
5.3.7	the mean density of observations/ number of samples sites per unit area[2]; and	Part B: Section 3
5.3.8	any conditions to which the compliance statement is subjected	Part B Section 6
A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.		

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 June 2020, and 2).

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
2	**Terrestrial Biodiversity Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	**Part A – C:** Cover Page **Part A:** Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	**Part A**: Section 1

[1] An example of what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

[2] Refer to the Species Environmental Assessment Guideline

2.3	**The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:**	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna) **For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 25-0028, 2025)*
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	**Part B**: Section 4 (flora) **Part C:** Section 4 (fauna)
2.3.7	**The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:**	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;* *c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* *d) the impact on ecosystem threat status;* *e) the impact on explicit subtypes in the vegetation;* *f) the impact on overall species and ecosystem diversity of the site; and* g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 **Part C:** Section 3
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the ESA; and* c) *loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-	**Part A**: Section 3 (desktop analysis). However, not applicable as no protected areas or areas of

	a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	conservation concern are within 10 km of the proposed project
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	**Part A**: Section 3 (desktop analysis). Not applicable as no protected area expansion are within 10 km of the proposed project
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	Not Applicable. No SWSAs within the study area.
2.3.7.6	FEPA sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;*	**For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 25-0028, 2025)*
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not Applicable. No indigenous forests within the study area.
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Part B: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. **Part C:** Results of the **Faunal Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	**Terrestrial Biodiversity Specialist Assessment Report**	
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	**Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part B:** Section 1.2 (flora) **Part C:** Section 1.2 (fauna)
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	**Part A**: Appendix C **Part B:** Section 2 (flora) **Part B:** Appendix A (flora) **Part C:** Section 2 (fauna) **Part C**: Appendix A (fauna)
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	**Part B:** Section 1.2 (flora) **Part C:** Section 1.2 (fauna)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	**Part B:** Section 4 (flora) **Part C:** Section 4 (fauna)
	Impact Assessment Requirements 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Section 5 (flora) – Preliminary Scoping Phase Impact Assessment **Part C:** Section 5 (fauna) – Preliminary Scoping Phase Impact Assessment
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	**Not Applicable to this report**

	"low" terrestrial biodiversity sensitivity and that were not considered appropriate;	
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	**Part A:** Executive summary **Part B:** Section 6 (flora) **Part C:** Section 6 (fauna)
3.1.15	Any conditions to which this statement is subjected.	**Part B:** Section 5 (flora) – Preliminary Scoping Phase statements only **Part C:** Section 5 (fauna) – Preliminary Scoping Phase statements only
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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LIST OF ACRONYMS

AIP	Alien and Invasive Plant
BGIS	Biodiversity Geographic Information Systems
BI	Biodiversity Importance
BODATSA	Botanical Database of Southern Africa
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DAEARDLR	Department: Agriculture, Environmental Affairs, Rural Development and Land Reform
DFFE	Department of Forestry Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EDL	Episodic Drainage Line
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
FEPA	Freshwater Ecosystem Priority Area
FI	Functional Importance
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectares
IBA	Important Bird and Biodiversity areas
IEM	Environmental Management
IUCN	International Union for Conservation of Nature
km	kilometres
m	metre
m^3	Cubic metres
MRA	Mining Right Area
LC	Least Concern
MPRDA	Mineral and Petroleum Resources Development Act, 2002 [Act No. 28 of 2002]
NCNCA	Northern Cape Nature Conservation Act, 2009 [Act No. 9 of 2009]
NEMA	National Environmental Management Act, 1998 [Act No. 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004 [Act No.10 of 2004]
NFA	National Forest Act, 1998 [Act No. 84 of 1998]
NL	not listed
NP	Not Protected
NT	Near Threatened
NWA	National Water Act, 1998 [Act No. 36 of 1998]
P	Protected
PES	Present Ecological State
PFP	Preferential Flow Paths
POC	Probability of Occurrence
PP	Poorly Protected
PPE	Personal Protective Equipment
QDS	Quarter Degree Square
RDL	Red Data Listed
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professionals
SANBI	South African National Biodiversity Institute

SAS	Scientific Aquatic Services
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
STS	Scientific Terrestrial Services [Pty] Ltd
SWSA	Strategic Water Source Area
TOPS	Threatened or Protected Species
VU	Vulnerable

GLOSSARY OF TERMS

Alien species (syn. exotic species; non-native species) (SANBI, 2020)	(a) a species that is not an indigenous species; or (b) an indigenous species translocated or intended to be translocated to a place outside of 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.
Biological diversity or Biodiversity (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biodiversity priority areas (Skowno et al., 2019)	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 (CR) and Endangered (EN) ecosystems, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), Freshwater Ecosystem Priority Areas (FEPA), high water yield areas, flagship free-flowing rivers, priority estuaries, Focus 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. The different categories are not mutually exclusive and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be complementary, with overlaps reinforcing the importance of an area.
Biome - (Mucina and Rutherford (2006); after Low and Rebelo (1998))	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (Mucina and Rutherford (2006))	A bioregion is a composite of spatial (vegetation) units sharing similar biotic and physio-geographical features and connected by processes operating on a regional sale.
Community Characterisation	Comparisons can be made among communities using attributes such as species richness, species diversity, and evenness. ➢ **Species richness** is simply the number of species in a community. ➢ **Species diversity** is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species. ➢ **Species evenness** is a description of the distribution of abundance across the species in a community. Species evenness is highest when all species in a sample have the same abundance. Evenness approaches zero as relative abundances vary. Source: https://tinyurl.com/2p9yr3j8
CBA (SANBI, 2020)	An area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-

	natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
CR, i.e., International Union for Conservation of Nature (IUCN) Red List category (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.
Development footprint (as per the National Environmental Management Act, 1998 [Act No. 107 of 1998] - NEMA definition)	"in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity"
Degradation (Skowno et al., 2019)	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Disturbance (van Wilgen et al., 2020)	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Driver (ecological) (Lead et al., 2005)	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.
Ecological Condition (SANBI, 2016)	"Ecological condition" means the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of "natural". Various terminology can be used for precision of language: ➢ Fair ecological condition: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem. ➢ Good ecological condition: Areas that are natural or near natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem. ➢ Poor ecological condition: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.
Ecological processes	The functions and processes that operate to maintain and generate biodiversity. To include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
EN (Red List category: Skowno et al. (2019))	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Endemic species (SANBI, 2020)	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.

ESA **(Skowno et al., 2019)**	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Fatal flaw **(IEM Series)**	Any problem, issue, or conflict (real or perceived) that could result in proposals being rejected or stopped.
Faunal Class	In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates.
Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat **(NEMBA)**	A place where a species or ecological community naturally occurs.
Habitat loss	Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and functional characteristics of the ecosystem concerned.
Important Bird and Biodiversity Area (IBA) **(Marnewick et al, 2015a; 2015b)**	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation **(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.
Indigenous species (synonym: native species)	(SANBI, 2020 definition) Occurring naturally in a defined area (contrast with endemic) – the area must be specified and is normally taken to be the historical range of a species, notwithstanding the effects of naturally initiated range expansions/ contractions, e.g., the baobab (Adansonia digitata) is indigenous but not endemic to South Africa, but it is not indigenous to KwaZulu-Natal. (NEMBA definition) – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic of South Africa, but excludes a species that has been introduced in the Republic as a result of human activity, e.g. the bontebok (*Damaliscus pygragus pygargus*) is indigenous to only South Africa, but according to previous definition would only be indigenous to the Western Cape.
Integrity (ecological) **(NEMA)**	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species (ecological) **(van Wilgen et al., 2020)**	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed invasive species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Near Threatened (according to IUCN)	Close to being at high risk of extinction in the near future.
Protected	Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA.
Quarter Degree Square (QDS) **(SANBI, 2020)**	A way of dividing the longitude latitude degree square cells into smaller squares of 15' × 15' (roughly 24 × 27 km), forming in effect a system of geocodes.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the IUCN, organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Resource (ecological)	A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.

Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.
Terrestrial Species (SANBI, 2020)	For the purposes of the species environmental guidelines (SANBI, 2020), terrestrial species are considered to represent species that are not exclusively marine and occur on land (at least for a portion of their life cycle). This includes amphibians (frogs and toads) but excludes other freshwater aquatic species which are considered to be aquatic (e.g., fish, diatoms and aquatic macroinvertebrates). This definition is not an accurate biological definition but rather applied in this manner to align with the Protocol on Terrestrial Biodiversity.
Threatened ecosystem (Skowno et al., 2019)	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 Member of the Executive Council for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
VU (Red List category: Skowno et al. (2019))	**Applied to both species/taxa and ecosystems**: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by Greenmined Environmental (Pty) Ltd to conduct a Terrestrial Biodiversity Impact Assessment as part of the Environmental Authorisation (EA) application process for the proposed Mining Rights Application (MRA) for the Makganyane Iron Ore Mine, located near Beeshoek, in the Northern Cape.

The proposed MRA area will include the following farm portions: Portion 2 (A Portion of Portion 1), Remainder Portion, Remainder Portion of Portion 1 and Portion 3 of the Farm Makganyane No. 667. The MRA is located approximately 24 kilometre (km) north-west of Postmasburg on opposite sides of the R385 provincial road. Situated in the Magisterial / Administrative district of Kuruman, in the Northern Cape Province of South Africa. The total MRA comprises 1549,61 hectares (ha).

This assessment is however focused on only certain pre-selected areas, within the above-mentioned farm boundaries, associated with (i) an historical mining operational area, (ii) the proposed mining operation and (iii) a freshwater feature identified by the background databases, along with a 200 metre (m) buffer area will furthermore be referred to as "**Focus Areas**" (Figure 1; Part A).

The proposed Makganyane mining operation is proposing the extraction of iron ore material from two open cast pits whereafter the crushed raw material will be transported by means of trucks along the R385 to the operational Beeshoek plant for processing. Once processed at the Beeshoek plant the concentrate is transported from the Postmasburg area to Arcelormittal's Vanderbijlpark and Newcastle Works through a combination of rail and road transport.

The following information was extracted from the mining work programme submitted for a mining right application for Makganyane Iron Ore Mine (Assmang (Pty) Ltd):

- The proposed mining operations will include two open cast pits, a stockpile area and a waste rock dump;
- Contractors will make use of diesel generated power supply and hence minimal electricity infrastructure will be required;
- A general water authorisation is available for 30 cubic metres (m^3) per day. Should additional water be required, it would need to be purchased from a third party; and
- Offices, parking and other supporting infrastructure will be constructed as required.

No information relating to clean and dirty water separation systems (trenches, channels or a Pollution Control Dam [PCD]) or stormwater management systems was provided at the time of undertaking this assessment. Furthermore, it was assumed that the existing road network

developed as part of the prospecting operation will be used for the mining operation as well. The Life of Mine (LoM) schedule is over 38 months. The proposed layout can be viewed in Part A (Figure 3).

The purpose of this report is to define the floral ecology of the Focus Areas, to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to describe the Present Ecological State (PES) of the Focus Areas. The primary objective of the floral assessment is not to compile 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 species of conservation concern (SCC) and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

1.1 *Reporting Protocol*

The site verification and field assessments confirmed the **low plant species theme** sensitivity (as identified by the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool")) for both the MRA and the Focus Areas. Therefore, the reporting protocol for the plant species theme follows the low sensitivity protocol (refer to the document guide in this report).

The very high sensitivity for the **terrestrial biodiversity theme** was verified within the MRA and the Focus Areas and aspects thereof as they pertain to the floral report is addressed in this report. Therefore, based on the confirmed very high terrestrial biodiversity theme the requirements specified for the "very high" sensitivity protocol as per the document guide in Part A was followed.

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

1.2 *Scope of Work*

Specific outcomes in terms of the report are as follows:

- To determine and describe habitat types, communities and the ecological state of the Focus Areas and to rank each habitat type based on conservation importance and ecological sensitivity;
- To provide inventories of floral species as encountered within the Focus Areas;
- To identify and consider all sensitive landscapes such as indigenous forests, rocky ridges, wetlands and/ or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);

- To conduct a Red Data Listed (RDL) floral species assessment as well as an assessment of other SCC, including the potential for such species to occur within the Focus Areas;
- To guide the activities associated with the Focus Areas by proving detailed information in terms of the ecological importance of the habitats within the Focus Areas as well as the anticipated impact to such habitats stemming from the proposed activities. Mitigation and management measures to reduce and manage such impacts are also provided in this report (Section 4 and Section 5); and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements, to allow regional and national biodiversity targets to be met, and the provision of ecological services in the local area is sustained.

1.3 *Assumptions and Limitations*

The following assumptions and limitations are applicable to this report:

- The floral field verification and assessment was confined to the Focus Areas and does not include the neighbouring and adjacent properties (including portions of the MRA). Habitat extrapolations were made to some of the surrounding MRA, where a portion of the Focus Areas has been joined to provide information regarding the terrestrial component for a potential movement corridor to be used during mining activities (should transport be envisioned between the two proposed pit locations in the future). The Focus Areas and immediate surroundings were, however, included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- Sampling, by its nature, means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A field assessment was undertaken from the 1st to the 3rd of April 2025 (summer). According to the Species Environmental Assessment Guidelines (SANBI, 2020) assessments between October and April are ideal for the Savanna Biome (i.e., Kuruman Mountain Bushveld & Olifantshoek Plains Thornveld vegetation types in which the Focus Areas is located);
- Not all areas of the Focus Areas could be accessed during the site assessment (April 2025) as some areas were located within very dense impenetrable thornveld (comprised of *Senegalia mellifera* subsp. *detinens* where access is restricted). Time constraints necessitated that the field assessment was focussed on areas where new development was proposed. However, expert knowledge from working in the surrounding areas were incorporated to ensure that conclusions drawn are deemed applicable for the purpose of the impact assessment.

2 ASSESSMENT APPROACH

This section provides a brief outline of the method of assessment followed for the floral assessment, whereas a more comprehensive description is provided in **Appendix A** of this report.

2.1 *General Approach*

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

- All relevant resources and datasets as presented by the SANBI's Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/), including all relevant provincial datasets and the screening tool (accessed 2025) were consulted to gain background information on the physical habitat and potential floral diversity associated with the assessment areas (refer to Part A);
- An on-site visual investigation of the Focus Areas was conducted during early autumn (April 2025) to confirm and ground truth the assumptions made during the consultation of the background maps and to determine whether the sensitivity of the terrestrial biodiversity associated with the assessment areas confirms the results of the screening tool;
- 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 A);
- The SCC assessment included the below aspects:
    - **Threatened species:** In terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), threatened species are RDL species falling into the following categories of ecological status: Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) in terms of the NEMBA Threatened or Protected Species (TOPS) Regulations (Government Notice (GN) R152 of 2007, as amended). Near-threatened (NT) species are not entirely considered RDL species; however, these species are still considered to be of increased conservation importance and thus are also included in the threatened species assessments. Removal, translocation

and/or destruction of RDL species require authorisation from the Department of Forestry, Fisheries, and the Environment (DFFE); and

- **Protected Species**: Protected species in terms of the NEMBA TOPS Regulations (GN R152 of 2007, as amended), i.e., species that are not RDLs but still protected under the TOPS regulations. Furthermore, this category includes species that do not necessarily classify within the above categories of ecological status (i.e., threatened species), but that are deemed important from a provincial biodiversity perspective, including provincially protected floral species as listed in the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA). Activities are restricted for these species and may not occur without permits from the relevant provincial authorities (where necessary). Protected species also include the List of Protected Tree Species (GN No. 536) as published in the Government Gazette 46094 dated 25 March 2022 as it relates to the National Forest Act, 1998 (Act No. 10 of 1998) (NFA) was also considered for the SCC assessment; and

- Photographs were taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photographs of all detected SCC, where and if relevant (photographs of sensitive species as identified by the DFFE's screening tool[3] may be excluded at the specialist's discretion).

Additional information on the method of assessment is provided in **Appendix A** of this report.

2.2 *Definitions, descriptions, and taxon nomenclature*

Scientific nomenclature for plant species in this report follows that of the SANBI's Red List of South African Plants Online, as it relates to the Botanical Database of Southern Africa (BODATSA), BRAHMS Online, and SANBI's Biodiversity Advisor. For alien species, the definitions of Richardson et al. (2011) are used. Vegetation structure is loosely described as per Edwards (1983) (refer to Figure A1).

2.3 *Sensitivity Mapping*

All the ecological features of the assessment areas were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery. The sensitivity map should assist the Environmental Assessment Practitioner (EAP) / proponent

[3] The identity of sensitive species **may not appear** in the final basic assessment report **nor any of the specialist reports** released into the public domain.

as to the suitability of the proposed development within the assessment areas. The various habitat types were assigned Site Ecological Importance (SEI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

3 RESULTS OF FLORAL ASSESSMENT

The subsequent sections contextualise the Focus Areas and provide descriptions of species present, the existing impacts on site, as well as ecological processes that remain present within the Focus Areas. Habitat extrapolations were made to some of the surrounding MRA, where a portion of the Focus Areas has been joined to provide information regarding the terrestrial component for a potential movement corridor to be used during mining activities (should transport be envisioned between the two proposed pit locations in the future).

3.1 *Sampling Effort*

The 2025 site assessment took place over three days during early autumn by registered members of the South African Council for Natural Scientific Professionals (SACNASP), including a floral specialist, one faunal specialist and a freshwater specialist. The timing of the field assessment is in line with the optimal survey times for the Savanna Biome as stipulated by the Species Environmental Assessment Guidelines, i.e., assessments between October and April are ideal for the Savanna Biome (SANBI, 2020). Figure 1 presents the GPS tracks of the specialist in relation to the Focus Areas as an indication of the area covered.

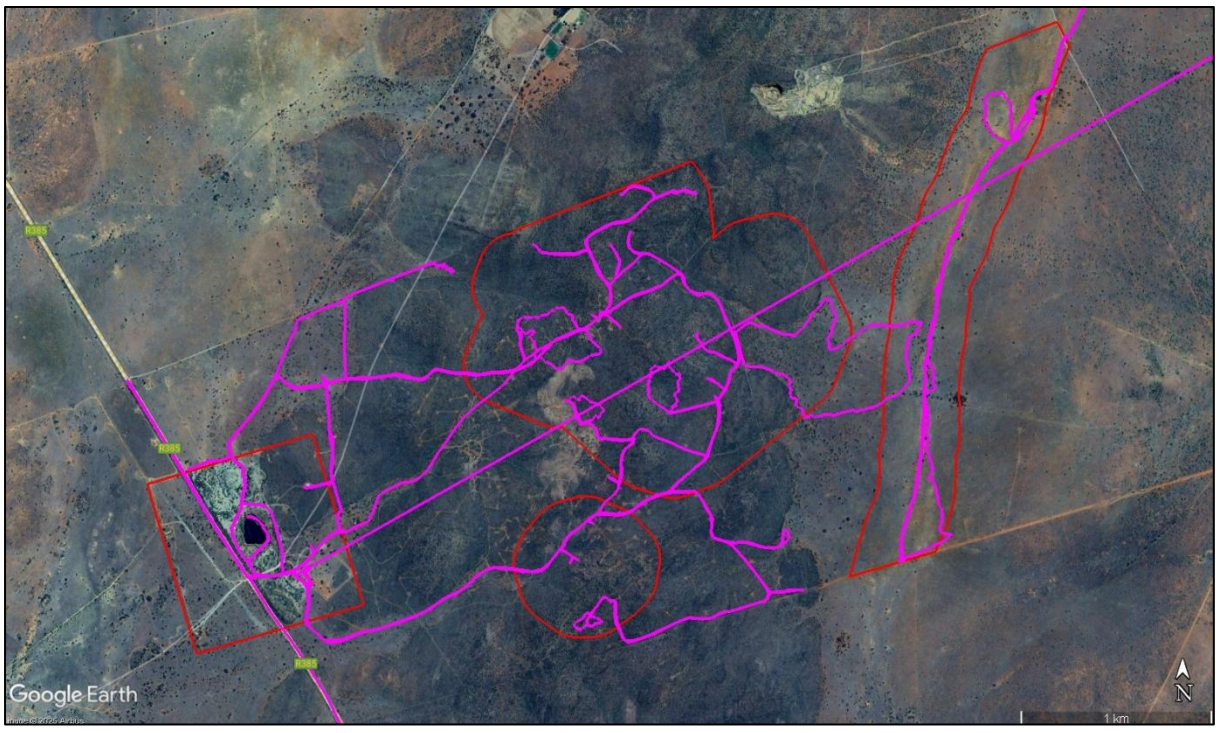


Figure 1: The Focus Areas (red outline) and the specialists GPS tracks from the 2025 field assessment, the purple relating to the floral specialist.

3.2 *Existing impacts*

The subsequent sections contextualise the Focus Areas and provide descriptions of floral communities present on site, the existing impacts on site, as well as ecological processes that remain present within the Focus Areas.

The Focus Areas has been significantly impacted by prospecting activities from 2022 to 2024 (Figure 2 and 3). These historic prospecting activities has impacted the vegetation communities within the Focus Areas, especially in terms of the vegetation structure – i.e., the impacted areas were associated with a lower woody tree cover and a higher abundance of both small shrubs and grass species than expected from the reference vegetation (i.e., Kuruman Mountain Bushveld). Historic prospecting has resulted in the loss of fauna; habitat resulting in displacement of many larger mammal and avifaunal species, leading to a general decline in population abundance within the Focus Areas. The ecosystems drivers (e.g., fire and herbivory) within the Focus Areas are present albeit modified, based on the proximity to the historic mining activities and agricultural activities (i.e., cattle grazing).

Figure 2: Prospecting areas scattered throughout the Fous area.

A portion of the Focus Areas (to the west) is situated within a historic diamond mine (Figure 4), this anthropogenic activity has significantly impacted the vegetation structure and composition of the surrounding vegetation, resulting in a compromised ecological state. The introduction of various Alien and Invasive Plants species (AIPs) and the extensive removal of the indigenous vegetation[4] as per National Environmental Management Act, 1998 [Act No. 107 of 1998] (NEMA) definition, have degraded habitat integrity within the area. Additionally, the absence of post-closure rehabilitation activities and rehabilitations has further reduced

[4] 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.

ecological function, leading to an overall poor ecological condition, characterised by severely or irreversibly modified areas where composition, structure and ecological function has been compromised.

Within the far eastern portions of the Focus Areas, the landowner has also indicated that they have been spraying pesticides to decrease the population of *Prosopis glandulosa* (an AIP species)*;* however the impact of the spraying is evident in the woody component throughout this section of the Focus Areas where native species such as *Senegalia mellifera* subsp*. detinens* are particularly observed to be affected (this is mostly evident in the far eastern section of the Focus Areas).

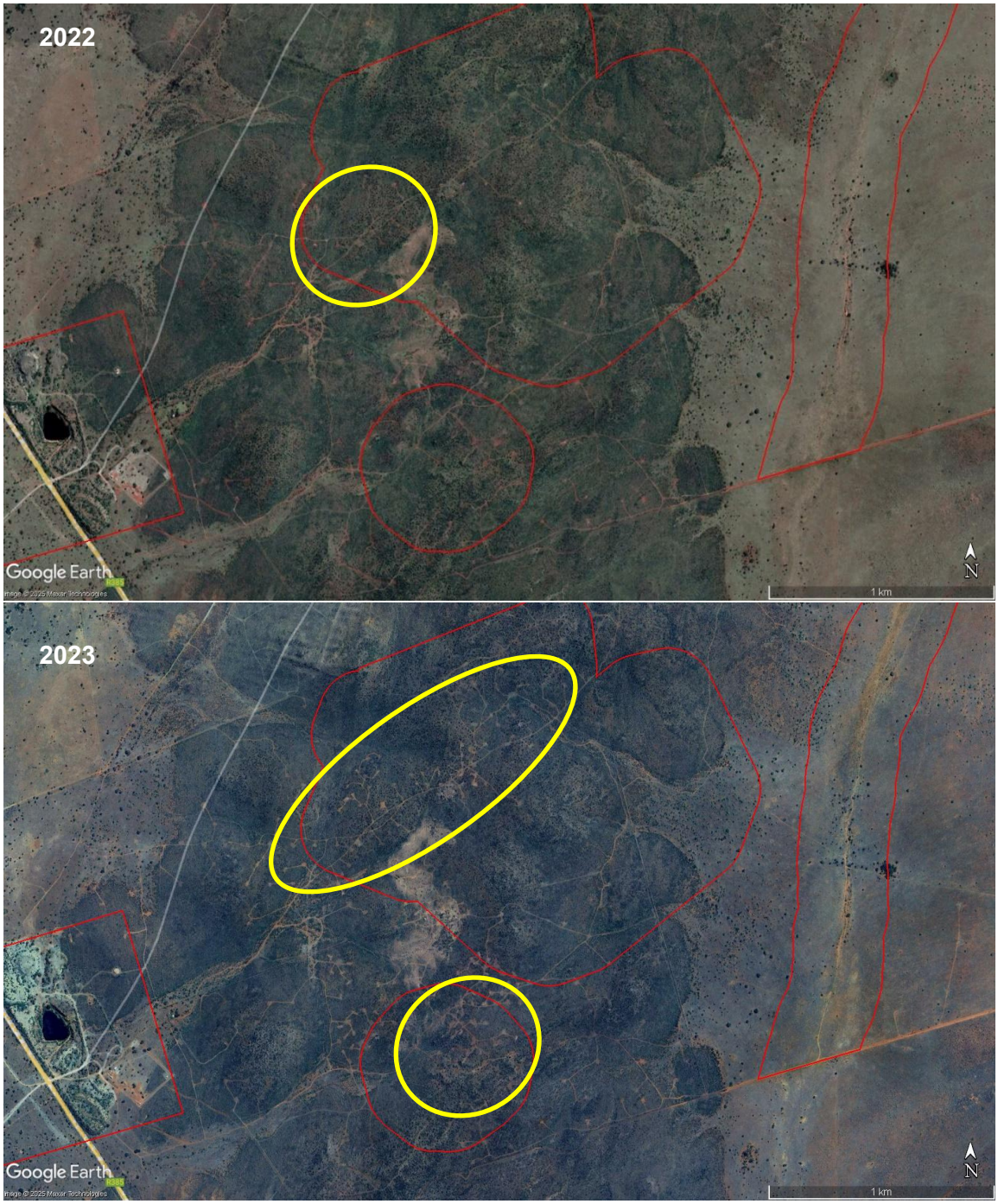


Figure 3: The aerial image dated 2022 and 2023, respectively, showing the extent and spread of the impacts associated with the prospecting activities within the Focus Areas, see yellow circled areas.

Figure 4: The anthropogenic impacts associated with the historic diamond mine within the Focus Areas that has resulted in loss of vegetation and decreased habitat integrity.

3.3 *Vegetation types, fine scale habitats, and ecological overview*

Following the site assessment, four (4) broad habitat units (with associated subunits) were identified within the Focus Areas that were based on the main vegetation types (Figure 5). The allocation of habitat units was based on species composition, vegetation structure and ecological function, and habitat integrity. The identified habitat units are as follows:

1) **Kuruman Mountain Bushveld (approx. 274 ha):** The Kuruman Mountain Bushveld habitat is represented by a short closed thornveld. The majority of the Kuruman Mountain Bushveld habitat unit meets the definition of indigenous vegetation as per the NEMA definition. However, large portions of this habitat unit have been recently impacted by prospecting activities, which only ceased end of 2024 therefore these sections of the Kuruman Mountain Bushveld are not considered indigenous vegetation. In some of the initial prospecting site indication of secondary succession[5] is visible. The Kuruman Mountain Bushveld is associated with various terrain of the Focus Area including rocky hills and valleys;
2) **Olifantshoek Plains Thornveld (approx. 119 ha):** This habitat is mostly associated with the eastern portions of the Focus Areas. Overall, the vegetation structure included a tall open to semi-closed thornveld with a sparsely developed woody layer and a well-developed grass layer. The vegetation within this habitat is considered to be indigenous vegetation;
3) **Freshwater Habitat (approx. 114 ha):** This habitat was associated with two watercourses[6] (SAS 25-0028, 2025), characterised as Episodic Drainage Lines (EDL) (without riparian[7] habitat), as defined in the National Water Act, 1998 (Act No. 36 of 1998) (NWA). However, various Preferential Flow Path (PFP) were also identified however these features do not meet the requirements of a watercourse. The EDL and PFP are located within the central Focus Areas. The vegetation

[5] In ecology, secondary succession is the natural process of ecosystem recovery that occurs in an area where a previous biological community existed but was disturbed or destroyed. The "recovery" of habitat begins with grasses, shrubs, and other opportunistic species that lead to a more complex ecosystem over time.

[6] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:

- A river or spring;
- A natural channel which water flows regularly or intermittently;
- A wetland, dam, or lake into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse;

and a reference to a watercourse includes, where relevant, its bed and banks.

[7] "Riparian habitat" (as per the NWA) includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

structure of both the EDL and PFPs are identical to the surrounding Kuruman Mountain Bushveld vegetation. The EDL and PFP was identified with their distinct topography (in low laying areas and following natural channels) and often showing a lack of vegetation (with a rock base). The Freshwater Habitat also includes a Recharge area that is not considered true watercourse based on the definition provided by the NWA. The vegetation associated with the Recharge area was predominantly comprised of grasses and forbs with a scattered presence of shrubs; and

4) **Transformed Habitat (33 ha):** The Transformed Habitat is mostly represented by the historic mining areas and mining infrastructure and farm houses. The floral communities associated with this habitat unit have been significantly compromised due to anthropogenic activities and comprise mostly of AIPs and pioneer species. The Transformed Habitat has been severely impacted and is in an overall poor ecological condition (i.e., habitat severely or irreversibly modified with an ecological condition class in which ecological function has been compromised in addition to its structure and composition). The Transformed sub-unit is not considered to be indigenous vegetation since it has undergone significant clearance of vegetation and significant soil disturbance within the past 10 years (NEMA). The Transformed Habitat occurs mostly in the western extent of the Focus Areas. Within this sub-unit, no clear vegetation structure can be linked to these areas as the natural vegetation structure has been altered or completely transformed (through mining activities). Furthermore, the Transformed Habitat has experienced a shift, in terms of species composition, structure and function, from the reference vegetation types (Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld). This habitat is dominated by AIPs and invasive species and does not provide suitable habitat for threatened Floral SCC; however, the possibility of provincially protected species (NCNCA) is considered high with common occurring species such as *Gomphocarpus frutcosus* observed on site (see Appendix B for the full SCC assessment).

For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, please refer to Section 3.3.1 – 3.3.3. Refer to Figure 5 and Figure 6 for a visual representation of the habitat units observed within the Focus Areas.

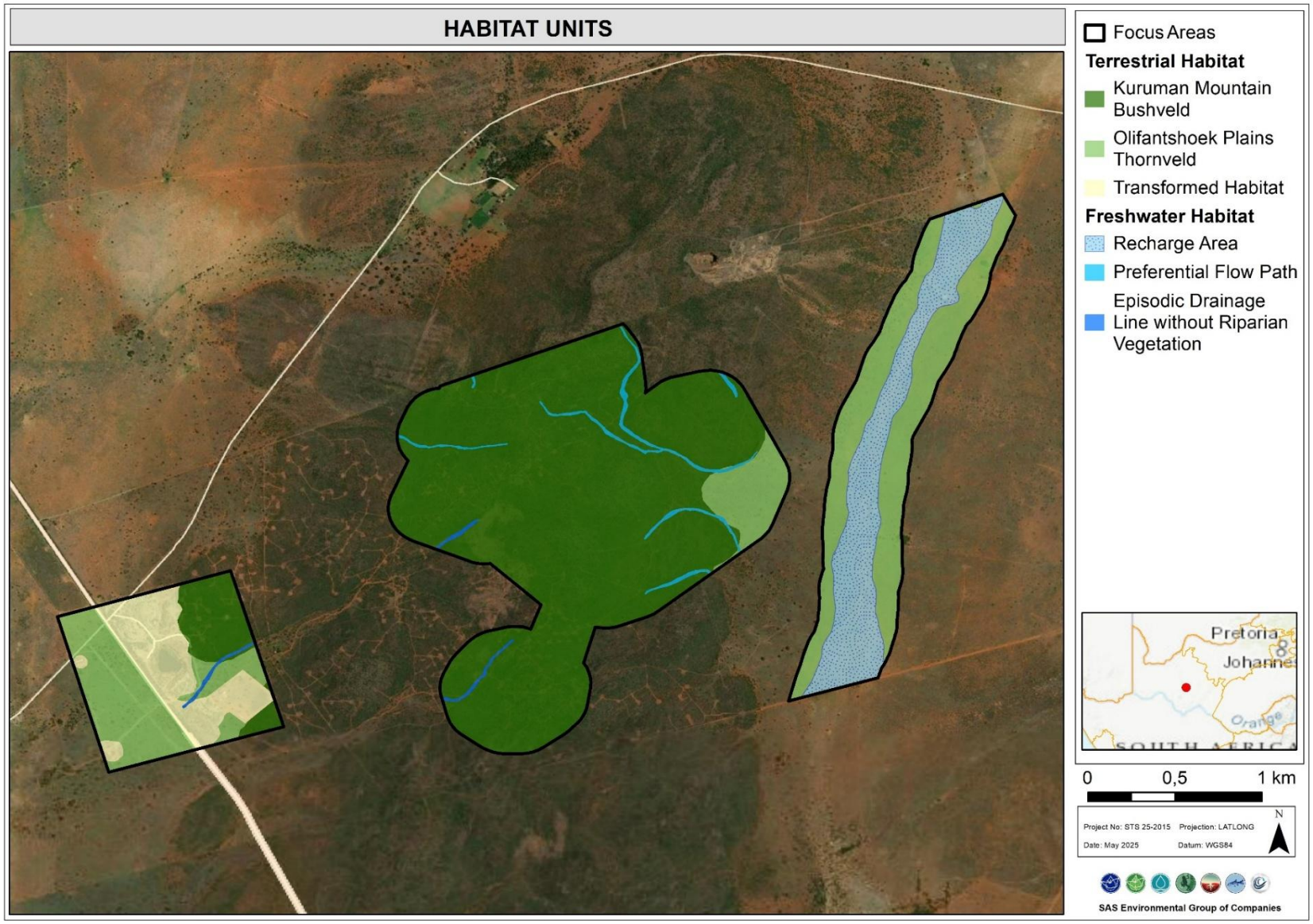


Figure 5: Habitat units associated with the Focus Areas.

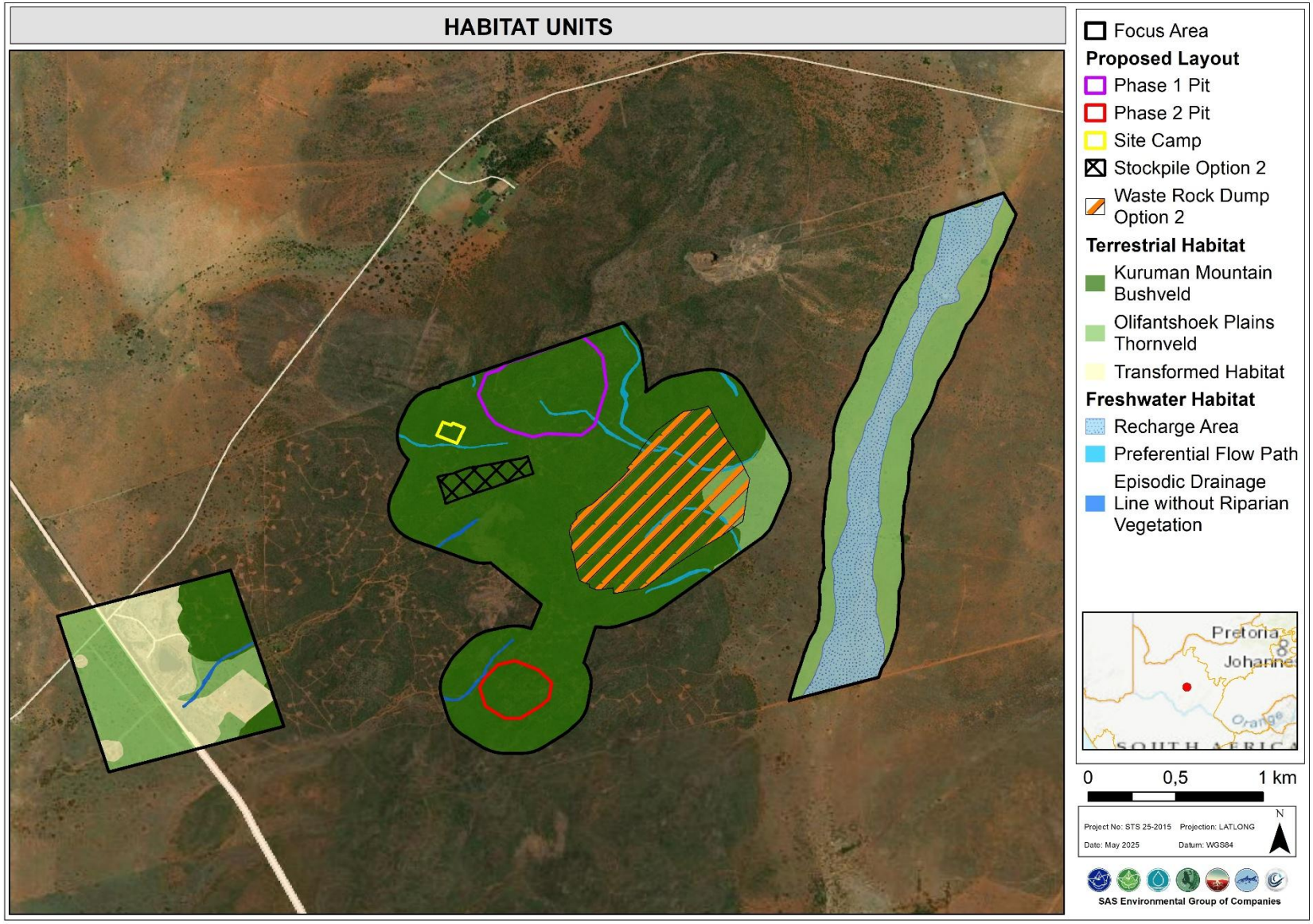


Figure 6: Proposed layout associated with terrestrial habitat units found within the Focus Areas.

3.3.1 Kuruman Mountain Bushveld

REFERENCE PHOTOS

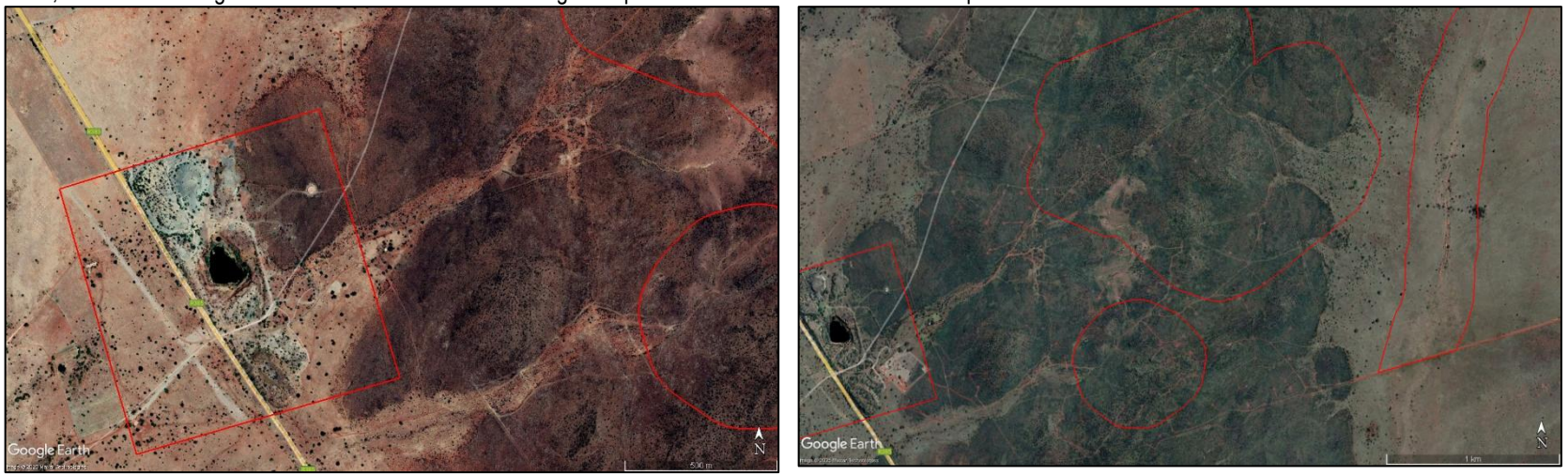
The photographs above show the typical habitat associated with the Kuruman Mountain Bushveld habitat. The vegetation is dominated by woody species forming a dense impenetrable layer often dominated by *Senegalia mellifera* subsp. *detinens*. The area associated with the Kuruman Mountain Bushveld is undulating with several koppies (with rocky substrate) present, the woody component was noticed to become denser with an increase in elevation.

The photographs above indicate areas within the Kuruman Mountain Bushveld that has been impacted by the recent prospecting. The photographs also indicate the response in vegetation structure and composition where, sites more recently cleared (left and middle photographs) are still devoid of most floral species especially woody species whereas sites cleared at the start of prospecting (i.e., 2022) have already started to recover (i.e., are secondary in nature) which is visible in the presence of a continuous grass layer.

HABITAT OVERVIEW

The Kuruman Mountain Bushveld occurs throughout the Focus Areas. The Kuruman Mountain Bushveld currently encompasses an intermediate floral diversity where floral communities are moderately to largely intact. In terms of species composition (refer to below sections) and vegetation structure this habitat unit is considered representative of the reference vegetation type for the area (i.e., Kuruman Mountain Bushveld). The majority of the Kuruman Mountain Bushveld Habitat is considered to be indigenous vegetation (according to the NEMA definition) with the exception of the prospecting areas. The prospecting areas are scattered within the Kuruman Mountain Bushveld and, due to the vegetation clearing the current floral communities represent a subset of the Kuruman Mountain Bushveld (i.e., floral diversity was moderately low to intermediate). However, recovery of these areas was most evident within the graminoid and herbaceous components, whereas the woody component only included lower/smaller individuals. This is expected as the woody layer is typically slower growing than graminoid and herbaceous species.

The Kuruman Mountain Bushveld still supports active ecological corridors and drivers, i.e., the habitat is still connected to a larger, untransformed landscape, natural grazers are currently still present, and from satellite imagery is evident that fire is still present within the Focus Areas and surroundings (although it is likely that fire breaks closer to the historic mining footprints, and farm houses would be in place). Given the above, the Kuruman Mountain Bushveld is considered to be in a fair ecological condition, i.e., encompassing areas that are moderately modified, semi-natural, and where ecological function is maintained even though composition and structure have been compromised.



Presence of fire (burn scars) as ecological driver within the Focus Areas (left photograph depicting the Focus Areas during 2004 and right photograph depicting the Focus Areas in 2018).

Vegetation structure: The vegetation structure can be described as **short (modified Kuruman Mountain Bushveld), closed thornveld (Kuruman Mountain Bushveld)** - (as per Diagram A1 in Appendix A).

SPECIES OVERVIEW

Floral communities recorded within this habitat unit include, but are not limited, to the below list:

<table>
<tr><td colspan="2">

The woody component was well-developed and commonly occurring species included Asparagus cf. laricinus, Euclea undulata, Euclea crispa, Gymnosporia buxifolia, Lacomucinaea lineata, Searsia burchellii, Searsia tridactyla, Senegalia mellifera subsp. detinens, and Tarconanthus camphoratus;
The forb/herbaceous component was not as diverse as anticipated commonly occurring species included Aptosimum marlothii, Barleria lichtensteiniana, Geigeria ornativa, Hermannia linnaeoides, Justicia divaricata, Melhania burchellii, Nidorella resedifolia, Sesamum triphyllum and Tribulus cf. zeyheri;
The succulent component was very species-poor, with only Kleinia longifolia and Viscum rotundifolium recorded during the field assessment;
The graminoid component was well-represented throughout this habitat unit, with the most commonly occurring species represented by Aristida congesta subsp. congesta, Cenchrus ciliaris, Enneapogon cenchroides, Fingerhuthia africana, Heteropogon contortus, Melinis repens, Schmidtia kalahariensis and Stipagrostis uniplumis; and
AIPs were not well-represented (i.e., present but not abundant) within the Kuruman Mountain Bushveld, species recorded during the site assessment included Alternanthera pungens, Argemone ochroleuca, Datura stramonium,Gomphrena celosioides and Nicotiana glauca (to name a few, see Section 3.5.2 for more information).

Refer to Appendix C for a list of species recorded within this habitat unit.
</td></tr>
<tr><td>Threatened Species: Refer to Appendix B for the comprehensive SCC assessment.</td><td>No threatened floral SCC were recorded on site during the field assessment and no threatened SCC are anticipated to occur within the Focus Areas since no suitable habitat was identified.

Refer to Appendix B for the complete floral SCC assessment results.</td></tr>
<tr><td>Protected Species: Refer to Appendix B for the comprehensive SCC assessment.</td><td>The NCNCA provides a list of Specially Protected Species (Schedule 1) and Protected Species (Schedule 2) for the Northern Cape Province. Provincially protected species recorded and the POC calculations for the Schedule 2 NCNCA protected species are presented below for the habitat unit (no Schedule 1 species are anticipated to be present within this unit):

- Boscia albitrunca (POC = Confirmed; Status = LC);
- Mestoklema arboriforme (POC = Medium, Status = LC);
- Moraea pallida ((POC = Medium, Status = LC);
- Gomphocarpus tomentosus (POC = Confirmed; Status = LC);
- Gymnosporia buxifolia (POC = Confirmed; Status = LC);
- Jamesbrittenia integerrima (POC=High, Status = LC); and
- Trichodiadema pomeridianum (POC = Medium, Status = LC).

Additionally, protected tree species recorded and the POC calculations for NFA protected species are presented below for the habitat unit:
- Vachellia erioloba (POC = Confirmed; Status = LC);
- Boscia albitrunca (POC = Confirmed; Status = LC); and
- Vachellia haematoxylon (POC = High; Status = LC).

The TOPS List as per the 2007 Regulations provides protected species for the Northern Cape Province. Suitable habitat was identified only for the following species within the Kuruman Mountain Bushveld Habitat:
- Harpagophytum procumbens (POC = High; Status = LC)

Permits from the Northern Cape Environmental Department and from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place. Refer to Appendix B for the complete floral SCC assessment results.</td></tr>
<tr><td colspan="2">SOME REFERENCE PHOTOS OF FLORA WITHIN THIS HABITAT UNIT</td></tr>
</table>

From left to right: ***Gomphocarpus tomentosus, Boscia albitrunca, Hermbstaedtia odorata, Heteropogon contortus, Melinis repens, Aptosimum marlothii, Asparagus cf. laricinus and Cymbopogon pospischilii***

3.3.2 *Olifantshoek Plains Thornveld*

REFERENCE PHOTOS

The photographs above indicate the typical habitat associated with the Olifantshoek Plains Thornveld habitat unit. Overall, the vegetation structure is described as a tall open to semi-open (in some areas) woodland with a well-developed grass layer and scattered medium to tall trees.

HABITAT OVERVIEW

The Olifantshoek Plains Thornveld habitat unit is associated with the far eastern and western sections of the Focus Areas. This habitat unit is associated with a well-developed graminoid layer with the tree and shrub layer being interspaced by open veld. The habitat unit was associated with more sandy soils. Tall *Vachellia luederitzii* and *Vachelliia erioloba* individuals are clearly seen above the shrub and grass layer. The Olifantshoek Plains Thornveld habitat unit occurs within the remaining extent of the Olifantshoek Plains Thornveld vegetation type and this habitat unit is similar in species composition and structure to that of the reference vegetation type.

This habitat unit has been subjected to some secondary impacts associated with the mining activities, i.e., edge effects such as AIP proliferation and changes in fire (due to the proximity to existing mining infrastructure) and herbivory regimes[8] and grazing influences, which have resulted in some areas that are more encroached by invasive species and agricultural weeds (i.e., *Prosopis glandulosa, Senegalia mellifera* subsp. *detinens* and *Seriphium plumosum* to name a few). Despite the impacts mentioned above, this habitat unit is moderately intact and in an

[8] Fire and herbivory are considered important ecological drivers of savanna systems (O'Connor et al. 2014). Compositional and structural changes to floral communities are often associated with altered fire and herbivory regimes.

overall fair ecological condition. The vegetation within this habitat unit meets the NEMA definition of indigenous vegetation[9] as no significant clearing or lawful soil disturbance has occurred within the past 10 years.

Vegetation structure: The vegetation structure can be described as **tall, open to semi-open woodland** (as per Diagram A1 in Appendix A).

SPECIES OVERVIEW

Compositional characteristics of the habitat unit:

- Dominant **grass species included** *Aristida congesta* subsp. *congesta, Brachiaria nigropedata, Cymbopogon pospischilii, Eragrostis echinochloidea, Melinis repens, Schmidtia pappophoroides, Stipagrostis uniplumis* and *Themeda triandra;*
- Representative **forb and herb species** included *Bulbine narcissifolia, Boophone distichta, Commelina benghalensis, Eriospermum cf. porphyrium, Kyphocarpa angustifolia, Nidorella resedifolia, Ornithoglossum vulgare, Ledebouria apertiflora* and *Sesamum triphyllum;*
- The **woody layer** was well represented: dominant species recorded included *Asparagus laricinus, Boscia albitrunca, Diospyros lycioides, Searsia lancea, Senegalia mellifera* subsp. *detinens Tarchonanthus camphoratus, Vachellia luederitzii* and *Vacheliia erioloba*
- Common **succulent species** recorded included *Kalanchoe rotundifolia* and *Kleinia longiflora;* and
- **AIP species** were evident, although not frequently recorded within the habitat unit. AIP species included *Bidens Pilosa, Opuntia ficus-indica, Prosopis glandulosa* var. *torreyana, Salsola kali* and *Tagetes minuta* (see Section 3.5.2).

Refer to **Appendix C** for a list of species recorded within this habitat unit.

Threatened Species: Refer to Appendix B for the comprehensive SCC assessment.	During the field assessment, no RDL species were identified within this habitat unit. Refer to **Appendix B** for the complete floral SCC assessment results.
Protected Species: Refer to Appendix B for the comprehensive SCC assessment.	The NCNCA provides a list of Specially Protected Species (Schedule 1) and Protected Species (Schedule 2) for the Northern Cape Province. Schedule 2 Provincially protected species recorded, and their Probability of Occurrence (POC) are presented below (no Schedule 1 species are anticipated to be present within this unit); - ***Gomphocarpus fruticosus* (POC = Confirmed; Status = LC);** - ***Oxalis sp.* (POC = Confirmed; Status = LC);** - *Babiana bainesii* (POC = High, Status = LC); - *Babiana hypogaea* (POC = High; Status = LC); - ***Bulbine abyssinica* (POC = Confirmed; Status = LC);** - ***Boscia albitrunca* (POC = Confirmed; Status = LC);** - *Jamesbrittenia atropurpurea* (POC = High; Status = LC); - *Chasmatophyllum musculinum* (POC = Medium; Status = LC);

[9] Indigenous vegetation is "*vegetation of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten year"* as per the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Listing Notices.

	- ***Kalanchoe rotundifolia* (POC = Confirmed; Status = LC);** - *Euphorbia crassipes* (POC= Medium; Status= LC) - *Moraea polystachya* (POC = High; Status = LC); and - *Trachyandra saltii* (POC = High; Status = LC). Additionally, protected tree species as per the (NFA, were observed within this habitat unit. Protected tree species recorded within this habitat unit and the associated POC of these species are presented below: - ***Boscia albitrunca* (POC = Confirmed; Status = LC);** - ***Vachellia erioloba* (POC = Confirmed, Status = LC); and** - *Vachellia haematoxylon* (POC = Medium; Status = LC). The TOPS List as per the 2007 Regulations provides protected species for the Northern Cape Province. Suitable habitat was identified only for the following species within the Olifantshoek Plains Thornveld Habitat: - *Harpagophytum procumbens* (POC = High; Status = LC) Permits from the Northern Cape DAEARDLR and from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place. Refer to **Appendix B** for the complete floral SCC assessment results.
SOME REFERENCE PHOTOS OF FLORA WITHIN THIS HABITAT UNIT	

From left to right: *Vachellia erioloba, Oxalis sp, Gomphocarpus fruticosus, Eriospermum* cf. *porphyrium*, *Tagetes minuta* and *Senegalia mellifera* subsp. *detinens.*

3.3.3 Freshwater Habitat Unit

REFERENCE PHOTOS

Typical habitat associated with the Freshwater Habitat of the watercourses (namely an EDL – without riparian vegetation) and non-watercourses such as the PFP. Both the EDL and PFP features are represented above, since they share similar vegetation structure and species traits. The vegetation associated with these features reflect the surrounding thornveld habitat (i.e., Kuruman Mountain Bushveld) with a clear channel (where no vegetation is present) where the water would flow.

The photographs above depict the Recharge area within the Focus Area (to the far east of the Focus Areas). This non-watercourse feature had a distinct vegetation community which was different from the surrounding vegetation type (i.e., Olifantshoek Plains Thornveld). As seen above the vegetation is dominated by low growing herbaceous species and an overall lack of large woody species (except in some areas as a result anthropogenic activity, for example around food throughs and dams).

HABITAT OVERVIEW

The two (2) EDLs are found within the western and central Focus Areas. These systems are defined as: "highly flashy systems that flow or flood only in response to extreme rainfall events, usually high in their catchments". Whereas as the seven (7) PFP are located within the eastern portion of the central Focus Areas and are defined as: "Areas where, when present, surface water flows but is not retained in the landscape for a sufficient period to encourage the establishment of a floral community that relies on an increased abundance of water within the effective rooting zone. PFPs receive surface sheet flow originating from the upgradient catchment which incises small channels, or 'rills' in the surface cumulatively defined as PFPs. PFPs are typically found draining off steeply sloped terrain units such as mountain and collect to form higher order episodic drainage lines in the landscape. These preferential flow paths lack riparian and wetland characteristics and may potentially only convey surface water for a short period of time after rainfall events. Thus, these features are not considered of ecological importance but contribute to the hydrological functioning of the drainage systems at large" (SAS 25-0028, 2025).

The floral community (vegetation structure and composition) did no vary from the surrounding habitat area. Similar species were associated with the EDL and PFP as the surrounding Kuruman Mountain Bushveld, the dominant species associated with the EDL and PFPs included *Euclea crispa, Gymnosporia buxifolia, Ziziphus mucronata, Tarconanthus camphoratus*, *Searsia lancea Senegalia mellifera* subsp. *detinens.* Overall, the EDL and PFPs are considered to be moderately intact and in a fair to good ecological[10] state with minimal signs of grazing pressures and AIPs present within the habitat.

Vegetation structure: The vegetation structure can be described as **short, closed thornveld** (as per Diagram A1 in Appendix A).

[10] Areas that are natural or near natural. An ecological condition class in which composition, structure and function are still intact or largely intact.

The Recharge area is not a true watercourse and is described as: "clearly defined low-lying area, which possesses a unique digital signature and is likely important from a hydropedological perspective as it contributes to the recharge of a downstream system". The vegetation was clearly different from the surrounding woodland vegetation; however, this habitat has also been significantly impacted by grazing. The vegetation is dominated by graminoid and herbaceous species with an overall lack of woody species. Several agricultural weeds and invasive species were observed within the Recharge area, particularly in some areas an abundance of *Pentzia incana*, *Seriphium plumosum, Tagetes minuta, Vachellia karroo* and *Verbesina encelioides*. Overall, the Recharge area is considered to be moderately modified however is still considered to be in a fair ecological state.

Vegetation structure: The vegetation structure can be described as **short, closed grassland to sparse shrubland** (as per Diagram A1 in Appendix A).

The Freshwater Habitat (as a whole) is still considered to be indigenous vegetation (as per the NEMA).

SPECIES OVERVIEW

Only the Recharge area had a different composition compared to the previous vegetation types and therefore the dominant species of the Recharge area sub-unit is presented below:

- **Grass species** were moderately well represented dominant species included *Aristida adscensionis, Aristida congesta* subsp. *congesta, Cymbopogon pospischili, Digitaria eriantha* subsp. *eriantha, Enneapogon cenchroides Eustachys paspaloides, Hyparrhenia hirta, Setaria pumila, Schmidtia pappophoroides* and *Themeda triandra;*
- **Forb and herb species** were also welll represented. Typical forb and herb species included*, Ammocharis coranica, Boophone distichta, Bulbine narcissifolia, Commelina africana, Eriospermum porphyrium, Lycium cinereum, Nerine laticoma, Pentzia incana, Selago densiflora* and *Seriphium plumosum*;
- The **woody component** was underrepresented with only a few woody species present namely *Dichrostachys cinerea* and *Vachellia karroo;* and
- **AIP species** were mostly absent, although individuals of *Bidens Pilosa, Datura stramonium, Prosopis glandulosa* var. *torreyana, Tagestes minuta* were recorded (see Section 3.5.2).

Refer to **Appendix B** for a list of species recorded within this habitat unit.

Threatened Species: Refer to Appendix B for the comprehensive SCC assessment.	No threatened floral SCC (i.e., RDL species), threatened TOPS listed plants were recorded within the Freshwater Habitat during the field assessment. Refer to **Appendix B** for a list of species assessed as part of the SCC assessment.
Protected Species: Refer to Appendix B for the comprehensive SCC assessment.	Three NCNCA protected species (either Schedule 1 or Schedule 2 species) were found within the Freshwater Habitat during the field assessment namely; - ***Bulbine abyssinica* (POC = Confirmed; Status = LC);** - ***Gomphocarpus fruticosus* (POC = Confirmed; Status = LC); and** - ***Oxalis sp.* (POC = Confirmed; Status = LC);** Protected tree species recorded for NFA protected species are presented below for the habitat unit: - ***Vachellia erioloba* (POC = Confirmed; Status = LC).** Permits from Northern Cape DAEARDLR and DFFE should be obtained to remove, cut, or destroy the above-mentioned protected species before any vegetation clearing may take place. Refer to **Appendix B** for a list of species assessed as part of the SCC assessment.

SOME REFERENCE PHOTOS OF FLORA WITHIN THIS HABITAT UNIT

From left to right: *Nerine laticoma*, *Ammocharis coranica*, *Bulbine narcissifolia*, *Commelina africana*, *Boophone distichta* and *Fingerhuthia africana*.

3.4 *Biodiversity Priority Areas / Conservation Significance*

Biodiversity importance/ conservation significance of the Focus Areas is largely determined based on triggering features as identified in the screening tool (Terrestrial Biodiversity Theme) as well as additional provincial datasets as presented in Part A. The conservation features and how they pertain to the habitat units identified for the Focus Areas are presented in the below table.

Table 1: Biodiversity Priority Areas / Conservation Significance.

Ecological Support Area (ESA) 1 [11]	The majority of the Focus Areas are identified as an ESA by the Northern Cape CBA database (2016). According to this Northern Cape CBAs Reasons layer, the triggering biodiversity, and ecological features, for the ESAs and ONAs within the Focus Areas include the following: Olifantshoek Plains Thornveld, Kuruman Mountain Bushveld, Postmasburg Thornveld, All Rivers, FEPA 500 m, FEPA subcatchment, Southern Kalahari Salt Pans, Landscape structural elements, all natural wetlands, and Conservation Areas. Therefore, since the Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld are considered to be representatives of the reference vegetation types, the presence of ESA is confirmed in these Habitat units. Furthermore, the EDLs which are confirmed watercourses are also confirmed as ESA habitat.
Critical Biodiversity Area (CBA)	The entire eastern section of the Focus Areas is considered a CBA 1: Irreplaceable Area. A CBA is an area that must remain in good ecological condition in order to meet biodiversity targets for ecosystem types, species of special concern or ecological processes. CBAs can meet biodiversity targets for terrestrial or aquatic features, or both. The CBA associated with the Focus Areas mainly follow the distribution of the Recharge area identify with a buffer including the Olifantshoek Plains Thornveld and a portion of the Kuruman Mountain Bushveld. According to this Northern Cape CBAs Reasons layer, the triggering biodiversity, and ecological features, for CBAs, include the following: Olifantshoek Plains Thornveld, Kuruman Mountain Bushveld, Postmasburg Thornveld, All Rivers, FEPA 500 m, FEPA subcatchment, Southern Kalahari Salt Pans, Landscape structural elements, all natural wetlands, and Conservation Areas. The Recharge area, while not identified as a watercourse (SAS 25 – 0028, 2025), this feature is likely important from a hydropedological perspective where it contributes to the recharge of a downstream system. Therefore, based on the ecosystem service and functionality of the Recharge area this is regarded as a CBA. Furthermore, the presence of the Olifantshoek Plains Thornveld and the Kuruman Mountain Bushveld is confirmed but should be noted that these habitat unts does not represent sensitive ecosystems (sei-intact and impacted by anthropogenic activities) or any threatened species of concern. The CBA is therefore, confirmed for the eastern portions of the Focus Areas.
Highest Biodiversity Importance	The eastern portion of the Focus Areas are associated with a CBA 1 and ESA areas, since the CBA and ESA is confirmed for the Recharge area, Olifantshoek Plains Thornveld and Kuruman Mountain Bushveld this Highest Biodiversity Importance is also confirmed.

[11] ESAs are areas which must retain their ecological processes to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas. Similarly, ESAs are required to meet biodiversity targets for representation of ecosystem types or species of special concern when it is not possible to meet them in CBAs. These areas support ecological functioning of protected areas or CBAs or a combination of these (SANBI. 2017).

3.5 *Alien and Invasive Plant (AIP) Species*

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation[12]. 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).

3.5.1 Legal Context

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

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

[12] Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 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[13]. 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 DEFF - i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

3.5.2 Site Results

A total of 16 AIP species were recorded during the March 2024 field assessment. Of the 16 AIPs recorded, **eight (8)** species are listed under NEMBA Category 1b, **one (1)** listed as NEMBA Category 3. The remaining **seven (7)** species are not listed (NL) under NEMBA, but these species are identified as problem plants as they can have a negative impact on the indigenous floral communities within and surrounding the Focus Areas. Refer to Table 2 below for more information on the AIPs recorded on site.

Although the extent of AIPs within the Focus Areas is relatively low, AIPs can easily proliferate in areas of disturbance. As such, it is recommended that the current invasive alien plan be updated to include all newly authorised activities.

[13] 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 2: Dominant alien floral species identified during the field assessment with their invasive status as per NEMBA: Alien and Invasive Species Lists, GN R1003 of 2020 (NL = Not Listed).

Scientific name	Common Name	Origin	NEMBA Category	OLIFANTSHOEK PLAINS THORNVELD	FRESHWATER HABITAT	KURUMAN MOUNTAIN BUSHVELD	TRANSFORMED HABITAT
Woody Species							
Datura stramonium	Common Thorn Apple	Central America	1b	x	*x*	x	*x*
Melia azedarach	Syringa	China	1b	x			*x*
Nicotiana glauca	Wild Tabacco	Central northwest Argentina and Bolivia	1b		*x*		*x*
Prosopis glandulosa var. *torreyana*	Honey mesquite	North America	3 in NC	*x*	x	*x*	*x*
Schinus molle	Peruvian pepper	South America	NL			*x*	
Solanum elaeagnifolium	Silverleaf Nightshade	Central America	1b		*x*	*x*	*x*
Herbaceous Species							
Alternanthera pungens	Khaki joyweed	South America	NL			x	x
Argemone ochroleuca subsp. *ochroleuca*	White-flowered Mexican poppy	Central America	1b		x	x	x
Bidens pilosa	Spanish needles, Blackjack	South & Central America	NL	x	x	x	x
Chenopodium album	Goosefoot	Unknown	NL	x	x	x	x
Gomphrena celosioides	Bachelor's button	South America	NL	x		x	x
Salsola kali	Tumbleweed	Europe	1b	x		x	x
Schkuhria pinnata	Mexican Marigold	South America	NL	x	x	x	x
Tagetes minuta	Stinking roger	South America	NL	x	x	x	x
Succulent Species							
Opuntia ficus-indica	Sweet prickly pear	Central America	1b	x		x	x
Graminoid Species							
Cenchrus setaceum	Fountain grass	North Africa	1b			x	x

4 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

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

Based on the criteria provided in Appendix A of this report, all habitats within the Focus Areas were allocated an importance category, i.e., SEI category. SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor. For an SEI of “Very High” and “High”, avoidance mitigation is recommended (see development constraints section of Table 3). Table 3 indicates the individual SEI scoring for each habitat unit respectively. Figure 7 indicates the SEI for the Focus Areas (Figure 8 represent the various habitat sensitivities associated the proposed layout).

Table 3: SEI importance for the different habitat units associated with the Focus Areas.

Unit	CI	FI	BI	RR	SEI	Development Constraints
KURUMAN MOUNTAIN BUSHVELD	**Low** No confirmed or highly likely populations of threatened SCC are anticipated to occur within the Kuruman Mountain Bushveld habitat.	**Medium** This habitat is considered a large semi-intact area. However, the Kuruman Mountain Bushveld have been impacted upon by the historic prospecting activities. However, the negative ecological impacts are all considered to be past events and given the fact that some prospecting areas have shown signs of rehabilitation the habitat is still considered to provide habitat connectivity,	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
OLIFANTSHOEK PLAIN THORNVELD	**Low** No confirmed or highly likely populations of threatened SCC are anticipated to occur within the Olifantshoek Plains Thornveld habitat.	**Medium** This habitat is considered to be an area of relatively small extent that is semi-intact with only minor current impacts. Current anthropogenic activities, such as grazing, have impacted upon the habitat integrity of this habitat unit. However, this habitat is still considered to provide narrow corridors of good habitat connectivity to the surrounding natural areas.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Unit	CI	FI	BI	RR	SEI	Development Constraints
FRESHWATER HABITAT: EDLs	**Low** No confirmed or highly likely populations of threatened SCC are anticipated to occur within the Freshwater Habitat.	**Medium** The EDLs are small however are considered semi-intact habitat. The EDLs provide narrow habitat connectivity. The EDLs have not been impacted by any major past event and only minor current negative ecological impacts have been observed.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities..
FRESHWATER HABITAT: RECHARGE ZONE	**Low** No confirmed or highly likely populations of threatened SCC are anticipated to occur within the Freshwater Habitat.	**High** The Recharge Zone is a large area of semi-intact habitat, however anthropogenic activities have impacted the integrity of this habitat. Indeed, some areas of the Recharge Zone has been extensively grazed and this has led to an increase in the presence of agricultural weeds and AIPs. Furthermore, the Recharge Zone is considered to be impacted by some major past ecological impacts (i.e., building of dam walls). Although the vegetation is considered modified the habitat still provides good habitat connectivity.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities

Unit	CI	FI	BI	RR	SEI	Development Constraints
FRESHWATER HABITAT: PFP	**Low** No confirmed or highly likely populations of threatened SCC are anticipated to occur within the Freshwater Habitat.	**Low** The PFPs are very small in extent and provides only narrow corridors of good habitat connectivity. The PFPs has mostly sustained minor current negative ecological impacts with no major historic impacts identified.	**Low**	**High** Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low**	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
TRANSFORMED HABITAT	**Very Low** No confirmed and highly unlikely populations of threatened SCC and no natural habitat remaining within the Transformed Habitat.	**Very Low** The Transformed Habitat provides no habitat connectivity except for flying species or flora with wind-dispersed seeds. The habitat is associated with several major current negative ecological impacts.	**Very Low**	**High** The Transformed Habitat is comprised of mostly short-lived species (majority of which are aliens or weeds) therefore, the Transformed Habitat is expected to be able to recover relatively quickly between 5–10 years (to the current state) to restore more than 75% of the original species composition and functionality.	**Very Low**	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

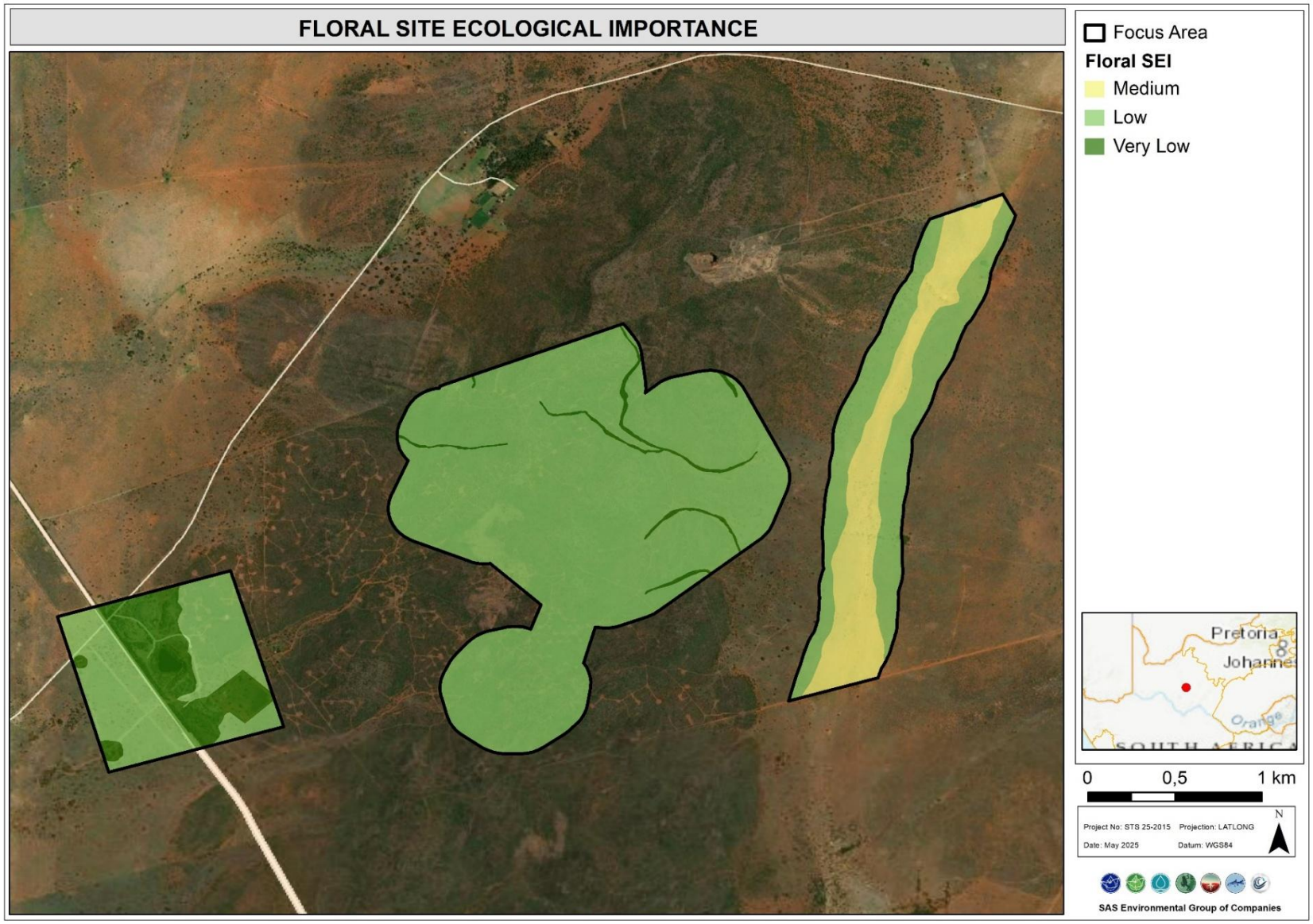


Figure 7: Conceptual illustration of the floral habitat sensitivity associated with the Focus Areas.

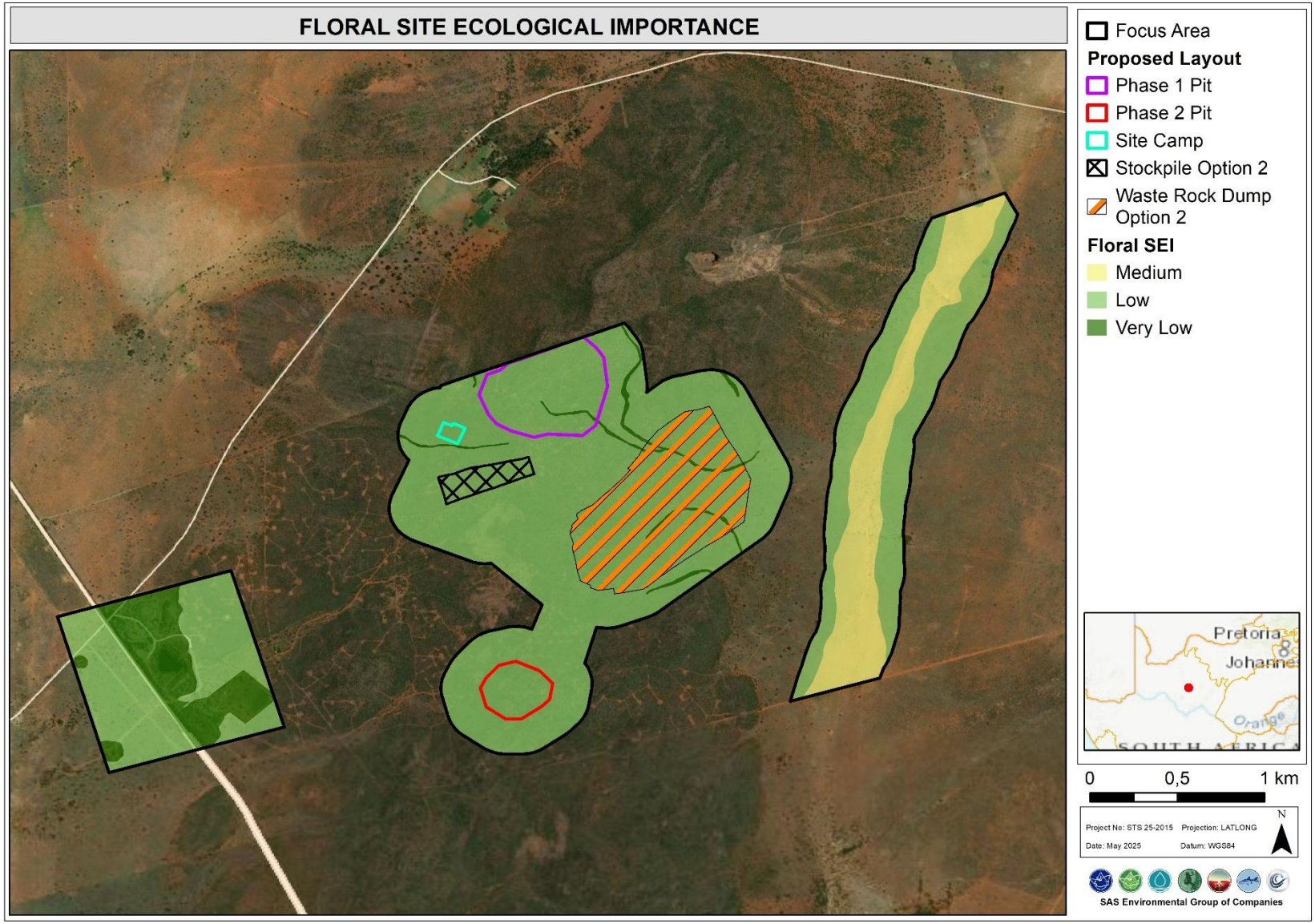


Figure 8: Conceptual illustration of the floral habitat sensitivity associated with the proposed layout.

5 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed activities within the Focus Areas. The impact assessment is based on the layout provided by the proponent as illustrated in Part A (Figure 3), for additional information regarding the project description please see **Part A**. The following infrastructure is proposed for Makganyane Iron Ore Mine:

- The proposed mining operations will include **two open cast pits**, **a stockpile area** and a **waste rock dump area**; and
- **Offices, parking** and other supporting infrastructure will be constructed as required.

The table below indicate the extent of habitat loss, of the habitat units within the Focus Areas, as a result on the proposed Makganyane mining activities.

Table 4: Impacts on habitat units within the Focus Areas.

Habitat Unit	Total extent (ha)	Proposed extent loss (ha)
Kuruman Mountain Bushveld	273,83	92,98
Olifantshoek Plains Thornveld	118,64	5,99
Transformed Habitat	32,46	NA
Freshwater Habitat		
Episodic Drainage Line	3,34	NA
Preferential Flow Path	102,52	2,98
Recharge Area	8,31	NA
Total Extent	**539,13**	**101,95**

Note: The proposed activities and development exclude sensitive habitat (i.e., Medium SEI) namely the Freshwater Habitat: Recharge Area, and is mostly positioned within habitats such as the Kuruman Mountain Bushveld.

5.1 *Activities and Aspect Register*

The sections below provide the significance of perceived impacts arising from the proposed activities within the Focus Areas.

An impact discussion and assessment of all potential i) pre-construction phase (“planning phase” hereafter), ii) construction and operational phase (“mining phase” hereafter), and iii) decommissioning and rehabilitation phase impacts are provided in Section 5.2 and 5.3. All mitigatory measures required to minimise the calculated impacts are presented in Section 5.2.

Distinct activities and perceived impacts can be identified in Table 5 below.

Table 5: Activities and Aspects likely to impact on the floral resources of the Focus Areas.

ACTIVITIES AND ASPECTS
Pre-construction and planning phase

- Potential failure to develop necessary management plans before and at the commencement of construction activities:
  o Potential failure to design an erosion control plan and stormwater management plan;
  o Potential failure to determine a desired post-closure land-use goal and associated rehabilitation strategy;
  o Potential failure to develop an AIP Management/Control Plan; and
  o Potential failure to develop a Biodiversity Action Plan (BAP).
- **Impact**: Long-term or permanent degradation and modification of the receiving environment. Loss of favourable floral habitat beyond the authorised footprint.

- Potential failure to conduct a walkdown of the footprint areas prior to commencement of construction activities where floral SCC (protected species) are searched and marked for either **1)** rescue and relocation (only applicable to provincially protected and nationally protected species), **2)** for harvesting of propagules (where provincially protected and nationally protected species cannot be relocated but can be propagated in a plant nursery to form part of rehabilitation activities later down the line), **3)** obtaining numbers of both nationally and provincially protected SCC individuals that will be impacted (e.g., for permit application requirements), and/or **4)** liaising with relevant authorities such as SANBI, DFFE, and the Northern Cape DAEARDLR as to the applicability of rescue and relocation attempts for required permit applications (provincially protected species). - Potential failure to develop a rescue and relocation plan to guide relocation activities for eligible provincially protected species for relocation, or failure to harvest sufficient propagules of such SCCs to propagate for rehabilitation later down the line. - **Impact**: Avoidable loss of floral SCC from the Focus Areas with potential to impact on their population numbers and dynamics in the larger region.
- Potential failure to relocate provincially protected floral SCC for which permits were authorised prior to the commencement of site clearing activities. - Potential inadequate planning with regards to new site locations for floral SCC eligible for relocation initiatives. - Potential failure to monitor the success of relocated floral SCC (where applicable). - **Impact:** Unmitigated loss of SCC individuals and potential impacts to population dynamics.
- Inconsiderate planning, infrastructure placement and design, leading to the loss of potential sensitive floral species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the proposed project footprint. - The appropriate provincial authorities will need to determine whether or not the proposed development within an ESA habitat is considered an acceptable land use type. - **Impact:** Degradation and modification of the receiving environment, habitat fragmentation as well as loss of floral habitat.
- Potential failure to demarcate sensitive habitat (namely Recharge area and Freshwater habitat, SAS 25-0028, 2025) and floral SCC populations occurring outside of the direct project footprint as “No-Go” areas before construction commences. - **Impact**: Unnecessary clearing of vegetation and floral SCC. Overall increased in the decline of floral diversity and habitat.
Minning phase
- Site clearing and the removal of vegetation (encompassing degraded habitats, ESA sites, watercourses, and provincially protected species). - **Impact:** Loss of floral habitat (both intact and degraded habitats), floral diversity (both high and low diversities affected), and floral SCC (provincially protected species as well as nationally protected species recorded within the footprint areas). Degradation and modification of the receiving environment, as well as loss of both degraded and sensitive floral habitats.
- Failure to monitor any relocated SCC – following a rescue and relocation pland (permit permitting) as designed by a qualified individual. - **Impact:** Loss of floral SCC (provincially protected species as well as nationally protected species recorded within the footprint areas).
- Potential stockpile slope failure due to poorly managed stockpile height and slope steepness, or uncontrolled runoff and erosion of stockpiled material during rainfall events, resulting in an increased footprint, impacting on adjacent floral species: - Slope failure will result in the loss of downslope habitat and an increase in the footprint size of the stockpiles; - Increased sediment runoff and dispersion from the stockpiles which will result in the smothering of the surrounding vegetation, hindering plant growth and sedimentation of downslope habitat. - **Impact**: Loss of floral habitat and diversity, as well as potentially occurring protected flora.

ACTIVITIES AND ASPECTS
- Potential failure to correctly stockpile topsoil resulting in **1)** potential contamination of topsoil stockpiles with AIP propagules (and poor AIP management), **2)** compaction of stockpiled topsoil leading to loss of viable soils for rehabilitation, and **3)** inefficient vegetating of stockpiled topsoil resulting in loss and degradation of soils (e.g., loss of viable soil through erosion and sediment runoff). - **Impact**: Long-term loss of floral habitat and species diversity due to unsuitable topsoil for rehabilitation.
- Potential loss of floral species and habitat outside of the planned and authorised footprints due to the potential failure to mitigate edge effects, including **1)** introduction and spread of AIPs with construction vehicles and personnel, **2)** inconsiderate driving of construction machinery through natural habitat, **3)** dumping of cleared vegetation (including cleared AIPs) and construction-related waste outside of designated waste areas and within sensitive habitat, **4)** increased risk of fire frequency and intensity, as well as uncontrolled fires, and **5)** increased habitat fragmentation due to creation of additional roads where no roads were planned. - **Impact:** Additional loss (beyond planned footprints) of floral habitat (likely of both intact and degraded nature), floral diversity (both high and low diversities affected), and floral SCC (provincially protected species likely to be present surrounding some of the footprint areas). Degradation and modification of the surrounding habitats (including important biodiversity areas such as ESA and CBAs).
- Decreased ecoservice provision and decreased ability of ESAs to function optimally due to vegetation and soil disturbance, loss of habitat, and habitat fragmentation. - **Impact:** Loss or alteration of ESAs and associated ecological corridors.
- Potential failure to implement an annual vegetation monitoring programme within the remaining natural vegetation areas within the Focus Areas. - **Impact:** Additional loss of natural habitat (beyond planned footprints) of floral habitat and diversity including habitat for floral SCC or floral SCC currently present (provincially protected species). Ongoing degradation and modification of the surrounding habitats.
- Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs. - **Impact:** Loss of favourable floral habitat, diversity and SCC as AIPs outcome and replace these species.
- Dust generated during construction activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[14] and potentially further decreasing optimal growing /re-establishing conditions. - **Impact:** Declines in plant functioning leading to loss of floral species and habitat for optimal growth.
Decommissioning and rehabilitation phase
- Disturbance of soils as part of demolition activities. - **Impact:** Loss of favourable growing conditions for floral communities.
- Failure to rehabilitate bare areas or disturbed sites as soon as they become available, potentially resulting in the loss of viable soils, increased erosion risks and/or the proliferation of AIPs. - **Impact**: Long-term loss of favourable habitat for the establishment of floral species. Loss of floral diversity and SCC.
- Inability to restore specialised habitats such as ESAs within the landscape. - Potential poor monitoring of relocated SCC (protected species). - **Impact**: Loss of species diversity and a permanent loss of ESA sites, ecological corridors, and habitat for a variety of SCCs (including nationally protected species). Fragmenting of sensitive areas such as ESAs.
- Potential poorly executed rehabilitation and failure to adequately implement and monitor rehabilitation efforts, leading to: - Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and an overall decrease in floral diversity; - Compacted soils limiting the re-establishment of natural vegetation; - Increased risk of erosion in areas left disturbed; and - Failed relocation of SCCs within rehabilitated areas. - **Impact:** Poor habitat recovery post-rehabilitation. Permanent degradation of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation.
- Potential on-going risk of contamination from mining facilities beyond closure. - **Impact:** Permanent impact on floral habitat.

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

5.2 *Floral Impact Assessment Results*

The tables below (Table 6 - 8) indicate 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 stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The impact assessment is divided between impacts on **1)** floral habitat and diversity and **2)** significant biodiversity features (ESA). The post-closure rehabilitation goal was not provided at the time of assessment. As such, it will be recommended that the post-closure landscape should attempt to reinstate, as far as is feasible, a wilderness landscape resembling the surrounding areas and comprising native vegetation from the reference state. The impact assessment will be undertaken with this assumption and when a post-closure goal is established and, if it differs from what is recommended in this report, the impact assessment will have to be updated accordingly.

Important to note is the below impact tables only include the habitat units that will be impacted by the proposed layout. However, where edge effects are anticipated to affect these habitats, these are also assessed collectively in the impact tables. Furthermore, should the layout be amended and various infrastructure added (e.g., PCD, pipelines and access roads) the impact assessment will need to be updated as well to reflect the necessary changes.

For the assessment of threatened floral SCCs, the assumption is that where such species, which is limited to provincially and nationally protected species, are within the proposed layout that they will be destroyed. The translocation / relocation of threatened SCC is not recognised as a mitigation measure to reduce impacts by the proposed activities (SANBI, 2020) and, as such, cannot be used to reduce the scoring of impacts to such species for the impact assessment. Search and rescue initiatives for threatened species must still be attempted if proposed activities are approved but cannot be regarded as a mitigation measure. As no threatened floral SCC are anticipated, impacts pertaining to these species are negligible so have not been assessed below. Impacts to protected species (e.g., provincial and NFA species) have however been considered in the impacts to the habitat and diversity.

Table 6: Impact significance on the floral ecology for the proposed development, prior to mitigation and post mitigation for the pre-construction and planning phase.

HABITAT AND DIVERSITY																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
Kuruman Mountain Bushveld	2	4	2	2	5	**2,67**	**3,5**	**9,33 Low-Medium**	2	4	1	1	5	**2,33**	**3**	**7 Low-Medium**
Olifantshoek Plains Thornveld	2	4	1	2	5	**2,33**	**3,5**	**8,16 Low-Medium**	2	4	1	1	5	**2,33**	**3**	**7 Low-Medium**
Freshwater Habitat: EDL	2	4	2	2	5	**2,67**	**3,5**	**9,33 Low-Medium**	1	4	1	1	4	**2**	**2,5**	**5 Low-Medium**
Freshwater Habitat: PFP	1	4	2	2	3	**2,33**	**2**	**4,67 Low**	1	4	1	1	2	**2**	**1,5**	**3 Low**
IMPORTANT ECOLOGICAL FEATURES																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
ESA	1	4	2	1	4	**2,33**	**2,5**	**5.83 Low-Medium**	1	4	2	1	2	**2,33**	**1,5**	**3,5 Low**
MITIGATION MEASURES																
➢ At all times, ensure that sound environmental management is in place during the planning phase; ➢ Stockpile height and slope angle / steepness must follow sound geotechnical design. Ensure that the slope ratio is not designed or planned to be excessively steep which may induce slope failure. Ensure mechanisms to improve slope stability are planned for. Stormwater management planning and erosion control must be stricter for all newly proposed stockpiles as the existing stockpiles have contributed to sedimentation of the adjacent natural habitat due to sub-par stormwater management; ➢ Prior to the commencement of vegetation clearing activities, 1) a rehabilitation plan and/or strategy must be developed (by suitably qualified individuals) for implementation throughout the project phases, 2) a rescue and relocation plan must be developed (by suitably qualified individuals), specifically targeting protected species, under the guidance of the relevant authorities (after walkdown was implemented), and 3) an AIP control plan must be developed and the AIP control must subsequently be implemented throughout all phases of the proposed project. The AIP control and																

management plan should be regularly updated by a suitably trained specialist. It is highly recommended that the AIP Management/ Control Plan should be monitored on a yearly basis (or as specified by an AIP professional);

- A thorough walkdown of all footprint areas (including a 15 m buffer around the footprint areas) must take place within the optimal flowering season of all (or most of) the anticipated provincially protected species prior to the project initiation. The appropriate permitting and authorisation processes must be followed as per the Northern Cape Environmental Department (for provincially protected species) and DFFE (for non-threatened TOPS and/or NFA species) requirements. A rescue and relocation plan, under the guidance of the DFFE and/or Northern Cape Environmental Department, must be developed based on the outcome of the site walkdowns;
- Based on the outcome of the walkdowns, the following permit application and/or authorisation will be necessary before project activities can commence. Where NCNCA -protected species will be impacted, permits from the Northern Cape Environmental Department will be required. Provincially protected species can be targeted for rescue and relocation attempts or destruction permits prior to the mining phase;
- Minimise loss of indigenous vegetation and natural habitat by considering the sensitivity of the biodiversity report as well as other specialist studies, i.e., optimise layouts within medium to very low SEI habitats, and avoid loss of high and very high SEI habitats as best possible, and avoid very high SEI habitats. At all times, ensure placement of infrastructure does not lead to increased habitat fragmentation (i.e., ensure temporary laydown areas and infrastructure placement occur within already disturbed areas or as close to existing disturbances as possible) or avoidable disruption to ecological processes; and
- It is recommended that prior to the commencement of construction activities, the construction servitude be clearly demarcated to prevent footprint creep into areas beyond the authorised footprints.

Table 7: Impact significance on the floral ecology for the proposed development, prior to mitigation and post mitigation for the mining phase.

HABITAT AND DIVERSITY																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
Kuruman Mountain Bushveld	5	4	2	5	5	**3,67**	**5**	**18,3 Medium high**	5	4	1	5	5	**3,33**	**5**	**16,67 Medium high**
Olifantshoek Plains Thornveld	4	4	2	5	5	**3,33**	**5**	**16,67 Medium high**	3	4	1	5	5	**2.67**	**5**	**13,33 Medium**
Freshwater Habitat: EDL	2	4	1	4	5	**2,33**	**4,5**	**10,5 Medium**	2	4	1	4	3	**2,33**	**3,5**	**8,17 Low-Medium**
Freshwater Habitat: PFP	3	4	2	5	5	**2,67**	**5**	**13,3 Medium**	3	4	1	5	5	**2,67**	**5**	**13,33 Medium**
IMPORTANT ECOLOGICAL FEATURES																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
ESA	3	4	3	4	5	**3,33**	**4,5**	**15 Medium high**	3	4	2	4	4	**3**	**4**	**12 Medium**
MITIGATION MEASURES																
Floral Habitat and Diversity																
➢ No NCNCA-protected floral species may be removed during any mining phase activities without 1) permits from the DFFE and Northern Cape Environmental Department, and 2) all conditions of the permits being adhered to. It is recommended that propagules and/or seed of the NCNCA-protected species be harvested (depending on the permit conditions) and grown under nursery conditions to be used for 1) rehabilitation activities later down the line, and/or 2) to supplement unsuccessful relocation attempts; ➢ Removal of vegetation must be restricted to what is absolutely necessary and must remain within the approved project footprint. Footprints to be clearly demarcated to avoid footprint creep into adjacent habitat. It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, be placed outside of sensitive habitat units; ➢ As far as possible, vehicles must utilise the existing and planned roads and avoid the creation of unplanned / unauthorised roads;															

- No vegetation cuttings from clearing activities may be left to accumulate in the Freshwater Habitat. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility or in a secluded area designated by the mine. No waste or construction rubble may be dumped in the surrounding natural habitats, or any unauthorised areas;
- Current proposed infrastructure and future expansions during the mining phase (as material is deposited), must be kept within authorised footprints only. No additional habitat outside of the demarcated and approved footprints (being applied for) may to be disturbed during the operational phase of the project. Monthly (minimum requirement) monitoring and recording of the footprint areas must be done by the Mine Surveyor to ensure consistency of footprint areas and no footprint creep takes place;
- Initiating, and maintaining, an annual vegetation monitoring programme, therefore the biodiversity within the Focus Areas (remaining natural areas) can be protected and managed in terms of ecological function, which comprises the floral species composition associated with the reference vegetation types. Furthermore, continued monitoring of relocation of SCC until evident that the individuals have successfully established.
- All crossings must be constructed as per the recommendations of a freshwater specialist (SAS 25-0028, 2025) and engineer. Where crossings will be constructed, these must be adequately designed to prevent impacts on habitat, instream flow, pattern and timing of water and water quality. Ensure AIP vegetation cuttings and propagules do not enter the freshwater systems where crossings will be constructed;
- It must be ensured that stockpiled topsoil is not contaminated by AIP material, and is considered a high priority for AIP control (stockpiled topsoil should be included in monitoring activities). Handling of topsoil must follow best-practice standards. Topsoil must be stockpiled in such a way as to limit soil compaction and erosion. No personnel and heavy vehicles to move over topsoil stockpiles. It is recommended that topsoil stockpiles be vegetated and while vegetating, measures will be needed to contain erosion of the stockpile during rain events;
- No collection of floral SCC or indigenous vegetation beyond the planned footprints must be allowed by construction or operational personnel;
- Open fires must be restricted to fire safe zone facilities and suitable fire control measures must be in place. However, harvesting of surrounding trees, shrubs or any indigenous vegetation for fire-making purposes must be strictly prohibited. A Fire Management Plan (FMP) must be in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs;
- Care must be taken during the construction and operation of the proposed activities to limit edge effects to the surrounding natural habitat. This can be achieved by:
- Demarcating all footprint areas during construction activities;
- All soils compacted outside of the footprint areas because of construction activities must be ripped and profiled and reseeded;
- Suppress dust to mitigate the impact of dust on flora within a close proximity of construction activities, as well as to prevent sedimentation of the Wetland Habitats surrounding the activities;
- Minimise the risk of erosion by limiting the extent of disturbed vegetation and exposed soil; and
- Manage the spread of AIP species, which may affect natural habitat outside of planned footprints;
- Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site. No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of the construction activities must be disposed of at an appropriate registered dump site or a safe area designated by the mine. 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;
- If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line;
- Appropriate fuel storage and distribution facilities need to be established; and
- Rehabilitate areas that are no longer used for construction and operational activities. Any natural areas beyond the direct footprint, which have been affected by construction activities, must be rehabilitated using indigenous species. As part of rehabilitation activities, ensure that a vegetation layer is reinstated and maintained where natural areas beyond the direct footprint have been affected by construction and operational activities – i.e., to promote soil health and vegetation establishment, to reduced habitat fragmentation, and to provide resources for fauna. In this regard, the use of indigenous plants from either the reference vegetation type or the general area is recommended for best biodiversity outcomes.

Significant Biodiversity Features

- Options to mitigate the loss of habitat associated with ESAs are limited. Edge effects should be managed to reduce cumulative loss of ESAs through **1)** minimisation of habitat loss through reconsideration of layouts, especially with regards to habitats that support protected floral species and watercourses, **2)** limiting of habitat fragmentation through utilisation of existing roads and keeping new construction activities within or close to existing disturbances, **3)** ensure a rehabilitation plan is developed and approved by authorities prior to mining activities commencing, which

must aim to incorporate concurrent rehabilitation through all phases of the project (preferred), and **4)** Ensuring habitat degradation especially surrounding the authorised footprints are kept to a minimum (limit edge effects).

Alien Vegetation

- AIP proliferation, which may affect adjacent natural areas, must be strictly managed. Specific mention in this regard is made of Category 1b and 2 AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020). Management of AIPs during the mining phase activities must be focused on limiting their introduction and preventing their spread;
- Ongoing AIP monitoring and clearing/control should take place throughout the mining (e.g., construction and operational) phase of the proposed activities; a 30 m buffer surrounding the proposed activities during the operational phase should regularly be monitored for AIP proliferation and instances thereof controlled appropriately. Disturbed areas and linear infrastructure must be regularly checked for AIP proliferation to prevent spread into surrounding natural areas (until successfully rehabilitated);
- All cleared alien vegetation 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, or at a garden refuse site;
- The AIP Management/Control Plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). No chemical control of AIPs to occur within 32 m of a watercourse, unless registered as safe for use in watercourses by the Working for Water group;
- Yearly monitoring of alien vegetation control plan (as implemented by a qualified specialist), stormwater management, and general good housekeeping must be done by the mine Environmental Control Officer (ECO) and photographic records kept; and
- Quarterly reporting on alien vegetation control to effectively monitor and manage the control and spread of AIPs.

Table 8: Impact significance on the floral ecology for the proposed development, prior to mitigation and post mitigation for the decommissioning and rehabilitation phase.

HABITAT AND DIVERSITY																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
Kuruman Mountain Bushveld	2	4	2	3	4	**2,67**	**3,5**	**9,33 Low Medium**	2	4	2	3	3	**2,67**	**3**	**8 Low Medim**
Olifantshoek Plains Thornveld	2	4	2	3	4	**2,67**	**3,5**	**9,33 Low Medium**	2	4	1	3	3	**2,33**	**3**	**7 Low Medium**
Freshwater Habitat: EDL	1	4	2	3	2	**2,33**	**2,5**	**5,83 Low Medium**	1	4	1	3	1	**2**	**2**	**4 Low**
Freshwater Habitat: PFP	1	4	2	3	3	**2,33**	**3**	**7 Low Medium**	1	4	1	3	2	**2**	**2,5**	**5 Low Medium**
IMPORTANT ECOLOGICAL FEATURES																
Habitat Unit	**Pre-mitigation**								**Post-mitigation**							
	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**	Severity	Duration	Extent	Frequency	Probability	**Consequence**	**Overall likelihood**	**Significance**
ESA	2	4	2	3	3	**2,67**	**3**	**8 Low Medium**	3	4	1	2	2	**2,67**	**2**	**5,33 Low Medium**
MITIGATION MEASURES																
Habitat and Diversity:																
➢ All infrastructure and footprint areas must be rehabilitated in accordance with the rehabilitation plan. Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure, or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions that are analogous with the desired post-closure land use;																
➢ The post-closure rehabilitation land use must be used as guidance for the rehabilitation plan to be implemented. It is recommended that the post-closure land use be to natural vegetation that represents, as far as possible, the pre-mined vegetation communities, with ecological function and habitat connectivity enhanced as much as feasible. The rehabilitated areas must be able to sustain floral SCC, especially if such species were rescued and propagated for relocation into rehabilitated sites;																

- Species selected for rehabilitation should meet the biodiversity and land end-use objectives. Only use species that are well adapted to local climatic conditions and post-establishment method of use (as provided by a suitably qualified individual);
- All temporary structures, waste, rubble, AIPs etc., must be removed from the site before re-vegetating can commence. Site levelling and preparation for rehabilitation activities must ensure no harm or disturbance come to the surrounding natural areas;
- Appropriate shaping of disturbed areas is essential. To promote successful establishment of vegetation, the slopes must resemble the natural surroundings. Where slopes are left steeper than what is recommended for whatever reason, additional measures must be implemented to prevent soil erosion and stormwater must be adequately managed;
- Shaping and backfilling recommendations include:
    - Areas that will be backfilled must be monitored for subsidence (as the backfill settles) and depressions filled using available material;
    - Replacement of topsoil that was removed and stored during site clearance activities must be to the original depth. Where topsoil is not enough for rehabilitation activities (or where topsoil has been severely contaminated by AIPs and regarded unsuitable for rehabilitation), provision must be made to import enough soils that will be suitable for slope shaping and for the re-establishment of vegetation; and
    - The site must be monitored for signs of erosion and remedial action taken where there are problems.
- Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas and as part of the rehabilitation phase continuing for at least 3 years post mine closure. Followed by ongoing AIP monitoring and control throughout the rehabilitation phase of the project;
- Monitoring of rescued and relocated floral SCC must continue during the decommissioning and rehabilitation phase until it is evident that the species have successfully established; and
- Collection of floral SCC and protected flora by rehabilitation and decommissioning teams must be prohibited.

5.3 *Impact Discussion*

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed MRA application. The proposed activities associated with the proposed mining will result in the loss of floral habitat associated with the removal of indigenous vegetation that encompasses both intact and degraded habitats, ESA sites, watercourses, and provincially protected species. The below sections provide a discussion of the impact assessment outcome in more detail.

For floral habitat and diversity, the mining phase (i.e., vegetation clearing activities and operational activities) will have the greatest impacts. Impacts on protected floral species will be higher during the planning phase during which SCC should be relocated and/or propagules harvested for propagation in plant nurseries. Thereafter, impacts can be reduced to lower impact significance on floral SCC given that sufficient monitoring of relocated and harvested specimens is implemented.

5.3.1 Impact on Floral Habitat and Diversity

The verified habitat conditions that were determined during the site visit indicated that the Recharge area (within the Freshwater Habitat) are of **medium SEI**, and the Kuruman Mountain Bushveld, Olifantshoek Plains Thornveld and EDL (within the Freshwater Habitat) of **low SEI** and the PFP (within the Freshwater Habitat) and Transformed Habitat are of **very low SEI**. Refer to Figure 6 (Table 4) for an indication of the extent of the various habitat units that occur directly within the proposed footprints.

The proposed activities will largely impact on semi-intact habitat (i.e., Kuruman Mountain Bushveld), the impacted habitats within the Focus Areas are not regarded as sensitive floral communities, and the loss of floral species (and associated habitat) will not result in significant, negative residual impacts. These habitats were associated with low and very low SEI scores and thus no avoidance mitigation is recommended (SANBI, 2020). However, minimisation and rehabilitation mitigation measures are the key focus in these habitats, ensuring that 1) loss of any remaining indigenous vegetation is reduced, 2) areas where mining-related disturbances took place outside of the mining footprints are rehabilitated and revegetated, and 3) additional, or potential cumulative, impacts to surrounding habitats (especially if more sensitive) must be managed and prevented. For the Recharge area, which is a **medium SEI** minimisation and restoration mitigation are recommended followed by appropriate restoration activities, however no activities are currently planned within the habitat unit therefore should any expansion be considered the development constraints should be followed.

Albeit to a lesser extent, the somewhat increasingly sensitive habitats such as the EDL (within the Freshwater Habitat) will also be impacted and fragmented if the proposed layout with only a small portion thereof (<1 ha) anticipated to be directly affected. Recommendation above and any mentioned in the Freshwater Report (SAS 25-0028, 2025) should be implemented to avoid impacts to the watercourse.

The most significant, negative impacts stemming from the proposed activities will take place within the Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld (lesser extent). Both these habitat units are in a fair ecological condition and support diverse floral communities as well as confirmed populations of protected plant species.

Indirect impacts that are anticipated from the proposed activities ranges from the potential spread of AIPs, the fragmentation of movement and dispersal corridors, sedimentation of Freshwater Habitat because of poor stormwater management and increased erodibility of watercourses. These indirect impacts can result in degradation of habitats and species beyond the proposed footprints and must be strictly managed if the proposed footprints are authorised. If managed, the indirect impacts can remain limited in their extent and the perceived effects on floral ecology can be kept to a local scale. Mitigation of indirect impacts is more feasible and achievable than for direct impacts.

Considering the mitigation hierarchy, the proposed activities are avoiding loss of sensitive floral habitat and species by optimising layouts within partially modified habitats. However, with the current layout, loss of sensitive flora (Provincially and Nationally protected species) is unavoidable. Restoring the “woodland” habitats (Kuruman Mountain Thornveld and Olifantshoek Plains Thornveld) post-mining has a moderately low to moderate probability of success (since the duration of activities are considered low) and therefore the loss of these habitats will not result in significant (depending on the activity, open cast pits will have a far greater impact on vegetation communities than stockpile or temporary structures), negative residual impacts to the associated floral communities, if concurrent rehabilitation is implemented. Therefore, the decommissioning and closure phase can improve the overall condition of the vegetation communities (including ecological processes) when adequately reinstated through effective rehabilitation activities. This is especially true for habitats that are currently of low ecological integrity (i.e., Transformed Habitat and impacted Kuruman Mountain Bushveld).

5.3.2 Impacts on Floral SCC

Of the threatened species assessed (i.e., VU, EN, CR, or NT species), none were recorded within the Focus Areas. Therefore, the proposed activities are not anticipated to directly impact on any populations of threatened species within the Focus Areas.

However, several species protected under the NCNCA, TOPS and NFA were recorded or are likely to occur within the Focus Areas. These species will require marking as part of final site walkdowns prior to vegetation clearing activities. Permit applications are required for the removal of NCNCA-protected species, and DFFE for nationally protected trees and/or TOPS species, and it is recommended that species be relocated out of the proposed mining footprints and not destroyed (where possible for some provincially protected species and TOPS species, however protected trees have a low likelihood of success after relocation therefore the permit should indicate destruction of the individuals). Permits from the Northern Cape Environmental Department and from the DFFE should be obtained to remove, cut, or destroy any of the above-mentioned protected and/or threatened species before any vegetation clearing may take place.

To determine the number of protected species that will be impacted, a detailed walkdown of the footprint areas must take place within the optimal flowering season of all or most of the anticipated SCCs. This will be an essential step in determining accurate numbers of protected species (and population sizes) within the proposed project footprints. A species rescue and relocation plan along with monitoring methods is recommended. All rescue and relocation activities (successes, failures, exact number of species rescued) must be documented and monitored until it is evident that the species have successfully established within the relocated areas.

5.3.3 Impact on CBAs, ESAs, Threatened Vegetation and Protected

The proposed mining activities will impact on ESAs within the Focus Areas. Loss of approx. 115 ha of ESA habitat is anticipated to take place if the proposed mining project is authorised. The ESA is already considered to be impacted by the surrounding mining activities (i.e., extensive prospecting activities). The isolated and fragmented nature of the disturbance within Focus Areas is not expected to significantly alter the functioning of the ESA as the majority of the larger ESA remains intact. However, the fragmentation of the associated movement and dispersal corridors within the ESA will result in impeded ecological processes and drivers, thus resulting in local scale impacts over the long term. It should be noted that the CBA will not be impacted upon by the proposed mining activities, and by managing edge effects to the ESA adequately the impact on the surrounding CBA is considered to be low.

5.3.4 Probable Residual Impacts

Several of the habitats that will be affected by the proposed mining activities have historically been impacted by mining activities (e.g., prospecting) and/or transformed to varying degrees. This includes portions of Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld.

Although ESAs will be impacted, the extent of these impacts is expected to be isolated, with no anticipated landscape-level effects on broader ecological processes. While the proposed mining activities will still result in some residual impacts, these are not considered significant in nature, as they do not involve critical or irreplaceable biodiversity elements, such as RLEs or CBAs, which would typically trigger the need for a formal biodiversity offset. Even with extensive mitigation, residual impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key residual impacts that have been identified:

- Permanent loss of and altered floral species diversity;
- Edge effects such as further habitat fragmentation and AIP proliferation;
- Permanent loss of floral SCC and suitable habitat for such species; and
- Disturbed areas not rehabilitated to an ecologically functioning state with resulting significant loss of floral habitat, species diversity, and SCC/protected floral species likely to be permanent.

5.3.5 Cumulative Impacts

For the assessment of potential cumulative impacts on vegetation and plant species associated with the proposed activities, consideration was given to past, present, and future (known) projects and natural drivers that affect these aspects. Four areas of concern were identified:

- Habitat fragmentation: The proposed project will result in fragmentation of the landscape (including ESA habitat);
- Spread of AIPs: Numerous AIPs were recorded within the current Focus Areas and these species pose a considerable risk to the habitat integrity of the remaining areas of natural, intact habitats. Potential poor AIP management from the mine as well as additional disturbances from mining edge effects may contribute to the spread of such species and a consequent cumulative decrease in habitat integrity within the Focus Areas and surrounds. Leading to possible degradation of important biological features such as ESAs and CBAs; and
- Impacts to SCC population dynamics: Should the proposed application be authorised and granted, the habitat for of provincially and nationally protected species will be impacted upon, and cumulative loss of these species are anticipated.

5.4 *Floral Monitoring*

A floral monitoring plan must be designed and implemented throughout all phases of the proposed mining project, should it be approved. The following points aim to guide the design

of the monitoring plan, and it must be noted that the monitoring plan must be continually updated and refined for site-specific requirements:

- Permanent monitoring plots must be established within (target area) and surrounding (reference area) all rehabilitated areas. These plots must be designed to accurately monitor the following parameters:
  - Species richness and species abundance;
  - Recruitment of indigenous species and of AIP species, including alien vs indigenous plant ratios;
  - Erosion levels and the efficacy of erosion control measures; and
  - Vegetation community structure including species composition and richness which should be compared to pre-development conditions and work towards the post-closure objective.
- Monitoring of all the natural areas should continue throughout the operational phase to ensure these systems are not adversely affected by associated activities;
- Stockpile slope monitoring should be carried out regularly to manage the slope angle and height. Where high levels of sediment are collecting at the base of the stockpiles, these areas should be re-vegetated to stabilise these sections and to minimise further dispersion of sediment into the surrounding soils during e.g., high rainfall events. Should this not be feasible, this material should be collected, transported, and stored in a suitable waste facility;
- The rehabilitation plan must be continuously updated (i.e., adaptive management) in accordance with the monitoring results to ensure that optimal rehabilitation measures are employed. Adaptive management is an integral part of any rehabilitation plan as it assesses monitoring results to allow rehabilitation measures to be revisited and to be adapted accordingly;
- A BAP must be drafted for the Focus Areas and monitoring and auditing thereof must take place;
- In the event that floral SCCs were relocated, or a nursery developed for the propagation of species for rehabilitation, monitoring would need to focus on the establishment success of such species;
- Results of the monitoring activities must be considered during all phases of the proposed project and action must be taken to mitigate impacts as soon as negative effects from mining activities become apparent; and
- The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

6 CONCLUSION

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 highest impacts are anticipated during the mining phase of the proposed mining activities, as this phase will result in large portions of the Focus Areas (i.e., indigenous vegetation), of varying SEI (mostly low SEI), being cleared. The anticipated impacts within the more sensitive habitat units namely Kuruman Mountain Bushveld and Freshwater Habitat (EDL and Recharge area) resulting in the highest impact scoring. However, based on the proposed layout the majority of the planned activities will be taking place in the less sensitive habitats and sensitive habitat are mostly avoided, with only minor activities taking place in the Freshwater Habitat (EDL).

Based on the above, it is the floral specialists' opinion that the project may be approved, provided that a floral walkdown (of the footprint areas) is implemented to ensure all possibly occurring floral SCC are relocated before vegetation clearing commences, and that stringent mitigation measures are implemented including monitoring of the footprint extents (including edge effects management) to ensure no additional loss of ESA integrity and functioning.

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

7 REFERENCES

BRAHMS Online Copyright © 1985 - 2020 Department of Plant Sciences, University of Oxford. Online available: http://posa.sanbi.org/sanbi/Websites.

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APPENDIX A: Floral Method of Assessment

Floral Species of Conservational Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the Focus Areas, 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 Data Deficient 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 Focus Areas. 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[15]:

- **Very High**: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.

- **High**: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.

- **Medium**: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.

- **Low**: Areas where no SCC are known or expected to occur.

[15] 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

BRAHMS Online Website

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

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the Botanical Database of Southern Africa (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 Focus Areas 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.

Provincial: Specially Protected and Protected Species

The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA), provides a list of Specially Protected Species (Schedule 1) (Section 49(1) of the NCNCA) and Protected Species (Schedule 2) (Section 50(1) of the NCNCA) for the Northern Cape Province. These species formed part of the SCC assessment.

Nationally Protected Trees

The National Forest Act, 1998 (Act No. 10 of 1998) (NFA), affords protection to a list of tree species. All nationally protected trees, whose distribution overlap with the Focus Areas, were included as SCC in this report.

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

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

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

Low POC	Medium POC	High POC	Confirmed

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

Site Ecological Importance (SEI)

SEI is a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site[16]) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

SEI can be derived from a simple matrix of BI and RR as follows:

Table A1: Matrix of CI and FI to determine BI.

Site Ecological Importance (SEI)		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed development is provided below.

Table A2: Guidelines for interpreting SEI in the context of the proposed development activities.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

BI = CI + FI

BI can be derived from a simple matrix of CI and FI as follows:

Table A3: Matrix of CI and FI to determine BI.

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

[16] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

Interpretation of the SEI in the context of the proposed development is provided below.

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as:

> *'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'*

These criteria are defined as follows:

- IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status[17] should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) in order to appropriately apply these for the evaluation of SEI. This criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species. Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat. y Range-restricted species – the presence of terrestrial flora, vertebrate, and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km^2 or less.
- Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons. y Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e., proportion) and how threatened (CR, EN, VU) the vegetation types are.
- Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint, but best practice recommendation is that it should be determined for all habitats within the entire PAOI[18].

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table A4). Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

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[17] http://speciesstatus.sanbi.org/. For mammals: https://www.ewt.org.za/wp-content/uploads/2020/04/2020-updated-2016-Red-List-of-Mammals-of-South- Africa-Lesotho-Swaziland-Summary-Listings.xlsx; for plants: http://redlist.sanbi.org.

[18] Because CI needs to be assigned to a receptor (e.g., the vegetation/fauna community or habitat type), it is customary to use the flora community delineation developed for a PAOI by a botanical specialist. However, such delineation is often too fine scaled to define fauna-specific habitats, which are generally more structural than phytosociological in nature. Where this is the case, the fauna specialist should merge two or more relevant floral communities to correlate with the specific fauna habitat type that is characteristic of a particular taxon assemblage. In certain cases, the faunal specialist will have to demarcate habitats that have not been classified by the botanical specialist; a pertinent example is the presence of cliffs, which are frequently important breeding habitat for some bird SCC.

Table A4: Conservation importance (CI) criteria.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[19] or Critically Rare[20] species that have a global EOO of < 10 km^2. - Any area of natural habitat[21] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[22]) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).
High	- Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. - Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. - Presence of Rare species. - Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	- Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. - Any area of natural habitat of threatened ecosystem type with status of VU. - Presence of range-restricted species. - > 50% of receptor contains natural habitat with potential to support SCC.
Low	- No confirmed or highly likely populations of SCC. - No confirmed or highly likely populations of range-restricted species. - < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	- No confirmed and highly unlikely populations of SCC. - No confirmed and highly unlikely populations of range-restricted species. - No natural habitat remaining.

Functional integrity (FI) of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is:

'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'

These criteria can be defined as:

- Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological processes, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g., fossorial reptiles) in question.
- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact

[19] For butterflies, as per Armstrong *et al*. (2013).

[20] For plants, as per Raimondo *et al*. (2009).

[21] This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g., Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.

[22] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi. org/Projects/Detail/49).

area and ecosystem functioning of a particular habitat. Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.

- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

Ecological processes can be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table A5) and will require justification by the specialist.

Table A5: Functional integrity (FI) criteria.

Functional integrity	Fulfilling criteria
Very high	- Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. - High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. - No or minimal current negative ecological impacts with no signs of major past disturbance (e.g., ploughing).
High	- Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. - Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. - Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	- Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. - Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. - Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	- Small (> 1 ha but < 5 ha) area. - Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. - Several minor and major current negative ecological impacts.
Very low	- Very small (< 1 ha) area. - No habitat connectivity except for flying species or flora with wind-dispersed seeds. - Several major current negative ecological impacts.

Ecological processes can be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table 8.2) and will require justification by the specialist (see worked example below).

Receptor resilience (RR) is defined here as:

'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (Table A4) and will require justification by the

specialist. The specialist needs to bear in mind that resilience will often be linked to a particular disturbance or impact, or even time of year, and needs to be described in relation to these factors. For example, large birds of prey have different levels of resilience to noise disturbance depending on whether they are breeding or not; these species would have low resilience to noise disturbance such as construction of a road adjacent to a nest site during the breeding season but a higher resilience to lodge construction in an area with limited breeding habitat outside of the breeding season.

Receptor resilience needs to be evaluated by the specialist and justification for each evaluation must be provided in the report (see worked example below). Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows:

SEI should be described in the above manner for each impact receptor within the area of influence and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities (Table A1) must be provided by the specialist.

It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated activities on the same spatial location. However, SEI for the same proposed development with multiple alternative layouts and/or locations may be compared within the same study.

Table A6: Resilience criteria.

Resilience	Fulfilling criteria
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[28] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

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 Focus Areas. 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/Focus Areas.

One of the problems with random sampling, another popular sampling method, is that random samples may not cover all areas of a Focus Areas 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 A1 below:

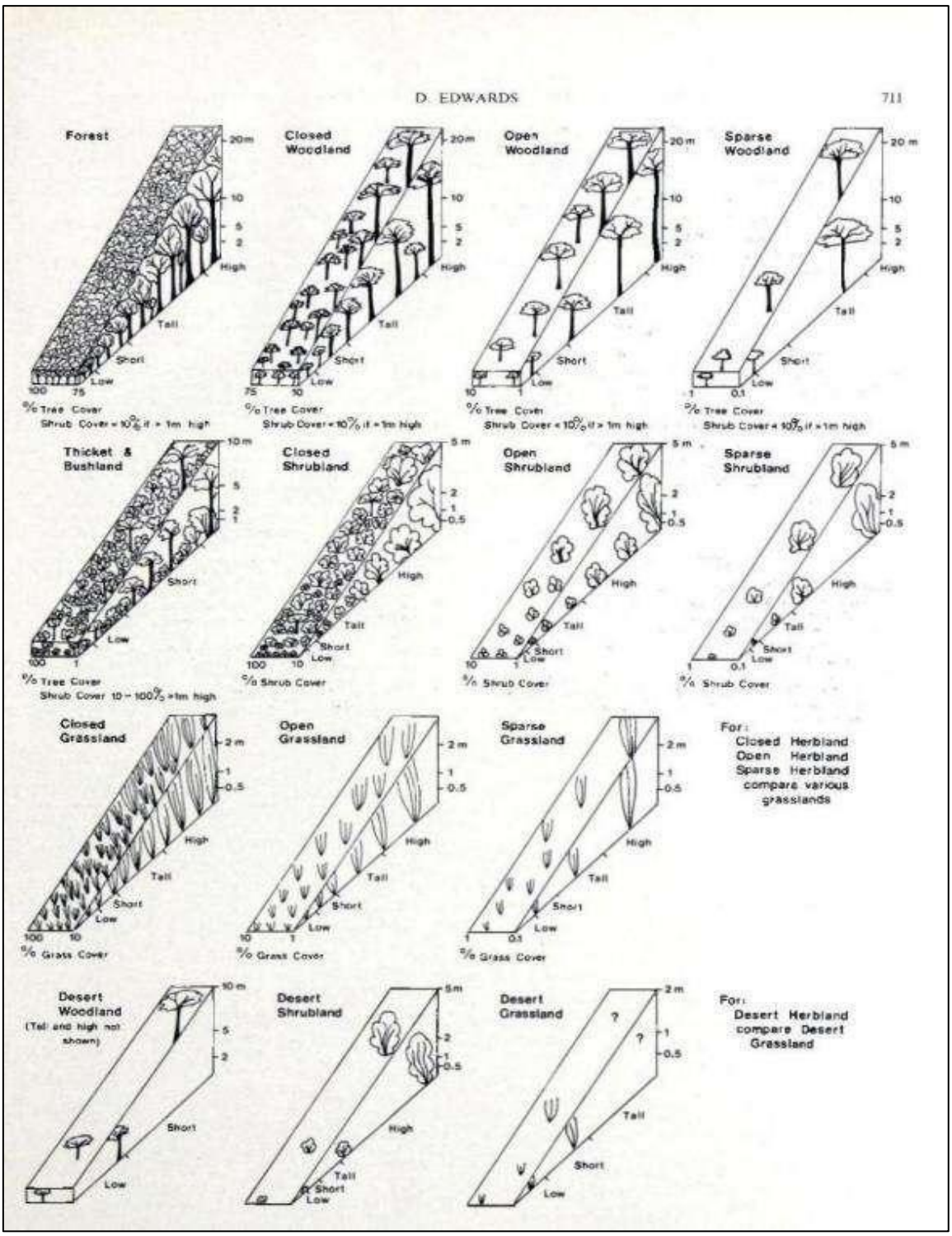

Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

APPENDIX B: 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 Focus Areas was pulled from the Botanical Database of Southern Africa (BODATSA) (http://posa.sanbi.org/). This list was further cross-checked with the NCNCA (2009) flora list (Schedule 1 and Schedule 2) to identify provincially protected species previously recorded for the area.

Definitions of the national Red List categories

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

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- ^{N}**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- ^{N}**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km^2, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km^2, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

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

The below table presents the results of the POC assessment.

PROVINCIALLY PROTECTED SPECIES

Table B1: POC assessment results for provincially protected floral species as per the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA). Threatened status and additional information on species threat status, habitat and distribution was obtained from The Red List of South African Plants (http://redlist.sanbi.org/index.php). The Potential of Occurrence (POC) of these floral SCC within the Focus Areas is also provided.

Species	Habitat and distribution details	IUCN	POC
Schedule 2 Protected Species FAMILY AIZOACEAE (MESEMBRYANTHEMACEAE) - All species except those listed as Schedule			
Chasmatophyllum musculinum	Succulent **Provincial distribution**: Eastern Cape, Free State, Gauteng, Mpumalanga, Northern Cape, North West, Western Cape **Major habitats: Terrestrial** **Description:** Wide, but sparse distribution within the southern African interior. Habitat can range from rocky areas to deeper soils (Smith et al. 1998). **Suitable habitat on site:** Olifantshoek Plains Thornveld.	LC	**Medium**
Ebracteola wilmaniae	Succulent **Range**: Widespread across the Northern Cape and North West Province, from Zeerust to Prieska. **Major habitats:** Grassland, Savanna. **Description:** Lithosols in chert or dolomite outcrops in grassland.	LC	**Low**
Lithops aucampiae subsp. *aucampiae* var. *aucampiae*	Succulent **Range**: Northern Cape. Kimberly to Upington. **Major habitats:** Savanna. **Description:** Red quartzite.	LC	**Low**
Galenia collina	Dwarf shrub **Provincial distribution:** Northern Cape, Western Cape. **Major habitats:** Terrestrial. **Description:** None provided.	LC	**Low**
Galenia prostrata	Dwarf shrub **Provincial distribution:** Eastern Cape, Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** None provided. **Population trend:** Stable.	LC	**Low**
Nananthus aloides	Succulent **Range**: Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** Widespread in the climatically severe southern African interior. It grows mostly at the edge of pans in finely decomposed limestone, the plants often sunken into the ground, or among stones (The encyclopaedia of succulents). **Population trend:** None provided.	LC	**Low**

Species	Habitat and distribution details	IUCN	POC
Plinthus cryptocarpus	Dwarf shrub **Range**: Northern Cape **Major habitats:** Terrestrial. **Description:** None provided. **Population trend:** None provided.	LC	**Low**
Prepodesma orpenii	Succulent **Range**: Northern Cape. **Major habitats:** Terrestrial. **Description:** Arid subtropics. It grows in dry plane lands on barren loamy shales or in crevices between quartzitic limestone stones (The encyclopaedia of succulents). **Population trend:** Stable.	LC	**Low**
Tetragonia arbuscula	Succulent; dwarf shrub **Range**: Eastern Cape, Free State, Northern Cape, Western Cape. **Major habitats:** Terrestrial. **Description:** Not provided. **Population trend:** Not provided.	LC	**Low**
Tetragonia calycina	Succulent; dwarf shrub **Range**: Eastern Cape, Free State, Northern Cape, Western Cape. **Major habitats:** Terrestrial. **Description:** Not provided. **Population trend:** Not provided.	LC	**Low**
Schedule 2 Protected Species FAMILY APOCYNACEAE - All species except those listed as Schedule			
Brachystelma circinatum	Succulent; geophyte **Range**: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Western Cape. **Major habitats:** Terrestrial. **Description:** Grows in various stony places and has adapted to different environmental factors (The encyclopaedia of succulents). **Population trend:** Not provided.	LC	**Low**
Cynanchum orangeanum	Herb **Range**: Eastern Cape, Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Population trend:** Not provided.	LC	**Low**
Fockea angustifolia	Succulent; climber **Range**: Free State, KwaZulu-Natal, Limpopo, Northern Cape, North West **Major habitats:** Terrestrial. **Description:** Occurs in dry areas on stony hillsides on granite or limestone (Pooley, 2005).	LC	**Low**
Gomphocarpus fruticosus	Herb; shrub **Range**: Widespread across South Africa, extending northwards to Angola, Zambia and Mozambique. **Major habitats:** Albany Thicket, Desert, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, Succulent Karoo. **Description:** Dry sandy soils in open or disturbed places, often on riverbanks. **Suitable habitat on site:** Throughout Focus Areas	LC	**Confirmed**
Gomphocarpus tomentosus	Herb; shrub **Range**: Widespread across the central and north-eastern interior of South Africa, extending northwards within southern Africa to southern Angola, Zimbabwe and southern Mozambique. **Major habitats:** Grassland, Nama Karoo, Savanna. **Description:** Sandy open or disturbed areas. **Suitable habitat on site:** Throughout Focus Areas	LC	**Confirmed**
Huernia barbata subsp. *ingeae*	Succulent **Range**: Northern Cape. **Major habitats:** Terrestrial. **Description:** Not provided.	LC	**Low**
Microloma armatum	Dwarf shrub; shrub **Range**: Widespread but sparsely distributed across southern Namibia and the Northern Cape Province, South Africa, extending as far south as Karoopoort east of Ceres in the Western Cape.	LC	**Low**

Species	Habitat and distribution details	IUCN	POC
	Major habitats: Nama Karoo, Savanna, Succulent Karoo. **Description:** Arid shrubland and thornveld. Sometimes restricted to rock formations.		
Pachypodium succulentum	Succulent; shrub **Range**: Eastern Cape, Northern Cape, Western Cape. **Major habitats:** Terrestrial. **Description:** It occurs in rocky grassland, koppies, steep hills and succulent scrub vegetation in the Western, Eastern and Northern Cape and western Free State, at altitudes up to 1 400 m (SANBI PlantZAfrica). **This species is listed on Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora).	LC	**Low**
Schedule 2 Protected Species FAMILY ASPHODELACEAE - All species except those listed as Schedule 1, and the species *Aloe ferox*			
Aloidendron dichotomum	**Range**: From Nieuwoudtville east to Olifantsfontein and northwards to the Brandberg in Namibia. **Major habitats:** Terrestrial. **Description:** On north-facing rocky slopes (particularly dolomite) in the south of its range. Any slopes and sandy flats in the central and northern parts of range. **Population trend:** Decreasing.	VU	**Low**
Bulbine abyssinica	Succulent; geophyte; herb **Range**: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape. **Major habitats:** Terrestrial. **Description:** It favours rocky grassland and shallow soil overlying rock but can also be found in woodland and along seepage areas. **Suitable habitat on site:**	LC	**Confirmed**
Trachyandra saltii	Succulent; geophyte **Range**: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** In rocky montane grassland, margins of forest and vleis and open woodland, often on stony or sandy soils, including Kalahari sand. **Suitable habitat on site:** Olifantshoek Plains Thornveld	LC	**Medium**
Schedule 2 Protected Species FAMILY CAPPARACEAE - *Boscia* spp., i.e. Shepherd's trees, all species			
Boscia albitrunca	Shrub; tree **Range**: Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** This species is found in the drier parts of southern Africa, in areas of low rainfall. **Suitable habitat on site:** Olifantshoek Plains Thornveld & Kuruman Mountain Bushveld	LC	**Confirmed**
Schedule 2 Protected Species FAMILY CELASTRACEAE - *Gymnosporia* spp. All species			
Gymnosporia buxifolia	Shrub; tree **Range**: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape. **Major habitats:** Terrestrial. **Description:** Its natural habitat is in grasslands, fynbos, Nama-karoo, forests, thickets and savanna-bushveld. It occurs on hillsides, dry slopes of valleys, sometimes in riverbeds, often on termite mounds and it is often found as undergrowth to taller trees. **Suitable habitat on site:** Kuruman Mountain Bushveld	LC	**Confirmed**
Schedule 2 Protected Species FAMILY CRASSULACEAE - All species except those listed in Schedule 1			
Crassula corallina	Succulent; herb **Range**: Northern Cape (Subsp. *corallina*, also occurs in the Eastern Cape, Free State, North West, Western Cape).	LC	**Low**

Species	Habitat and distribution details	IUCN	POC
	Major habitats: Terrestrial. **Description:** It grows in quartzite outcrops in desert-like habitat and dry floodplain (The encyclopaedia of succulents).		
Crassula muscosa	Succulent; herb **Range**: This species is widespread across Namaqualand, Bushmanland and the Karoo, extending to the coastal lowlands of the Western Cape and the western half of the Eastern Cape. It also occurs in Namibia. **Major habitats:** Terrestrial, including Postmasburg Thornveld. **Description:** Occurs sheltered under shrubs or in rocky places in karroid shrubland, valley bushveld and fynbos.	LC	**Low**
Kalanchoe rotundifolia	Succulent; dwarf shrub **Range**: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** A very common plant found growing as a pioneer plant usually in shade or half-shade, single or in large communities under trees or shrubs in bushland, woodland, open and secondary forests, savanna, open veld; sandy, limestone, brackish or rocky soils or on rocks, either in dry or wet habitats, sometimes in salt marshes. **Suitable habitat on site:** Olifantshoek Plains Thornveld	LC	**Confirmed**
Schedule 2 Protected Species FAMILY EUPHORBIACEAE - *Euphorbia* spp. All species			
Euphorbia crassipes	Dwarf succulent **Range**: Northern Cape. **Major habitats:** Namibia to Kliprand, Pofadder, Prieska and Kimberley. **Description:** Gravelly flats. **Suitable habitat on site:** Olifantshoek Plains Thornveld	LC	**Medium**
Euphorbia davyi	Dwarf, spineless succulent shrub **Range**: Gauteng, Limpopo, North West. **Major habitats:** Terrestrial. **Description:** Rocky outcrops in grassland.	LC	**Low**
Euphorbia duseimata	Succulent; dwarf shrub **Range**: Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** Sandy or turfy soils, *Senegalia-Tarconanthus* Thornveld and Bushveld.	LC	Low
Euphorbia gariepina	Succulent **Range**: Northern Cape and Namibia. From the Orange River to 160 km north of Windhoek. **Major habitats:** Terrestrial. **Description:** Sandy, gravelly soils.	LC	**Low**
Euphorbia wilmaniae	Spineless dwarf succulent **Range**: Northern Cape. Griqualand West Centre endemic species. **Major habitats:** Terrestrial. **Description:** Among boulders and rocks, often concealed in the crevices of the rocks.	LC	**Low**
Schedule 2 Protected Species FAMILY HYACINTHACEAE - *Eucomis* spp. Pineapple flower, all species			
Eucomis autumnalis	Geophyte **Range**: South Africa, Swaziland, Lesotho, Botswana, Zimbabwe and Malawi. **Major habitats:** Grassland **Description:** Damp, open grassland and sheltered places from the coast to 2450 m.	NE	**Low**
Schedule 2 Protected Species FAMILY IRIDACEAE - All species except those listed in Schedule 1			
Babiana bainesii	Geophyte; herb **Range**: Limpopo, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** Grassland, usually among small rocks. **Suitable habitat on site:** Olifantshoek Plains Thornveld	LC	**High**
Babiana hypogaea	Geophyte; herb	LC	**High**

Species	Habitat and distribution details	IUCN	POC
	Range: Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** Red sand plains. Usually in Kalahari Sand or stony laterite in open woodland or grassland. **Suitable habitat on site:** Olifantshoek Plains Thornveld		
Duthieastrum linifolium	Geophyte; herb **Range**: Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Description:** None provided	LC	**Low**
Freesia andersoniae	Geophyte; herb **Range**: Eastern Cape, Free State, Northern Cape, North West. Widespread across the central interior of South Africa. **Major habitats:** Grassland, Nama Karoo, Savanna. **Description:** Wedged among rocks on lower slopes of dolerite and dolomite outcrops.	LC	**Low**
Gladiolus orchidiflorus	Geophyte; herb **Range**: Free State, Northern Cape, Western Cape. **Major habitats:** Terrestrial. **Description:** Found on clay and sandstone soils from Namibia to Cape Flats and also to Free State and flowers in the spring.	LC	**Low**
Moraea pallida	Geophyte; herb **Range**: Eastern Cape, North West, Western Cape. **Major habitats:** Terrestrial. **Description:** The habitat is well-drained flats and slight slopes, with collectors often referring to the presence of calcrete deposits. **Suitable habitat on site:** Olifantshoek Plains Thornveld & Kuruman Mountain Bushveld	LC	**High**
Schedule 2 Protected Species FAMILY MELIACEAE - *Nymania capensis* (Thunb.) (Lindb.) Chinese Lantern			
Nymania capensis	Tree; shrub **Range**: Eastern Cape, Northern Cape, Western Cape. **Major habitats:** **Description:** It favours hot, dry, rocky habitats, but also occurs near dry, sandy rivers.	LC	**Low**
Schedule 2 Protected Species FAMILY OXALIDACEAE - *Oxalis* spp. Sorrel, all species except those species listed in Schedule 1			
Oxalis lawsonii	Geophyte **Range**: Free State, Northern Cape, North West. **Major habitats:** Terrestrial. **Suitable habitat on site:** Olifantshoek Plains Thornveld.	LC	**Medium**
Schedule 2 Protected Species FAMILY SCROPHULARIACEAE - *Jamesbrittenia* spp. All species			
Jamesbrittenia atropurpurea	Shrub; dwarf shrub **Range**: Eastern Cape, Free State, Gauteng, Northern Cape, North West, Western Cape. **Major habitats:** Terrestrial. **Description:** This species grows in clay or loam flats, slopes and ridges among scrub. **Suitable habitat on site:** Olifantshoek Plains Thornveld & Kuruman Mountain Thornveld	LC	**High**
Manulea burchellii	Herb **Range**: Northern Cape. **Major habitats:** Terrestrial. **Description:** None provided	LC	**Low**

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

NATIONALLY PROTECTED SPECIES

NEMBA TOPS List for South Africa[23]

Table B3: TOPS list for South Africa – plant species.

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Adenia wilmsii	No common name	**Low**	**Provincial distribution**: Mpumalanga **Range**: Lydenburg to Waterval Boven **Description**: Dolerite outcrops or red loam soil, in open woodland, 1300-1500 m.	**EN; P**
Adenium swazicum	Swaziland Impala Lily	**Low**	**Range**: Kruger National Park to Swaziland along the Lebombo Mountains and adjacent areas in south-western Mozambique.	**VU**
Adenium swazicum	Swaziland Impala Lily	**Low**	**Provincial distribution**: Mpumalanga	**VU**
Aloe albida	Grass Aloe	**Low**	**Provincial distribution**: Mpumalanga **Range**: Aloe albida has a restricted range in the mountains south of Barberton, Mpumalanga, extending to Malolotja in north-western Swaziland.	**NT**
***Aloe pillansii* (now *Aloidendron pillansii*)**	False Quiver Tree	**Low**	**Provincial distribution**: Northern Cape **Range**: Richtersveld and southern Namibia.	**EN**
Aloe simii	No common name	**Low**	**Provincial distribution**: Mpumalanga **Range**: This species is endemic to a small area in the transition area between the Mpumalanga Lowveld and Escarpment, where it occurs from Sabie southwards to White River and around Nelspruit. **Description**: It occurs along drainage lines and in wetlands in open woodland and grassland, 600-1100 m.	**EN; P**
Clivia mirabilis	"Oorlogskloof' Bush Lily	**Low**	**Provincial distribution**: Northern Cape, Western Cape	**VU; P**
Diaphananthe millarii	Tree Orchid	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal **Range**: East London and Durban.	**VU**
Disa macrostachya	No common name	**Low**	**Provincial distribution**: Northern Cape	**EN; P**
Disa nubigena	No common name	**Low**	**Provincial distribution**: Western Cape	**Rare; P**
Disa physodes	No common name	**Low**	**Provincial distribution**: Western Cape	**CR; P**
Disa procera	No common name	**Low**	**Provincial distribution**: Western Cape	**EN; P**
Disa sabulosa	No common name	**Low**	**Provincial distribution**: Western Cape	**EN; P**
Encephalartos aemulans	Ngotshe Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**CR**
Encephalartos altensteinii	Bread **Palm**	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**VU; P**
Encephalartos arenarius	Dune Cycad	**Low**	**Provincial distribution**: Eastern Cape	**EN**
Encephalartos brevifoliolatus	Escarpment Cycad	**Low**	**Provincial distribution**: Limpopo	**EW**
Encephalartos caffer	Breadfruit Tree	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**NT; P**
Encephalartos cerinus	Waxen Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**CR**
Encephalartos cupidus	Blyde River Cycad	**Low**	**Provincial distribution**: Limpopo, Mpumalanga **Description**: Grassland, on steep, rocky slopes or cliffs and sometimes near seepage areas bordering gallery forests.	**CR**
Encephalartos dolomiticus	Wolkberg Cycad	**Low**	**Provincial distribution**: Limpopo	**CR**
Encephalartos dyerianus	Lowveld Cycad	**Low**	**Provincial distribution**: Limpopo	**CR; P**

[23] National Environmental Management: Biodiversity Act 10 of 2004 - Threatened or Protected Species Regulations, 2007. Government Notice R152 in Government Gazette 29657 dated 23 February 2007. Commencement date: 1 June 2007 [GN R150, Gazette no. 29657], as amended.

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Encephalartos eugene-maraisii	Waterberg Cycad	**Low**	**Provincial distribution**: Limpopo	**EN**
Encephalartos friderici-guilielmi	No common name	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**NT; P**
Encephalartos ghellinckii	No common name	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**VU; P**
Encephalartos heenanii	Woolly Cycad	**Low**	**Provincial distribution**: Mpumalanga **Description**: Open areas of montane grasslands amidst scarp forest in deep valleys and ravines.	**CR**
Encephalartos hirsutus	Venda Cycad	**Low**	**Provincial distribution**: Limpopo	**CR**
Encephalartos horridus	Eastern Cape Blue Cycad	**Low**	**Provincial distribution**: Eastern Cape	**EN**
Encephalartos humilis	No common name	**Low**	**Provincial distribution**: Mpumalanga **Description:** Montane and mistbelt grassland, rocky sandstone slopes.	**VU; P**
Encephalartos inopinus	Lydenburg Cycad	**Low**	**Provincial distribution**: Limpopo	**CR**
Encephalartos laevifolius	Kaapsehoop Cycad	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga **Description**: Steep, rocky slopes in mistbelt grassland, 1300-1500 m.	**CR**
Encephalartos lanatus	No common name	**Low**	**Provincial distribution**: Gauteng and western Mpumalanga **Description**:Sheltered, wooded ravines in sandstone ridges, 1200-1500 m.	**NT; P**
Encephalartos latifrons	Albany Cycad	**Low**	**Provincial distribution**: Eastern Cape	**CR**
Encephalartos lebomboensis	Lebombo Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal, Mpumalanga **Description**: Cliffs and rocky ravines in savanna and grassland.	**EN**
Encephalartos lehmannii	No common name	**Low**	**Provincial distribution**: Eastern Cape	**NT; P**
Encephalartos longifolius	No common name	**Low**	**Provincial distribution**: Eastern Cape	**NT; P**
Encephalartos middelburgensis	Middelburg Cycad	**Low**	**Provincial distribution**: Gauteng, Mpumalanga **Description**: Open grasslands and in sheltered valleys.	**CR**
Encephalartos msinganus	Msinga, Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**CR**
Encephalartos natalensis	Natal Giant Cycad	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**NT; P**
Encephalartos ngoyanus	Ngoye Dwarf Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**VU**
Encephalartos nubimontanus	Blue Cycad	**Low**	**Provincial distribution**: Limpopo	**EW**
Encephalartos paucidentatus	No common name	**Low**	**Provincial distribution**: Mpumalanga **Description**: Forest, occurs on steep rocky slopes and alongside streams in deep gorges.	**VU; P**
Encephalartos princeps	No common name	**Low**	**Provincial distribution**: Eastern Cape	**VU; P**
Encephalartos senticosus	No common name	**Low**	**Provincial distribution**: KwaZulu-Natal	**VU; P**
Encephalartos transvenosus	Modjadje Cycad	**Low**	**Provincial distribution**: Limpopo	**LC; P**
Encephalartos trispinosus	No common name	**Low**	**Provincial distribution**: Eastern Cape	**VU; P**
Encephalartos woodii	Wood's Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**EW**
Euphorbia clivicola	No common name	**Low**	**Provincial distribution**: Limpopo	**CR; P**
Euphorbia meloformis	No common name	**Low**	**Provincial distribution**: Eastern Cape	**NT; P**
Euphorbia obesa	No common name	**Low**	**Provincial distribution**: Eastern Cape	**EN; P**
Harpagophytum procumbens	Devil's Claw	**High**	**Provincial distribution**: Free State, Limpopo, Northern Cape, North West	**LC; P**
Harpagophytum zeyherii	Devil's Claw	**Low**	**Provincial distribution**: Gauteng, Limpopo, Mpumalanga, North West	**LC; P**
Hoodia currorii	Ghaap	**Low**	**Provincial distribution**: Limpopo	**P**
Hoodia gordonii	Ghaap	**Low**	**Provincial distribution**: Free State, Northern Cape, Western Cape	**DDD; P**
Jubaeopsis caffra	Pondoland Coconut	**Low**	**Provincial distribution**: Eastern Cape	**EN**

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Merwilla plumbea	Blue Squill	**Low**	Provincial distribution: KwaZulu-Natal, Mpumalanga Major habitats: Grassland Description: Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m.	**NT**
Newtonia hildebrandtii* var. *hildebrandtii	Lebombo Wattle	**Low**	**Provincial distribution**: KwaZulu-Natal	**Now LC**
Protea odorata	Swartland Sugarbush	**Low**	**Provincial distribution**: Western Cape	**CR; P**
Siphonochilus aethiopicus	Wild Ginger	**Low**	**Provincial distribution**: KwaZulu-Natal, Limpopo, Mpumalanga **Range**: Sporadically from the Letaba catchment in the Limpopo Lowveld to Swaziland. Extinct in KwaZulu-Natal. Widespread elsewhere in Africa. **Description**: Tall open or closed woodland, wooded grassland or bushveld.	**CR**
Stangeria eriopus	No common name	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**VU; P**
Warburgia salutaris	Pepper-bark Tree	**Low**	**Provincial distribution**: KwaZulu-Natal, Limpopo, Mpumalanga **Range**: North-eastern KwaZulu-Natal, Mpumalanga and Limpopo Province. Also occurs in Swaziland, Mozambique and Zimbabwe and Malawi. **Description**: Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets.	**EN**
Zantedeschia jucunda	Yellow Arum Lilly	**Low**	**Provincial distribution**: Limpopo	**VU**

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

Protected tree species as per the NFA

Table B4: Protected trees as defined by The National Forest Act, 1998, (Act No. 84 of 1998) (NFA) for the Focus Areas. Additional information on species threat status as defined in The Red List of South African Plants (http://redlist.sanbi.org/index.php) is presented.

Family	Scientific Name	IUCN	Description	POC
Brassicaceae	*Boscia albitrunca*	LC	**Range**: Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West. **Description**: hot dry areas as well as the bushveld, open woodland and are associated with termite mounds. **Suitable Habitat on Site**: Olifantshoek Plains Thornveld & Kuruman Mountain Thornveld	**Confirmed**
Fabaceae	*Vachellia erioloba*	LC	**Range**: Free State, Gauteng, Limpopo, Mpumalanga, Northern Cape, North West Province. **Description**: Savanna, semi-desert, and desert areas with deep, sandy soils and along drainage lines in very arid areas, sometimes in rocky outcrops. **Suitable Habitat on Site**: Olifantshoek Plains Thornveld & Kuruman Mountain Thornveld	**Confirmed**
Fabaceae	*Vachellia haematoxylon*	LC	**Range**: Northern Cape **Description**: Found in arid areas, usually on sandy soils. **Suitable Habitat on Site**: Olifantshoek Plains Thornveld & Kuruman Mountain Thornveld	**High**

APPENDIX C: Floral Species List

Table C1: Dominant floral species encountered during the field assessment. Alien species identified during the field assessment are indicated with an asterisk (*). Protected species are emboldened.

SCIENTIFIC NAME	OLIFANTSHOEK PLAINS THORNVELD	FRESHWATER HABITAT	KURUMAN MOUNTAIN BUSHVELD	TRANSFORMED HABITAT
WOODY SPECIES				
**Datura stramonium*	x	x	x	x
**Melia azedarach*	x			x
**Nicotiana glauca*		x		x
**Prosopis glandulosa* var. *torreyana*	x	x	x	x
**Schinus molle*			x	
**Solanum elaeagnifolium*		x	x	x
Aptosimum lineare	x		x	
Aptosimum marlothii	x			
Asparagus laricinus	x	x	x	
Asparagus suaveolens			x	x
Barleria rigida	x			
Blepharis sp.		x	x	
***Boscia albitrunca* (NFA & NCNCA)**	x		x	
Boscia foetida				
Diospyros lycioides subsp. *lycioides*	x	x	x	
Dodonaea viscosa var. *angustifolia*			x	
Ehretia rigida subsp. *rigida*	x			
Eriocephalus cf. ericoides	x	x	x	
Euclea crispa			x	
Euclea undulata	x		x	
Felicia sp.	x		x	
***Gomphocarpus fruiticosus* (NCNCA)**	x		x	x
***Gomphocarpus tomentosa* (NCNCA)**	x		x	
Grewia flava	x			
***Gymnosporia buxifolia* (NCNCA)**	x		x	
Hermannia cf. burchellii	x	x	x	
Hermannia comosa			x	
Indigophera sp.	x			
Justicia divaricata	x		x	
Lacomucinaea lineata			x	
Lantana rugosa	x	x	x	
Lycium hirsutum	x		x	
Monechma incanum	x			
Pentzia cf. calcarea	x	x	x	
Pentzia incanum			x	
Rhigozum obovatum	x		x	
Rhigozum trichotomum	x		x	
Searsia burchellii	x	x	x	
Searsia lancea	x	x	x	x
Searsia leptodictya	x	x	x	
Searsia tridactyla	x	x	x	
Senegalia mellifera subsp. *detinens*	x		x	x
Senna italica	x		x	
Solanum tomentosum	x		x	

SCIENTIFIC NAME	OLIFANTSHOEK PLAINS THORNVELD	FRESHWATER HABITAT	KURUMAN MOUNTAIN BUSHVELD	TRANSFORMED HABITAT
Tapinanthus oleifolius	x	x	x	
Tarchonanthus camphoratus	x	x	x	
***Vachellia erioloba* (NFA)**	x	x	x	
Vachellia hebeclada subsp. *hebeclada*	x			
Vachellia tortilis subsp. *heteracantha*	x		x	
Waltheria indica	x			
Ziziphus mucronata	x	x	x	x
HERBACEOUS SPECIES				
**Alternanthera pungens*			x	x
**Argemone ochroleuca* subsp. *ochroleuca*		x	x	x
**Bidens pilosa*	x	x	x	x
**Chenopodium album*	x	x	x	x
**Gomphrena celosiodes*	x		x	x
**Salsola kali*	x		x	x
**Schkuhria pinnata*	x	x	x	x
**Tagetes minuta*	x	x	x	x
Abutilon austro-africanum		x		
Ammocharis coranica				
Aptosimum marlothii	x		x	
Barleria lichtensteiniana			x	
Boophone distichta	x		x	
Blepharis furcata			x	
Bulbine abyssinica				
Bulbine narcissifolia				
Commelina africana	x		x	
Commelina benghalensis				
Cucumis africanus	x	x	x	
Cullen tomentosum				
Eriospermum cf. porphyrium	x		x	
Geigeria ornativa	x	x	x	
Hermannia comosa	x	x	x	
Hermannia linnaeoides			x	
Hermbstaedtia fleckii	x		x	
Hermbstaedtia odorata			x	
Kyphocarpa angustifolia	x	x	x	
Ledebouria apertiflora				
Lycium cinereum				
Melhania burchellii			x	
Mestoklema tuberosum			x	
Nerine laticoma				
Nidorella resedifolia			x	
Ornithoglossum vulgare		x	x	
Oxalis purpurea	x			
Parapolydora fastigiata				
Pellaea calomelanos	x		x	
Pentzia incana				
Sansevieria aethiopica	x		x	
Sansevieria pearsonii			x	
Seriphium plumosum				
Sesamum trilobum			x	
Sesamum triphyllum	x		x	
Sida ovata	x		x	

SCIENTIFIC NAME	OLIFANTSHOEK PLAINS THORNVELD	FRESHWATER HABITAT	KURUMAN MOUNTAIN BUSHVELD	TRANSFORMED HABITAT
Tribulus zeyheri subsp *zeyheri*	x		*x*	
GRAMINOID SPECIES				
**Cenchrus setaceum*			x	x
Aristida adscensionis		x	x	
Aristida congesta subsp. *congesta*	x	x	x	x
Aristida diffusa			x	
Brachiaria nigropedata	x		x	
Brachiaria serrata		x	*x*	
Bulbostylis burchellii				
Cenchrus ciliaris	x	x	x	
Chloris virgata		x		
Cymbopogon pospischilii	x	x	x	x
Cynodon dactylon	x		x	
Cyperus sp.		x		
Digitaria eriantha subsp. *eriantha*		x	x	
Diheteropogon amplectens			x	
Enneapogon cenchroides	x	x	x	
Eragrostis annulata				
Eragrostis bicolor				
Eragrostis echinochloidea	x	x		
Eragrostis lehmanniana	x	x	x	
Eragrostis obtusa				
Eragrostis pallens	x			
Eragrostis rigidior				x
Eragrostis rotifer				
Eragrostis trichophora	x		x	
Eragrostis truncata				
Fingerhuthia africana	x			
Heteropogon contortus	x		x	
Melinis repens	x		x	x
Pogonarthria squarrosa	x		x	
Schmidtia kalahariensis	x			
Schmidtia pappophoroides	x		x	
Setaria verticillata	x			
Sporobolus fimbriatus				
Stipagrostis obtusa	x		x	
Stipagrostis uniplumis	x		x	
Themeda triandra	x		x	
Tragus racemosus	x		x	
Typha capensis				
Urochloa panicoides	x	x	x	
SUCCULENT SPECIES				
**Opuntia ficus-indica*	x		x	x
Aloe cf. *grandidentata*			x	
Kalanchoe cf. *brachyloba*				
***Kalanchoe rotundifolia* (NCNCA)**	x			
Kleinia longiflora	x		x	
Mestoklema tuberosum			x	
Viscum rotundifolium	x		v	