SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

FOR THE PROPOSED DEVELOPMENTS SITUATED ON RIVERSIDE VIEW EXTENSION 126, GAUTENG PROVINCE.

Part B: Terrestrial Biodiversity Specialist Assessment Report and Plant Species Compliance Statement

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DOCUMENT GUIDE

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Theme-Specific Requirements as per Government Notice No. 1150 Plant Theme – Low Sensitivity Protocol followed		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
1.	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "medium sensitivity" for plant species, must submit either a Plant Species Specialist Assessment Report or a Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4	**Part B:** Section 5 - A Plant Species Compliance Statement is compiled within this report.
1.2	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "low" sensitivity for plant species, must submit a Plant Species Compliance Statement.	**Part B:** Section 5 - A Plant Species Compliance Statement is compiled within this report.
1.3	Where the nature of the activity is expected to have an impact on species of conservation concern beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the area of assessment must include the project areas of influence, as determined.	Not applicable to this study. A Plant Species Compliance Statement is compiled within this report.
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 **Parts A and B**: Cover page
5.2	**The compliance statement must:**	
5.2.1	Be applicable within the study area;	**Part B:** Section 1 & 2
5.2.2	Confirm that the study area is of "low" sensitivity for terrestrial plant species;	**Part A:** Section 4 (site verification report) **Part B:** Section 5
5.2.3	Indicate whether or not the proposed development will have any impact on SCC.	**Part B:** Section 5
5.3	**The compliance statement 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 1 & 2
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 A**: Appendix D **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 5
5.3.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data;	**Part B:** Section 1

Theme-Specific Requirements as per Government Notice No. 1150 Plant Theme – Low Sensitivity Protocol followed		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
5.3.7	The mean density of observations/ number of samples sites per unit area;	**Part B:** Section 2
5.3.8	Any conditions to which the compliance statement is subjected.	**Part B:** Section 5
	A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	

ACRONYMS

AIP	Alien and Invasive Plant
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries, and the Environment
EIS	Ecological Importance and Sensitivity
EN	Endangered
EOO	Extent of Occurrence
ESA	Ecological Support Area
FI	Functional Integrity
GBIF	Global Biodiversity Facility
GDARDE	Gauteng Department: Agriculture, Rural Development and Environment
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	hectares
LC	Least Concern
m	metres
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFA	National Forest Act, 1998 (Act No. 84 of 1998)
NT	Near threatened
NWA	National Water Act, 1998 (Act No. 36 of 1998), as amended
PES	Present Ecological State
POC	Probability of Occurrence
PPE	Personal Protective Equipment
RDL	Red Data Listed
RLE	Red List of Ecosystems
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
STS	Scientific Terrestrial Services (Pty) Ltd
TNCO	Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983)
TOPS	Threatened or Protected Species
VU	Vulnerable

GLOSSARY OF TERMS

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Baseline (IEM Series: DEAT, 2004)	Conditions that currently exist. Also called "existing conditions".
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, 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.
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.
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); after Low and Rebelo (1998))	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.
Critical Biodiversity Areas (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.
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
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critically Endangered (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.

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.
Development footprint (National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA))	"In respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity."
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	"*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 the 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 Support Areas (ESA: Skowno et al., 2019)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Endangered (EN), i.e., 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)	A species that is naturally restricted to a particular, well-defined region, i.e., 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.
Ground·Truth	To check the accuracy of (remotely sensed data) through in-situ observations.
Habitat (NEMBA)	A place where a species or ecological community naturally occurs.
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 the previous definition would only be indigenous to the Western Cape.
Indigenous vegetation (NEMA) - compare with "endemic" and "native"	Vegetation that occurs naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	"An ecosystem is generally understood to have integrity when its dominant ecological characteristics (e.g., elements of composition, structure, function, and ecological processes) occur within their natural ranges of variation and can

	withstand and recover from most perturbations" (CBD/SBSTTA/24/3/Add.2/Rev.1, para. 18). Indicators of ecosystem integrity may include the "structure, function and composition of an ecosystem relative to the preindustrial range of variation of these characteristics" (Hansen et al., 2021).
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 alien species	All alien species that are regulated in South Africa under the NEMBA: Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species	A species that is within its known natural range, and occurs naturally in a given area or habitat, as opposed to an introduced species or invasive species.
Primary grasslands (SANBI, 2013)	Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristics.
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 kilometres (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.
Secondary grasslands (SANBI, 2013)	Secondary grasslands are those that have undergone irreversible modification from their original ecological state. Such grasslands may superficially have the appearance of primary grasslands, but differ markedly with respect to species composition, vegetation structure and ecological functioning.
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 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 Biodiversity Act 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 (Skowno et al., 2019)	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
Vulnerable (VU), i.e., 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 Vulnerable 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. (hereafter “STS”) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed development of the Riverside View Ext 126 near Kyalami within the Gauteng Province (Figure 2).

The proposed development comprises three areas (Area 1, Area 2, and Area 3) which hereafter are collectively referred to as the “**study area**”. Area 1 is approximately 2,32 hectares (ha) in size and is located 580 metres (m) east of the R511 roadway, 170 m north of Reddam House Helderfontein, while Area 2 is approximately 7,32 ha and is located 1,5 kilometres (km) northwest of the M71 motorway and 1,1 km east of the R511 roadway. Area 3 is approximately 4,83 ha in size and is located 1,36 km east of the R511 roadway and 1,6 km northwest of the M71 motorway. The surrounding landscape consists of a peri-urban area such as residential developments.

No footprint areas or layouts have been received at the time of the assessment however; the development of residential and commercial activities is envisioned. Therefore, taking the precautionary approach, it is assumed that the entire study area will be developed with mixed land use. Should the proposed activities and layout be developed post the submission of this report the impact assessment will have to be updated to reflect the proposed activities.

1.1 Scope of Work

This report aims to present a detailed account of the terrestrial biodiversity and plant species data (interchangeably referred to as the “floral assessment”) for the area of interest and to identify areas of increased ecological importance and sensitivity (EIS) from a botanical perspective, as well as the mapping of such areas, and to describe the present ecological state (PES) of the area of interest relating to the terrestrial biodiversity theme and the plant species theme of the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool").

The primary objective of this assessment is not to compile an exhaustive floral 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).

The terrestrial biodiversity and plant species report includes the following:

- A description of the various floral habitat types, communities, and the ecological state of such communities within the study area and a ranking of each habitat type based on conservation importance and ecological sensitivity;
- Inventories of floral species as encountered within the study area;
- Maps and discussions of sensitive landscapes associated with the study area such as indigenous forests, rocky ridges, wetlands and/or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- An assessment of Red Data Listed (RDL) floral species as well as an assessment of other floral SCC (such as nationally and provincially protected flora), including the potential for such species to occur within the study area; and
- Information and recommendations that will ensure the ongoing functioning of the ecosystem within the study area in a manner that supports local and regional conservation requirements, allows regional and national biodiversity targets to be met, and sustains the provision of ecological services in the local area.

1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The results of the floral assessment as presented in this report is confined to the study area. The immediate surroundings do not form part of this assessment but were 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. Nevertheless, given the experience of the specialist within the area, together with adequate coverage of the study area within an appropriate flowering season (see bullets below), the survey was deemed sufficient for drawing adequate conclusions regarding the ecological condition and sensitivity of the various habitats therein;
- The identities of some floral SCCs will not be disclosed in this report, although their potential occurrence within the study area was still evaluated. According to the best practice guideline accompanying the DFFE's screening tool and the Species Environmental Assessment Guidelines (SANBI, 2020), the names of sensitive species may not appear in any of the specialist reports that would be publicly available. Such species will be referred to as sensitive plants, with their threat status included;
- The floral assessment took place on 5 November 2025 (early summer season); according to the Species Environmental Assessment Guideline (SANBI 2020) this

period of assessment is in line with the optimal survey periods for grassland ecosystems, i.e., peak flowering time for grassland ecosystems is considered between October and April;

- The timing of the site assessment also coincides with the optimal time to survey floral SCC (triggered by the screening tool- Sensitive species 1248 and *Melolobium subspicatum*) as most of the floral SCC flower between November and December (Figure 1):

SANBI STATUS	January	February	March	April	May	June	July	August	September	October	November	December
Overlapping Flowering Seasons:	1	1	0	0	0	0	0	0	1	1	2	2

Figure 1: Optimal survey period based on flowering time of floral SCC.

- This report addresses Freshwater Ecosystems as defined by the previous Freshwater Ecological Assessment for the nearby Helderfontein Estate (STS 200036 (2020)). No new delineation work was undertaken as part of the current 2025 assessment, as the scope of this study is restricted to a botanical and ecological evaluation of the mapped habitats. Accordingly, features were assessed solely from a vegetation and ecological perspective. Aspects relating to freshwater ecosystem drivers and receptors—namely hydrology, geomorphology, water quality, and aquatic biota—as well as the formal determination of watercourse[1] status in terms of the National Water Act, 1998 (Act No. 36 of 1998), were not reassessed and should be verified by a suitably qualified freshwater ecologist (should the proponent or competent authorities deem it necessary).

[1] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:1) a river or spring, 2) a natural channel which water flows regularly or intermittently, 3) a wetland, dam, or lake into which, or from which, water flows, and 4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks.

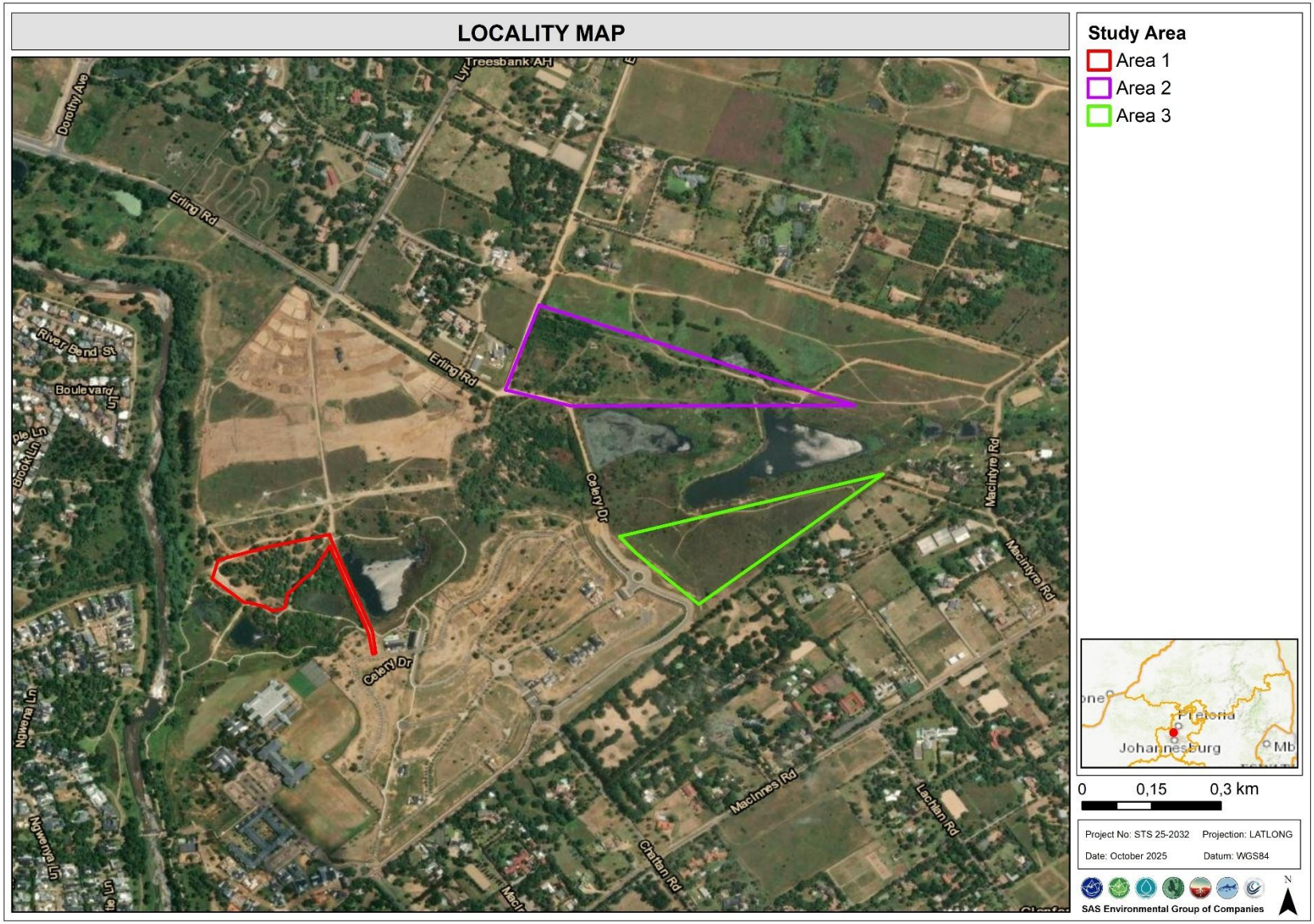

Figure 2: Location and extent of the study area in relation to the surrounding.

2 ASSESSMENT APPROACH

This section briefly outlines the assessment method employed for the botanical study. Further information regarding the approach adopted can be found in Appendix A of this report.

2.1 Reporting Protocol

The study area was identified as a medium sensitivity area for the Plant Species Theme according to the screening tool. Conversely, the study area was identified as a very high sensitivity area for the Terrestrial Biodiversity Theme. Following the November 2025 field assessment, the medium sensitivity for the Pant Species Theme was disputed and a low sensitivity instead verified (refer to Section 5). The very high sensitivity for the Terrestrial Biodiversity Theme was confirmed, owing to the presence of CBAs and ESAs (refer to Section 3.3).

Consequently, the reporting protocol for the Plant Species Theme adhered to the requirements of a Plant Species Compliance Statement, whereas the Terrestrial Biodiversity Theme adheres to the protocol for very high/high sensitivity and thus a Terrestrial Biodiversity Specialist Assessment was undertaken (please refer to the document guides in both Parts A and B).

For refined sensitivities, please refer to the Site Ecological Importance (SEI) breakdown in Section 4 of this report.

2.2 General Approach

Before conducting the field assessment, a desktop study was performed to gather background information regarding the study area, including the surrounding areas (refer to **Part A**). This involved consulting maps, aerial photographs, and digital satellite images to determine broad habitats and potential sensitive areas. A literature review of the habitats, vegetation types, and distributions of floral species within and surrounding the study area was undertaken, while also considering the threat status of the ecosystem(s) in the study area. The conservation requirements and biodiversity goals, at national and provincial levels, of the biodiversity features associated with the study area were also considered.

Following the desktop assessment and literature review, a field assessment was undertaken to confirm the presence of potentially sensitive habitats and to compile floral species inventories for each habitat type identified within the study area. The developed species lists include potential floral SCC and alien floral species.

2.3 Sampling Effort

The floral assessment took place on the 5th of November 2025. As above-mentioned, the floral assessment occurred during an optimal time for SCC detection and involved a site assessment carried out by a botanist registered with the South African Council for Natural Scientific Professions (SACNASP). The botanical specialist walked several meanderings during the field assessment, surveying various plant species and recording the habitat conditions.

2.4 Definitions, descriptions, and taxon nomenclature

Scientific nomenclature for plant species in this report follows that of the Red List of South African Plants[2] (http://redlist.sanbi.org/index.php) and the South African National Biodiversity Institute (SANBI) Biodiversity Advisor[3] (https://biodiversityadvisor.sanbi.org/). This largely follows the nomenclature of the World Flora Online (WFO) Plant List[4] (https://wfoplantlist.org/), however, some names differ between the WFO and the Red List of South African Plants. For alien (or exotic) species, the definitions of Richardson et al. (2011) are used. The description of vegetation structure broadly followed guidelines from Edwards (1983) (refer to **Appendix A: Figure A1**).

2.5 Sensitivity Mapping

All the botanical features (different vegetation and habitat types, as well as specific plant species distributions, where deemed necessary) within the study area were considered. Areas of increased sensitivity and conservation value were delineated using a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery, and the sensitivity thereof was mapped. The various habitat types were assigned SEI categories (SANBI, 2020) based on their functional integrity, conservation value,

[2] The Threatened Species Program is one of the continent's largest collaborative conservation projects to date. South Africa has become the first megadiverse country to fully assess the status of its entire flora. The Red List of South African Plants Online provides up-to-date information on the national conservation status of South Africa's indigenous plants.

[3] Open access to South Africa's biodiversity data:
- Occurrence records: 2 120 409
- Animal and plant checklists: 3
- Data partners: 17
- Image records: 194 863
- Species of plants, animals and fungi: 85 878
- Planning and ecosystem assessment spatial layers: 551

[4] The standardisation and cataloguing of plant names are critical in various fields of biology, including biodiversity, biogeography, and vegetation research. The WFO Plant List is the most comprehensive and authoritative list of the world's plants, maintained by the global community of taxonomic experts as a free and open-access resource.

the presence of SCCs and their resilience to disturbances. Refer to **Appendix A** for a breakdown of the SEI methodology.

2.6 Species of Conservation Concern (SCC) Assessment

An assessment of the presence of any floral SCCs, as well as suitable habitat to support any such species, was undertaken. As part of the SCC assessment, the following classes were considered (Box 1 - 3):

BOX 1: 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), and 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 considered RDL species; however, are still considered to be of increased conservation importance and are thus also included in the threatened species assessments. Removal, translocation, and/or destruction of these species require authorisation from, and consultation with, the DFFE.

In addition to species triggered by the screening tool, site-specific and QDS-specific Red Listed floral species were provided to STS by the Gauteng Department: Agriculture, Rural Development and Environment (GDARDE).

BOX 2: NATIONALLY PROTECTED SPECIES

Protected species in terms of the NEMBA TOPS Regulations (GN R152 of 2007, as amended), i.e., species that have a least concern (LC) threat status but are still protected under the TOPS regulations. The List of Protected Tree Species (GN 1935) 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.

BOX 3: PROVINCIALLY PROTECTED SPECIES

Species that are deemed important from a provincial biodiversity perspective include, e.g., species listed in the Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO) includes provincially protected plants under Schedule 11 (Protected Plants) and Schedule 12 (Specially Protected Species). Permits for removing, harming, or destroying species on the TNCO list will require permits from the GDARDE.

To generate a list of potentially occurring SCCs (both threatened and protected) for the study area (a necessary step before undertaking the field assessment), several approaches were used, namely the screening tool, iNaturalist, and various national and provincial legislation as per Box 1 above. A Probability of Occurrence (POC) assessment forms part of the floral assessment and a POC score is thus determined and assigned to SCCs that are located in, or have the potential to be located within, the study area. This POC score thus indicates the likelihood that a species would be present within the study area, and for each potential floral SCC for the study area, the POC is described below:

- “Confirmed’: if observed during the survey;
- “High”: if within the species’ known distribution range and suitable habitat is available;

- "Medium": if either within the known distribution range of the species or if suitable habitat is present; or
- "Low": if the habitat is not suitable and falls outside the distribution range of the species.

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

3 RESULTS OF THE PLANT SPECIES ASSESSMENT

This section provides a description and discussion of the baseline data collected during the floral site assessment.

3.1 Existing Impacts and Ecological Overview

Across the study area, the three focal areas have experienced differing degrees of disturbance and transformation over time.

Despite the absence of obvious large-scale disturbance, the current floral composition indicates that **Area 1** have experienced a long history of degradation. The vegetation community is notably altered and is now dominated largely by Alien and Invasive Plant (AIP) species, suggesting prolonged, cumulative disturbance over time. Between 2004 and 2023, a gradual increase in pressure is evident, largely associated with surrounding development. Since 2015, expanding construction activities in the vicinity (especially the Helderfontein Estate to the north) have resulted in additional disturbance, including edge effect disturbance (I.e., AIP proliferation and habitat fragmentation).

Area 2 has also undergone the continual modification and transformation. Imagery from 2004 indicates relatively limited disturbance, but by 2008 large portions of the area had been cleared and subsequently used as a dumping site for construction waste and general rubble. By 2015, sections along the northern boundary had been cultivated, while the remainder continued to receive informal dumping. Imagery from 2021 suggests that fire still occurs within this area, albeit with an altered fire regime (i.e., largely unnatural) (SANBI, 2013). By 2023, there is a marked increase in woody species cover (*Acacia dealbata, Eucalyptus camaldulensis and Melia azedarach*), particularly along previously disturbed zones, when compared to 2004.

Area 3 has been subject to moderate edge effects and localised disturbance from surrounding developments. Over the years, the area has been intersected by several access roads, and more recently, with the development of an estate to the west, parts of which have been cleared

and became proliferated with AIP species. Although the northern portions of Area 3 remain somewhat natural (although degraded), the area is situated within an urban matrix, with built-up areas bordering the south and west. These cumulative pressures have progressively reduced ecological integrity and connectivity, resulting in fragmentation of the remaining habitats within the landscape.

Figure 3 presents the satellite imagery (Google Earth) illustrating temporal changes across the study area and the three focus areas described above.

Figure 3: Signs of disturbances within the study area, including Areas 1 - 3.

2004

2008

2009

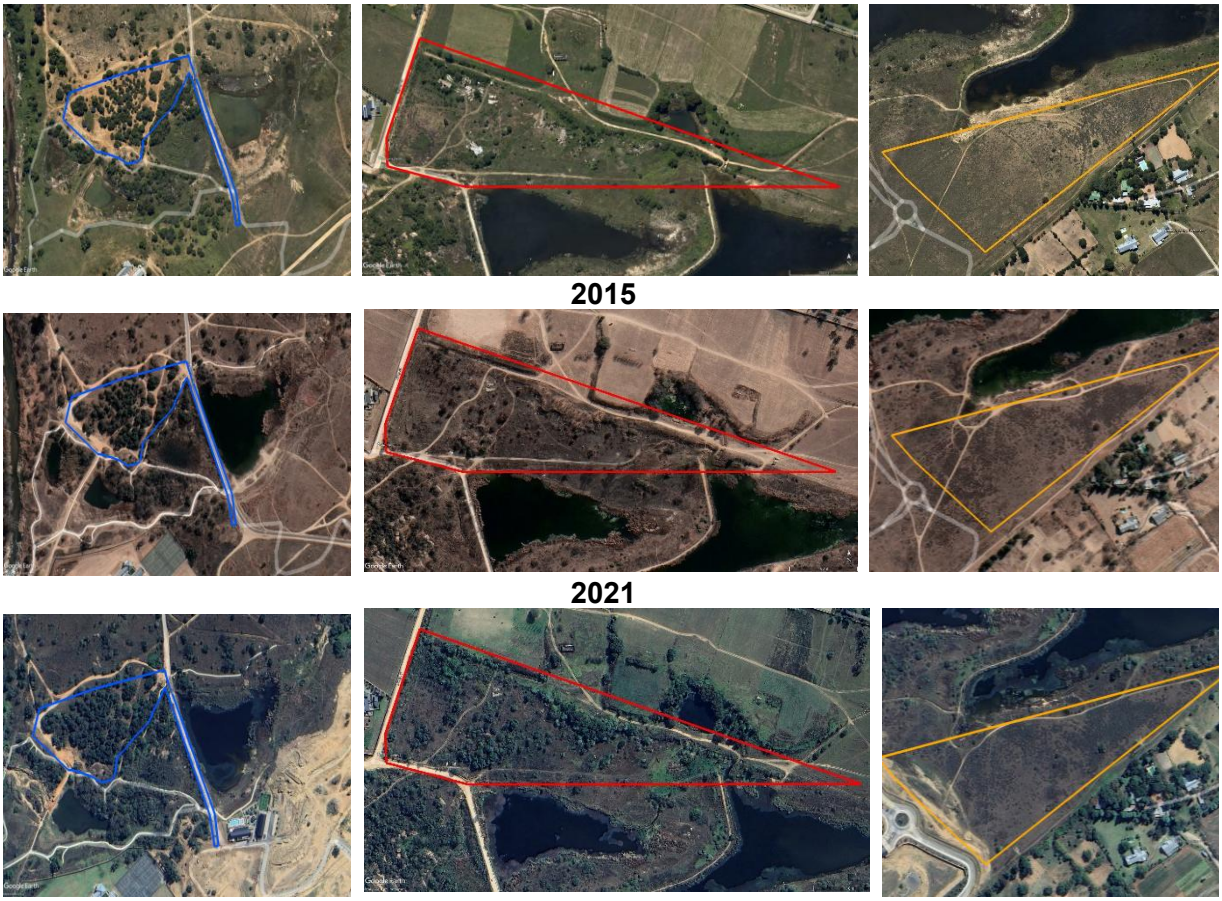

Figure 4: Historical images from 2004 till 2023 indicating changes in land use within the study area.

More subtle impacts on the habitat within the study area include alterations to ecological processes and drivers in the landscape, such as habitat fragmentation, altered fire regimes, and grazing pressures:

- **Fragmentation**: The study area is still considered a to support a relatively large patch of indigenous vegetation as per NEMA definition[5]. However, the study area is isolated and surrounded by urban developments. The Grassland Ecosystem Guidelines (SANBI, 2013) identify habitat fragmentation as a major form of degradation in Mesic Highveld Grasslands (in which the study area is located), particularly where natural areas become isolated from source populations, leading to reduced species turnover and altered ecological processes. The only remaining corridor between habitats - to facilitate movement and connectivity - is the freshwater ecosystems in the vicinity of the study area. However, this habitat is also impacted by the surrounding

[5] **The NEMA definition of indigenous vegetation**:vegetation that occurs 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.

developments and anthropogenic impacts. The degree of fragmentation present aligns with SANBI's (2013) description of landscape-level modification that can shift primary grassland towards secondary structure due to disrupted fire, grazing and dispersal processes (in addition to actual habitat modification through transformation);

- **Grazing pressures**: The study area is situated in the Mesic Highveld Grassland bioregion, which includes ecosystems dependent on fire and grazing. Both fire and grazing are key drivers needed to sustain healthy grassland communities (SANBI, 2013); however, both these drivers have been modified within the study area. Grazing is mostly absent within the study area. Sign of historic grazing is (or perhaps overgrazing) is present within the study area with some areas being heavily encroached by *Seriphium plumosum.* SANBI (2013) notes that long-term absence of herbivory alters competitive dynamics within grassland vegetation, reducing forb richness and increasing dominance of disturbance-tolerant grasses and encroaching dwarf shrubs. Encroachment by *Seriphium plumosum* is frequently associated with suppressed grazing pressure combined with infrequent fire, both of which are listed by SANBI (2013) as key drivers of degradation in Mesic Highveld Grasslands; and
- **Altered fire regimes**: Google satellite imagery further indicates that fire frequency in and around the study area is rare, with no clear digital indicators of burning except for 2015. The Grassland Ecosystem Guideline (SANBI, 2013) recommends patch burning every two to three years to maintain diverse floral communities in Mesic Highveld Grasslands, a practice not fully upheld in the study area. The encroaching *Seriphium plumosum* and *Vachellia karoo* within the study area may also indicate fire suppression. Extended periods without fire allow moribund material to accumulate, reducing forb diversity and increasing the likelihood of woody encroachment, whereas overly frequent fires reduce resprouter persistence; both conditions alter community structure (Zimmermann et al., 2008; 2010).

Given that the study area has not been subjected to natural or sufficiently managed fire and herbivory regimes (which in turn affect the life-history strategies of species and thus overall species composition) for extended periods of time, it should be noted that three of the important ecological characteristics that define the grassland community - namely the fire regime, herbivory regime, and the resulting life-history strategies of plant species – have been significantly altered. These characteristics include: (i) an appropriate fire-return interval, which maintains structural heterogeneity; (ii) sustained herbivory by wild or domestic grazers, which regulates competitive dynamics and forb richness; and (iii) the life-history strategies of plant species (e.g., balance of resprouters and seeders), which shift in response to long-term

changes in fire and grazing patterns. Combined, these changes have altered the composition and functioning of the grassland community.

Given the definitions of primary[6] and secondary[7] grasslands, as defined by SANBI (2013), and the degree of change experienced in the fire and herbivory regimes and how this impacts species composition through life-history strategies, the vegetation communities within the study area was not defined as primary vegetation, but rather secondary vegetation. The study area has undergone a fundamental shift from its original state. The combination of altered fire and herbivory regimes has resulted in a species composition that is not truly representative of the original vegetation state. Although the study area may look like primary grassland, the long-term changes in fire and herbivory regimes have resulted in an altered species composition, vegetation structure, and thus ecological functioning of the study area.

Under the GDARD (2014) minimum requirements for biodiversity assessments, only primary or good-condition natural grassland must be mapped as sensitive; the altered ecological drivers and resulting secondary structure therefore mean that these areas do not qualify as primary or "good condition" vegetation.

3.2 Vegetation Types and Fine-Scale Habitats

As per SANBI (2024), the study area is characterised by a single (reference) vegetation type, namely the **Egoli Granite Grassland**. According to the 2022 Red List of Ecosystems (RLE) database (SANBI, 2022a; 2022b), most of the study area is located within the remaining extent of the Egoli Granite Grassland vegetation type, which has a CR threat status. At a broad landscape scale, the above-mentioned vegetation type was used as the reference state against which floral communities were compared to ascertain habitat integrity and deviance from, and/or similarity to, the expected state.

The floral communities identified during the site assessment are described in this report under four (4) broad[8] habitat units (Figures 4). The four broad habitat units were delineated based on vegetation structure and the dominant plant groups observed within the vegetation communities, as well as on habitat integrity and the ecological processes the habitats provide or support. The delineated habitat units thus included:

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[6] Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristic.

[7] Secondary grasslands are those that have undergone extensive modification and a fundamental shift from their original state (e.g., to cultivated areas) but have then been allowed to return to a 'grassland' state (e.g., when old, cultivated lands are re-colonised by a few grass species). Although secondary grasslands may superficially look like primary grasslands, they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver

[8] **Broad habitat categories** have been delineated and provide an indication of the main vegetation types associated with the MRA.

- **Secondary Grasslands;**
- **Alien Dominated Woodland;** Within the Alien Dominated Woodland there is a small portion of Rocky Area (e.g., outcrop) that is associated with this habitat.
- **Transformed Habitat; and**
- **Freshwater Ecosystems, which comprised of two subunits, namely:**
    - An anthropogenic dam; and
    - Eastern Unchanneled Valley Bottom Wetland.

Given the altered ecological drivers and the existing impacts within and surrounding the study area (Section 3.1), the vegetation of the study area, has shifted from its reference state and no longer displays indicators of healthy mesic grasslands. For example, the secondary grasslands had a low diversity of graminoid and geophyte species, and was mostly dominated by *Digitaria eriantha, Enneapogon scoparius, Eragrostis chloromelas*, *Hyparrhenia hirta* and *Melinis repens.* The secondary grassland also had a high abundance of AIPs.

The deviance of each vegetation type from its reference state, including the ecological condition of each of the habitat units, is further described and discussed in the dashboards below under Tables 1 – 4.

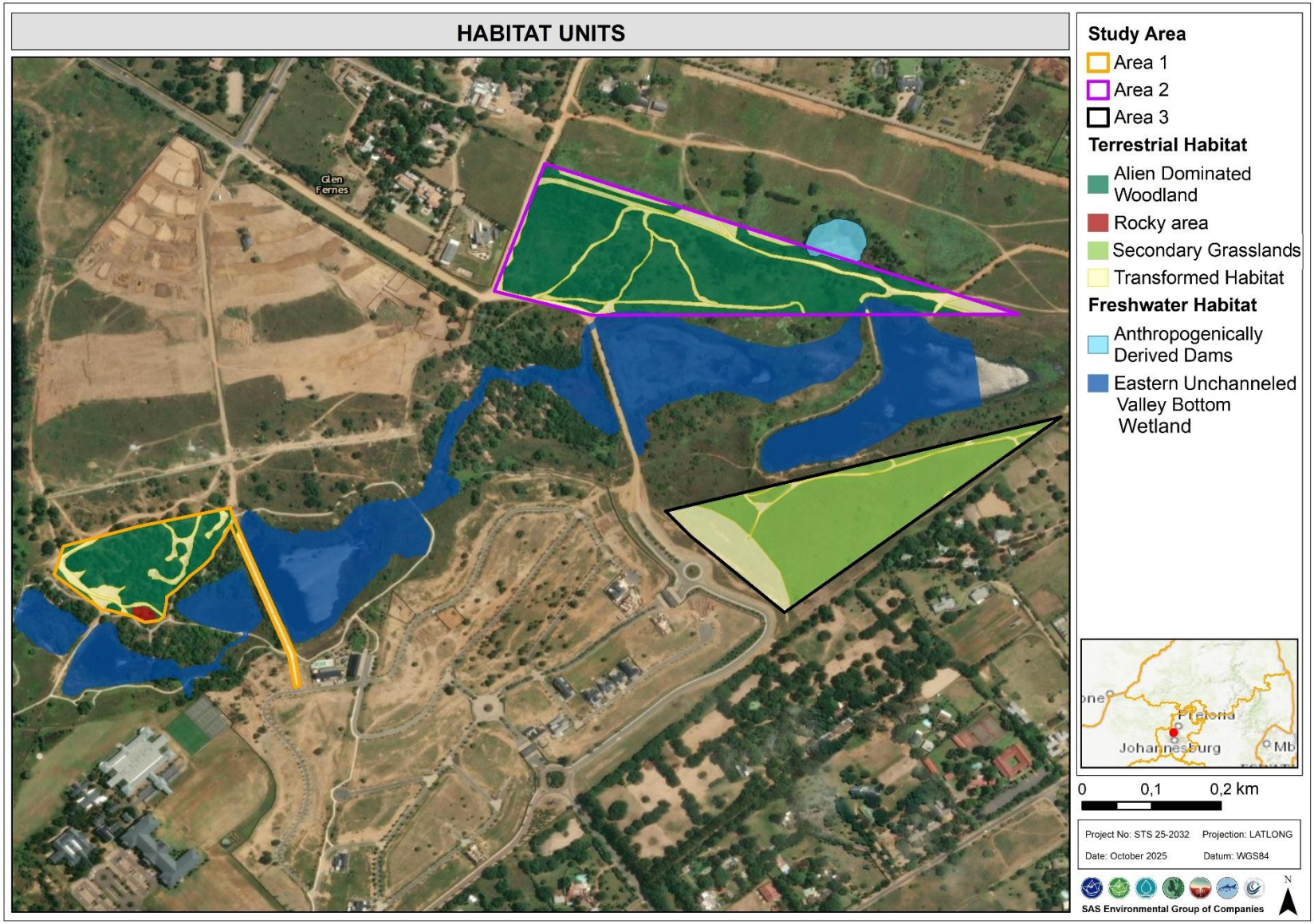


Figure 5: Conceptual illustration of the habitat units within the study area.

Table 1: Secondary Grassland.

HABITAT & SPECIES OVERVIEW
  
The Secondary Grasslands are restricted to Area 3 (approx. 3.7 ha) within the study area; the natural ecological drivers have been excluded and modified within this area. For example, the exclusion of fire and grazing is attributed to the location of this area being surrounded by urban development. The presence of encroaching *Seriphium plumosum* within some sections indicates, however, that disturbances of the habitat is not absent and this is hindering recovery to a healthy grassland state (refer especially to Section 3.1). Surrounding the areas recently cleared (for a residential development - in the west of Area 3) various AIPs have become abundant and have been able to encroach into the Secondary Grassland Habitat. Other indicators of historic disturbance (e.g., fragmentation) or degraded grassland are that some areas consisted of a dominance of grasses like *Cynodon dactylon, Digitaria eriantha, Eragrostis chloromelas* and *Hyparrhenia hirta*. The vegetation structure can be described as **short, open grassland** (as shown in Diagram A1 in Appendix A). The vegetation associated with the Secondary Grassland Habitat is however still considered indigenous vegetation (as per NEMA definition). The overall plant species diversity in this habitat falls short of what is anticipated for its reference state; the species composition of the Secondary Grassland habitat unit contains some floral species representative of the Egoli Granite Grassland vegetation type, but these species are also common species occurring throughout the grassland biome in many vegetation types and some are also an indication of disturbed veld, with the forbs and grasses present also commonly found in other highveld grassland types. These species have a broad distribution and can thrive in various habitat types. Examples of species observed in the Secondary Grassland include (refer also to Appendix B): ➢ AIP species: *Argemone ochroleuca* subsp. *ochroleuca, Campuloclinium macrocephalum, Cestrum parqui*, *Heliotropium amplexicaule, Lantana camara, Tipuana tipu, Richardia brasiliensis* and *Verbena bonariensis*; ➢ Forb component: *Chlorophytum cooperi, Commelina africana*, *Crinum graminicola, Cyanotis speciosa, Dipcadi viride, Erigeron bonariensis, Felicia muricata, Gazania krebsiana, Hilliardiella elaeagnoides* and *Kohautia amatymbica;* ➢ Graminoid component: *Cynodon dactylon, Digitaria eriantha, Enneapogon scoparius, Eragrostis chloromelas, Eragrostis gummiflua, Eragrostis lehmanniana, Hyparrhenia hirta* and *Melinis repens;* ➢ Succulent component: Only two species were identified namely *Aloe davyana* and *Delosperma herbeum*; and ➢ Woody component: *Gomphocarpus fruticosus, Pyracantha angustifolia*, *Searsia pyroides* and *Vachellia karoo*.

The Secondary Grassland are not considered to be representative of the reference vegetation type, although an affinity is shared therein in terms of structure ; however, the species composition of the habitat unit has been significantly modified from the reference vegetation type, especially with the apparent incidence of alien and invasive trees as well as a high prevalence of herbaceous species.

Considering and the altered composition of the habitat as well as observed indicators of disturbance, the Secondary Grassland is considered to be in an overall fair[9] ecological condition.

Example species, from left to right, observed within this habitat unit: *Lantana camara* (an AIP species), *Cestrum parqui* (an AIP species), *Gazania krebsiana, Heliotropium amplexicaule* (an AIP species), *Pelargonium luridum,* and *Verbena bonariensis* (an AIP species).

SPECIES OF CONSERVATION CONCERN	
Protected Species (refer also to Appendix C).	The Secondary Grassland are not important for populations of protected plant species. Although some TNCO-listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (TNCO-protected):** ➢ *Crinum* spp. (Status = LC. POC = **Confirmed**); ➢ *Scadoxus spp.* (Status = Species-specific. POC = Medium);

[9] 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.

	➢ *Gladiolus* spp. (Status = Species-specific. POC = Medium); ➢ *Eucomis* spp. (Status = Species-specific. POC = Medium); and ➢ Orchidaceae spp. (Status = Species-specific. POC = Medium).
Threatened species	None anticipated. Refer to Appendix C.

Table 2: Alien Dominated Woodland.

HABITAT & SPECIES OVERVIEW
  
Most of Area 1 and Area 2 consists of Alien Dominated Woodland vegetation (7.6 ha). The areas associated with Area 1 and large portions of Area 2 has been significantly modified by historic anthropogenic activities and currently comprises mostly AIP species. The vegetation in these areas have significantly changed from the reference vegetation type (i.e., Egoli Granite Grassland) and is no longer representative in term of vegetation structure or species composition. The vegetation structure can be described as **tall, closed woodlands** (as shown in Diagram A1 in Appendix A). While the habitat still has some native species present (see Appendix B) most of the vegetation consists of AIPs (see section 3.4).



Within the Alien Dominated Woodland Habitat there are some Rocky Areas (approx. 0.04 ha), while being impacted upon by the adjacent development (i.e., indiscriminate waste dumping) and clearing, the Rocky Areas have a lower woody cover and a higher abundance of smaller herbaceous and succulent species however the Rocky Areas are significantly impacted and isolated. The species composition of the Rocky Areas are very similar to the Alien Dominated Woodland with the exception of a few species that were particularly characteristic of the Rocky Areas namely (such as *Delosperma herbeum, Gomphocarpus fruticosus* and *Pellaea calomelanos*). The vegetation structure can be described as **tall, closed woodlands** (as shown in Diagram A1 in Appendix A). While the habitat still has some native species present (see Appendix B) most of the vegetation consists of AIPs (see section 3.4). This habitat is very small, isolated and severely fragmented by the historic and current development activities.

From a species perspective, the Alien Dominated Woodland Habitat and Rocky Areas has a low to moderate floral diversity. Examples of species observed in the Alien Dominated Woodland Habitat include (refer also to Appendix B):

- AIP species: *Agave americana, Agave sisalana, Argemone ochroleuca, Bidens pilosa, Cereus jamacaru, Delosperma herbeum, Gleditsia triacanthos, Heliotropium amplexicaule, Jacaranda mimosifolia, Lantana camara, Manihot grahamii, Melia azedarach, Morus alba, Opuntia ficus-indica, Populus alba, Richardia brasiliensis, Robinia pseudoacacia, Sesbania punicea, Solanum sisymbriifolium, Tipuana tipu* and *Verbena bonariensis;*
- Forb component: *Chascanum hederaceum, Commelina erecta, Convolvulus sagittatus, Cyanotis speciosa, Dipcadi viride, Hibiscus microcarpus, Hypoxis hemerocallidea, Hypoxis obtusa, Kohautia amatymbica, Leonotis nepetifolia, Plantago lanceolata* and *Scadoxus puniceus;*
- Graminoid component: *Digitaria eriantha, Melinis repens, Pogonarthria squarrosa, Setaria sphacelata var. torta* and *Tragus berteronianus*
- Succulent component: Among other AIPs only three native succulent species were identified *Aloe davyana, Crassula nodulose* and *Delosperma herbeum*; and
- Woody component: *Asparagus laricinus, Celtis Africana, Gomphocarpus fruticosus* and *Vachellia karoo.*

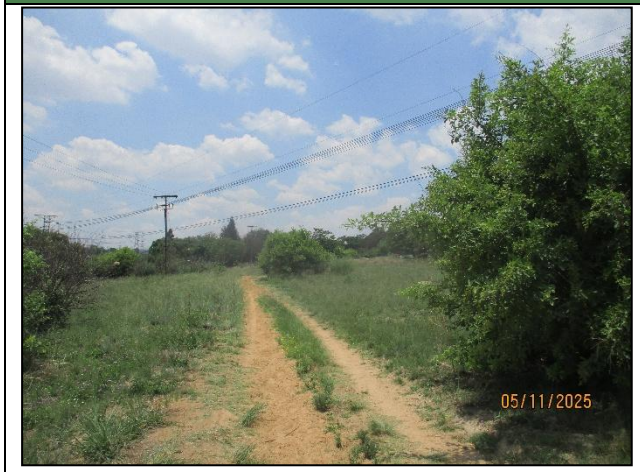
Considering evidence and indicators of disturbance in the Alien Dominated Woodland, the vegetation community associated with the Alien Dominated Woodland has an overall poor ecological condition[10].

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

Example species, from left to right, observed within this habitat unit: *Solanum sisymbriifolium* (an AIP species), *Hirschfeldia incana* (an AIP species), *Tagetes minuta* (an AIP species), *Melia azedarach* (an AIP species), *Dipcadi viride*, and *Opuntia ficus-indica* (an AIP species).

SPECIES OF CONSERVATION CONCERN	
Protected Species (refer also to Appendix C).	The Alien Dominated Woodland are not important for populations of protected plant species. Although some TNCO-listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (TNCO-protected):** ➢ *Scadoxus puniceus* (Status = LC. POC = **Confirmed**); ➢ *Gladiolus* spp. (Status = Species-specific. POC = Medium); ➢ *Orbea* spp. (Status = Species-specific. POC = Medium) – *specific to the Rocky Area*; and ➢ *Cussonia* spp. (Status = Species-specific. POC = Medium).
Threatened species	None anticipated. Refer to Appendix C.

Table 3: Transformed Habitat.

HABITAT & SPECIES OVERVIEW	
   The Transformed Habitat includes areas where all vegetation has been removed to erect buildings and roads, as well as areas that are significantly disturbed (approx. 2.86 ha). Although some of these areas are still vegetated, they do not accurately represent the reference vegetation type in terms of vegetation structure or species composition. Ultimately, the areas where grasslands have been significantly modified includes various weeds and common species prone to disturbance. The ecological condition of the Transformed Habitat is regarded as poor, encompassing areas that are severely or irreversibly modified, where both ecological function and structure have been compromised in composition. The vegetation within the Transformed Habitat is no longer considered to be indigenous (as per NEMA definition). From a species perspective, the Transformed Habitat is of low diversity and associated with species that are not representative of the reference state. Examples of species observed in the Transformed Habitat include (refer also to Appendix B): ➢ AIP species: *Bidens pilosa, Glandularia aristigera, Tagetes minuta,* and *Taraxacum officinale*; ➢ Forb component: *Conyza bonariensis, Hilliardiella elaeagnoides, Plantago lanceolata* and Scabiosa *columbaria*; ➢ Graminoid component: *Cynodon dactylon, Melinis repens,* and *Hyparrhenia hirta*; ➢ Succulent component: None, and none anticipated for this habitat; and ➢ Woody component: *Vachellia karroo*.	
SPECIES OF CONSERVATION CONCERN	
Protected Species (refer also to Appendix C).	The Transformed Habitat are not important for populations of protected plant species. Although some TNCO-listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present.

	Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022): ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (TNCO-protected):** ➢ None were recorded and none were anticipated to be present.
Threatened species	None anticipated. Refer to Appendix C.

Table 4: Freshwater Ecosystems.

HABITAT & SPECIES OVERVIEW
  
Within the study area, specifically Area 2 an Eastern Unchanneled Valley Bottom Wetland (left and middle photograph) and Anthropogenic derived dam (right photographs) is located, the extent of these features is 0,16 and 0,03 ha respectfully. The Freshwater report (STS 200036. 2020) identified the Eastern Unchanneled Valley Bottom Wetland is a **PES Category: E (Seriously Modified).** The Eastern Unchanneled Valley Bottom Wetland system has historically been extensively altered, primarily by means of impounding sections to store water, as well as the construction of gravel roads in several places along the length of the system, thus altering the natural geomorphological processes and impacting on hydraulic connectivity. The impoundments in turn have resulted in the loss of vegetation, although the floral community appeared to be fairly resilient and has adapted to the changes over time. Nevertheless, alien invasive flora has encroached in some areas of the system and this encroachment is likely to intensify as a result of disturbances relating to the rapid urbanisation of the surrounding area. The Eastern Unchanneled Valley Bottom Wetland system is predominantly vegetated by (native) *Typha capensis.* The Eastern Unchanneled Valley Bottom Wetland system is characterised as a watercourse (based on the NWA definition[11]) whereas the Anthropogenically derived dam is not defined as a watercourse by STS freshwater specialist (STS 200036. 2020). Considering the current condition of the Eastern Unchanneled Valley Bottom Wetland the overall ecological condition is fair. The Anthropogenically derived dam is considered to be in a poor ecological condition based on the predominantly AIP vegetated. From a species perspective, the Freshwater Ecosystems is of low diversity and associated with species that are not representative of the reference state. Examples of species observed in the Freshwater Ecosystems include (refer also to Appendix B):

[11] In terms of the definition contained within the National Water Act, 1998 (Act 36 of 1998) a watercourse means:
- 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

- AIP species: Pontederia *crassipes, Arundo donax, Argemone ochroleuca, Potentilla indica, Richardia brasiliensis*, *Rumex crispus*, *Crotalaria agatiflora, Eucaluptus camaldulensis, Populus alba, Salix babylonica, Sesbania punicea* and *Tipuana tipu;*
- Forb component: *Cycnium tubulosum, Hypoxis argentea, Iris pseudacorus, Lobelia flaccida, Nemesia fruticans* and *Pelargonium luridum;*
- Graminoid component: *Hyparrhenia hirta, Imperata cylindrica*, *Phragmites australis, Schoenoplectus muricinux* and *Typha capensis;*
- Succulent component: None, and none anticipated for this habitat given the increased moisture levels therein; and
- Woody component: *Asparagus laricinus*.

The vegetation structure of the Eastern Unchanneled Valley Bottom Wetland is described as **tall, closed grasslands** and the Anthropogenic derived dams vegetation can be described as **tall, closed woodlands (**as shown in Diagram A1 in Appendix A).

Example species, from left to right, observed within this habitat unit: *Pontederia crassipes* (an AIP species), *Lobelia flaccida, Oenothera rosea* (an AIP species), *Iris pseudacorus*, *Sesbania punicea* (an AIP species), and *Pelargonium luridum*.

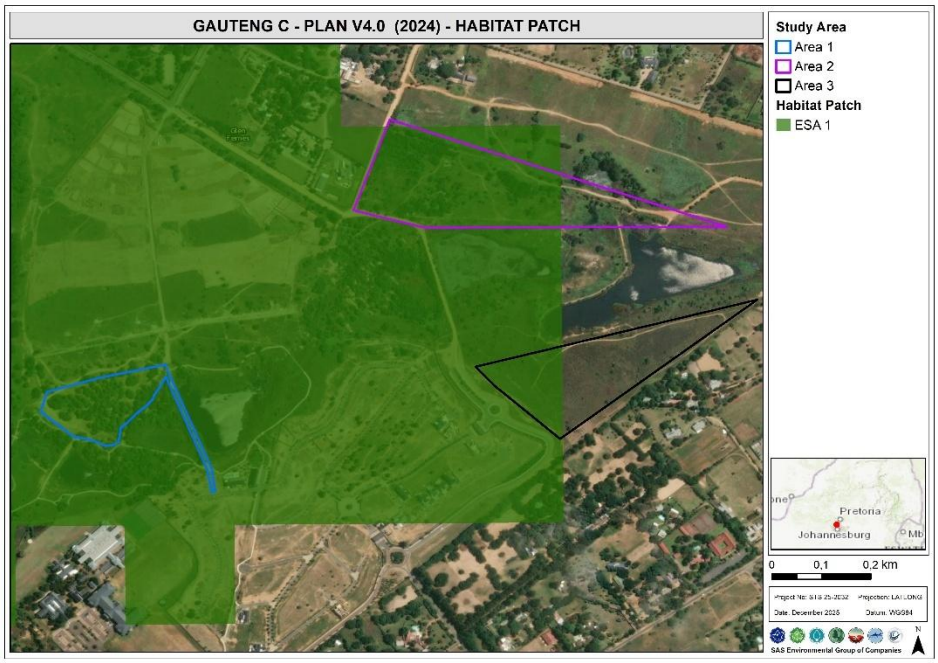
SPECIES OF CONSERVATION CONCERN	
Protected Species (refer also to Appendix C).	The Freshwater Ecosystems are not important for populations of protected plant species. Although some TNCO-listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present**.** **Specially Protected and Protected Species (TNCO-protected):** ➢ *Crinum* spp. (Status = LC. POC = Medium); ➢ Orchidaceae spp. (Status = Species-specific. POC = Medium); ➢ *Kniphofia* spp. (Status = Species-specific. POC = Medium); ➢ *Zantedeschia* spp. (Status = Species-specific. POC = Medium); and ➢ *Eucomis* spp. (Status = Species-specific. POC = Medium).
Threatened species	None anticipated. Refer to Appendix C.

3.3 Biodiversity Priority Areas12/ Conservation Significance

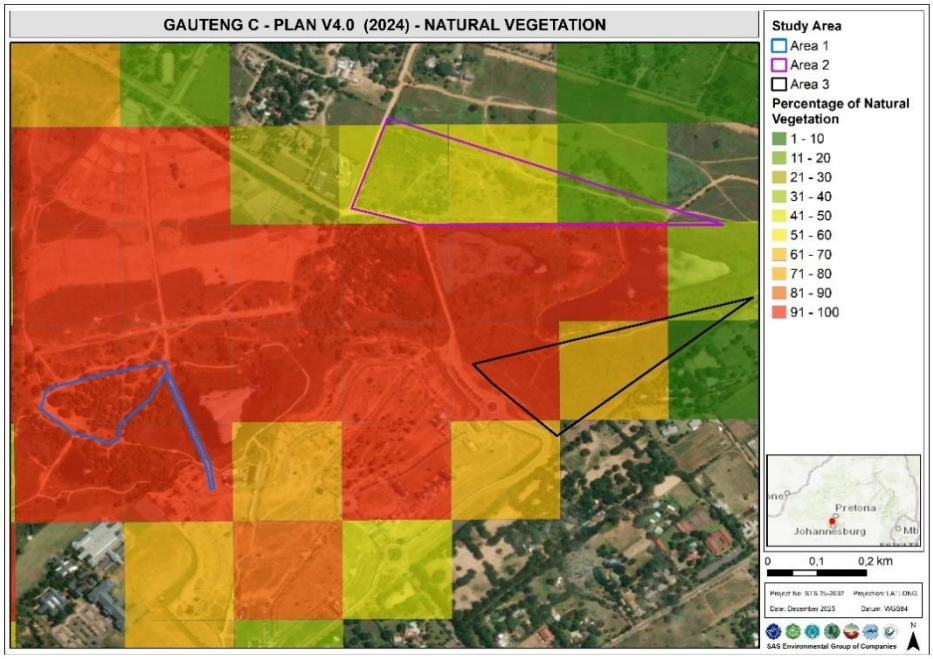
The biodiversity importance and the conservation significance of the study area is largely determined based on the triggering features identified in the screening tool (Terrestrial Biodiversity Theme), as well as additional provincial and national datasets as presented in Part A. The conservation features and their relation to the habitat units identified for the study area are presented in the table below.

Table 5 provides a breakdown of the biodiversity importance associated with the various habitat units.

Table 5: Biodiversity Priority Areas / Conservation Significance.

CBA 1	The entire study area is located within an area considered to be of Irreplaceable critical biodiversity importance, most notably a **CBA 1: Irreplaceable Site (Figure 6).** The triggering features of the CBA 1 include the presence of wetland life zones, habitat patch vegetation, as well as natural and secondary natural vegetation (Figure 6). However, based on the triggered and thresholds for habitat Life Zone, Natural and secondary natural vegetation and Habitat Patch where areas are confirmed as secondary habitat the area is regarded as an Ecological Support Areas (ESA) 1 rather than CBA 1 (Desmet et al., 2024) (Figure 7). Therefore, the western portion of Area 2, entire extent of Area 1 and the centre of Area 3 is considered ESA 1 habitat corresponding to areas of the Secondary Grassland Habitat, Alien Dominated Woodland and Freshwater Ecosystems.  **Figure 6: Categories within the Gauteng C-Plan (2024) specifically the trigger for Habitat Patch.**

[12] Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered and Endangered ecosystems, Critical Biodiversity Areas and Ecological Support Areas, Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, study areas for land-based protected area expansion, and study areas for offshore protection.

	 **Figure 7: Categories within the Gauteng C-Plan (2024) specifically the trigger for Natural and Secondary Habitat.**
NPAES	According to the NPAES 2018 database, the study area is located within a **Priority Focus Area**, especially Assessment Area 1 and 3. However, the areas associated with the Priority Focus Area is significantly fragmented and modified and therefore is not considered viable sites for protected.
CR Egoli Granite Grassland	According to the 2022 RLE, the majority of the southwestern portion of the study area (and the entire Area 3) is located within the remaining extent of the **Egoli Granite Grassland** threatened ecosystem**.** However, based on the site conditions verified within the study area, none of the habitat units within the study area are considered fully representative of the reference vegetation type – especially given the deviation in species composition and overall vegetation structure as a result of historic and current anthropogenic activities. The predominance of AIPs and common occurring species (which are often associated with poor land management and habitat degradation) the secondary grassland habitat is not considered a representative of the Egoli Granite Grassland.

3.4 Alien and Invasive Plant (AIP) Species

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

[13] Government Notice (GN) 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).

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).

3.4.1 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 September 2020. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

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

Duty of Care, or responsibilities, regarding listed invasive species are mentioned in Section 73 of NEMBA[14]. Both environmental and economic considerations drive the motivation for this duty of care. The management of alien species in South Africa is estimated to cost at least ZAR 2 billion (approximately US$142 million) annually, which is the amount currently allocated by the national government's DFFE, specifically the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will ultimately reduce clearing costs.

[14] 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.

3.4.2 Site Results

The study area is characterised by a moderate to high diversity of AIPs; the Alien Dominated Woodland is associated with the highest abundance of AIPs specifically.

In total, 43 AIPs were recorded during the 2025 site assessment, of which 18 species are not currently listed. Species like *Bidens pilosa, Tagetes minuta,* and *Verbena aristigera* are not listed on the NEMBA list of invasive species, but these species tend to become problematic and proliferate in areas where there are increased disturbances. There is a risk that these problem plants may negatively impact indigenous species if not controlled. The remaining 25 species are NEMBA listed species with 19 Category 1b, four Category 2 and two Category 3 NEMBA species.

Refer to Table 6 below for more information on the AIPs recorded within the various habitat units.

Table 6: Alien and invasive alien species recorded in the study area.

Scientific name	Common Name	Origin	NEMBA Status	Secondary Grasslands	Alien Dominated Woodland	Freshwater Ecosystems
Acacia dealbata	Silver Wattle	New South Wales, Victoria, Tasmania and the Australian Capital Territory	2		x	
Acacia podalyriifolia	Queensland Silver Wattle	Australia	1b		x	
Agave americana	American Century Plant	Arid Chihuahua desert and the southwest United States	Not Listed		x	
Agave sisalana	Sisal	Mexico	2		x	
Amaranthus hybridus	Smooth pigweed	Eastern United States	Not Listed			x
Argemone ochroleuca subp. *ochroleuca*	Mexican Poppy	Mexico	1b	x	x	x
Arundo donax	Giant Reed	Eastern and southern Asia	1b			x
Bidens pilosa	Black jack	Cosmopolitan weed native to South and Central America	Not Listed	x	x	
Campuloclinium macrocephalum	Pompom Weed	Native to South America (Argentina and Brazil), Central America and Mexico	1b	x		
Cereus jamacaru	Queen-of-the-Night	Central and eastern Brazil	1b		x	
Cestrum parqui	Green Cestrum	Chile	1b	x		
Crotalaria agatiflora	Canary Bird Bush	Native to Tropical East Africa and North-East Africa	1b			x
Conyza bonariensis	Flax-leaved Horseweed	Central America or South America	Not Listed	x	x	x
Eucaluptus camaldulensis	Red River Gum	Southeastern Australia	1b			x
Gleditsia triacanthos	Honey Locust	Central North America	1b		x	
Gomphrena celosioides	Batchelor's Button	Native to Argentina, Bolivia, Brazil, Ecuador, Paraguay and Uruguay	Not Listed	x		
Heliotropium amplexicaule	Fragrant Heliotrope	South America, especially Argentina	Not Listed		x	
Hirschfeldia incana	Shortpod Mustard	Mediterranean Basin	Not Listed	x	x	
Jacaranda mimosifolia	Jacaranda	Argentina and Brazil	1b		x	
Lantana camara	Common Lantana	Central and South America	1b	x	x	
Manihot grahamii	Hardy Tapioca	Northern and Southern America	Not Listed		x	

Scientific name	Common Name	Origin	NEMBA Status	Secondary Grasslands	Alien Dominated Woodland	Freshwater Ecosystems
Melia azedarach	Chinaberry	Native to China, Japan, the Indian sub-continent	1b		x	
Morus alba	White Mulberry	China	3		x	
Oenothera rosea	Rose Evening Primrose	South America	Not Listed			x
Opuntia ficus-indica	Prickly Pear	Mexico	1b		x	
Physalis viscosa	Gooseberry	South America	Not Listed		x	
Pinus patula	Cluster pine	Mexico	2			x
Populus alba	White Poplar	Central and southern Europe and Central Asia	2		x	x
Potentilla indica	Mock Strawberry	Native to the Indian Sub-continent	Not Listed			x
Pyracantha angustifolia	Narrowleaf Firethorn	South-western China	1b	x		
Richardia brasiliensis	Tropical Mexican Clover	South America	Not Listed	x		
Robinia pseudoacacia	Black Locust	Southeastern United States	1b		x	
Rumex crispus	Curled Dock	Europe and Western Asia	Not Listed			x
Salix babylonica	Weeping willow	Native to dry areas of northern China, Korea, Mongolia, Japan, and Siberia	Not Listed			x
Sesbania punicea	Scarlet Sesbane	South America	1b		x	x
Solanum mauritianum	Bugweed	South America, including Northern Argentina, Southern Brazil, Paraguay and Uruguay	1b		x	
Solanum sisymbriifolium	Red Buffalo-Bur	Native to dry regions of South America, from Ecuador to Argentina	1b		x	
Sonchus oleraceus	Common Sow-Thistle	Europe and Western Asia	Not Listed	x	x	x
Tagetes minuta	Wild marigold	South and North America	Not Listed	x	x	
Taraxacum officinale	Dandelion	Eurasia	Not Listed	x	x	
Tipuana tipu	Pride of Bolivia	South America	3	x	x	x
Verbena aristigera	South American Mock Vervain	South America	Not Listed	x	x	
Verbena bonariensis	Purpletop Vervain	South America	1b	x	x	x

3.5 Medicinal Plant Species

Within developing countries, plants provide people with fuel, food, medicines and material for construction and craft purposes. Having a knowledge of which plant species are useful for different aspects of everyday life thus has an important role to play in the daily lives of thousands of people across South Africa. Such knowledge, hereafter “traditional knowledge” is important for two main reasons: i) it plays a role in retaining cultural identity, and ii) it aims to achieve unattainable natural resource management (Maroyi, 2017).

Medicinal plant species are not necessarily restricted to indigenous species only; many medicinally important species within South Africa are regarded as AIPs. The medicinal species identified for the study area are all generally commonly occurring species and are not necessarily confined solely to the study area. The table below (Table 7) presents a list of plant species with traditional medicinal value as well as the plant parts traditionally used, and the main applications used thereof.

Table 7: Dominant traditional medicinal floral species identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn, Gericke, 2009). Alien species indicated with an asterisk (*).

Species name	Common name	Plant parts used	Medicinal uses
**Agave americana*	Spreading century-plant	Leaves	Mucosal inflammation; digestive disorders; base for pulque and tequila; fibres.
**Agave sisalana*	Sisal hemp, Sisal	Leaves	Mucosal inflammation; digestive disorders; base for pulque and tequila; fibres.
Asparagus sp.	Wild asparagus	The rhizomes and fleshy roots (less often also the aerial parts)	Treatment of tuberculosis, kidney ailments and rheumatism. *A. suaveolens* part of a remedy used for epilepsy. *A. racemosus* important in Ayurvedic medicine for treating dyspepsia, nervous conditions, and other ailments. In Europe *A. officinalis* is a traditional diuretic used for urinary tract infections
Elephantorrhiza elephantina	Elandsbean	Underground rhizomes, commonly referred to as roots, are used	Traditional remedy for a wide range of ailments, including diarrhoea and dysentery, stomach disorders, haemorrhoids and perforated peptic ulcers, and as emetics. It is popular for the treatment of skin diseases and acne.
**Melia azederach*	Syringa	Leaves, roots, bark, seeds, fruit	An aqueous extract reduces the intensity of asthmatic attacks. The leaf juice is anthelmintic, antilithic, diuretic and emmenagogue. A decoction is astringent and stomachic. A decoction is used to treat diarrhoea. The leaves are used externally to treat skin conditions such as scabies and itch. A decoction is used as a gargle to treat tooth problems and strengthen the gums. The leaves are harvested during the growing season and can be used fresh or dried. The flowers and leaves are applied as a poultice in the treatment of neuralgia and nervous headache. The stem bark is anthelmintic, astringent, and bitter tonic. It is used as a tonic in India. It can be harvested at any time of the year and is used fresh or dried. The root bark is emetic, emmenagogue, purgative and vermifuge. It is highly effective against ringworm and other parasitic skin diseases. It can be harvested at any time of the year and is used fresh or dried. The fruit is antiseptic and febrifuge. The pulp is used as a vermifuge. The fruit is harvested in the autumn when it is fully ripe and can be used fresh or dried. The seed is antirheumatic. It is used externally. A gum that exudes from the tree is considered by some to have aphrodisiac properties]. Excess causes diarrhoea, vomiting and symptoms of narcotic poisoning.
**Morus alba*	White mulberry, Silkworm mulberry	Leaves, fruit and bark	Food for silkworms; expectorant; colds.
**Opuntia ficus-indica*	Prickly pear	Flowers and fruit	Astringent; haemostyptic; intestinal disorders
Pallaea calomelanos	Hard fern	Leaves and rhizomes	Burnt leaves are smoked for headaches, chest colds, asthma and head colds. Decoctions of rhizomes are traditionally used to treat boils, mouth or nasal ulcers and intestinal parasites. Boiled roots and rhizomes are used as poultices for abscesses, while milk decoctions of rhizomes are administered to frightened children at night and for internal sores. Tea made from this species was an early Cape remedy for colds and chest ailments.
Plantago lanceolata	Ribwort Plantain	Leaves and herb	Anti-inflammatory; expectorant
**Bidens pilosa*	Blackjack	Herb	Astringent, diuretic, inflammation of the digestive tract; antidiarrheal

Species name	Common name	Plant parts used	Medicinal uses
Commelina africana	Common yellow commelina	Roots and ash	The Ndebele use a decoction of the roots in the treatment of venereal diseases and as a medicine for women suffering unduly during the menstrual period.
Hypoxis hemerocallidea	African star grass or African potato	Tuberous rootstock (corm).	Dizziness, bladder infections and insanity are treated by using the infusions of the corm as an emetic. Stems and leaves can be used with other ingredients to treat prostate problems. *H. hemerocallidea* has become commercialised as a source of extracts used in various tonics and so-called immune boosting preparations.
Ledebouria spp.	Ledebouria	Various parts	*Ledebouria* has been cited as being used for medicinal purposes, including pregnancy, diarrhoea, influenza, backache, skin irritations, wounds, and lumbago. The genus is also reported to be poisonous in Africa (consuming the bulbs).
**Tagetes minuta*	Khaki bush, Khaki weed, African marigold	Leaves, stalks, and flowers	It is also grown commercially in South Africa, France, and North America for its essential oil. The oil is very effectively used for wounds and a wide variety of infections.
Gomphocarpus fruticosus	Narrow-leaf Cotton Bush	Leaves are mainly used, sometimes the roots.	Leaves are used as snuff and as a sedative in the treatment of headache and tuberculosis. Roots are used to relieve stomach pain and general aches in the body.
Hilliardiella elaeagnoides	Bicoloured Vernonia	Leaves and twigs.	Infusions are taken as stomach bitters to treat abdominal pain and colic.
Typha capensis	Cattail	Rhizomes.	Used for venereal diseases during pregnancy to ensure an easy delivery, and for dysmenorrhoea, diarrhoea, dysentery, and to enhance male potency and libido.
Vachellia karroo	Sweet thorn	Bark, leaves and gum.	Remedy for diarrhoea and dysentery
**Rumex crispus*	Curly dock	Roots, sometimes leaves	Traditional remedy for internal parasites. The whole plant is said to be used for vascular diseases and internal bleeding. Externally applied for abscesses, boils and tumours.
**Salix babylonica*	Weeping willow	Branch tips and leaves, sometimes also the bark.	*Salix babylonica* can be used as a substitute for the indigenous Salix, and medicinal uses are similar. Thus, this includes treatment for rheumatism and fever. Treatment of headaches have also been listed.
Scabiosa columbaria	Wild scabious	Leaves and fleshy roots	Remedy for colic and heartburn. Grounded roots were used to make baby powder.
**Solanum elaeagnifolium*	Silverleaf Nightshade	Fruit, seed pods and roots	Raw seedpods - eaten or boiled into a syrup and taken as a laxative. The crushed, dried fruits are used as a treatment for colds. The fruit is chewed over an aching tooth. An infusion of the plant is taken by nursing mothers in order to sustain the milk flow. The plant is used to treat sore eyes, nose problems and throat problems. The fresh or dried root is chewed by a medicine man before sucking a snakebite, and the chewed root used as a poultice. The chewed root is placed in the cavity of an aching tooth.
Crinum sp.	Swamplily	NL	Throughout the world *Crinum* species have been used traditionally to cure ailments and diseases. Phytochemical analysis yielded more than 150 different isoquinoline or Amaryllidaceae alkaloids and some of the most noted effects are analgesic, anticholinergic, antitumour and antiviral. Recently, galanthamine has been registered as an acetylcholinesterase inhibitor, which is an important approach in treating Alzheimer's disease. Since the alkaloids are highly toxic, use of *Crinum* species is not recommended for the novice, as a large dose could easily be fatal.

4 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

This section aims to (1) present the sensitivity of the receptors identified within the study area (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 study area 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. Table 8 indicates the individual SEI scoring for each habitat unit/receptor. Figure 7 illustrates the SEI for the receptors identified in the study area.

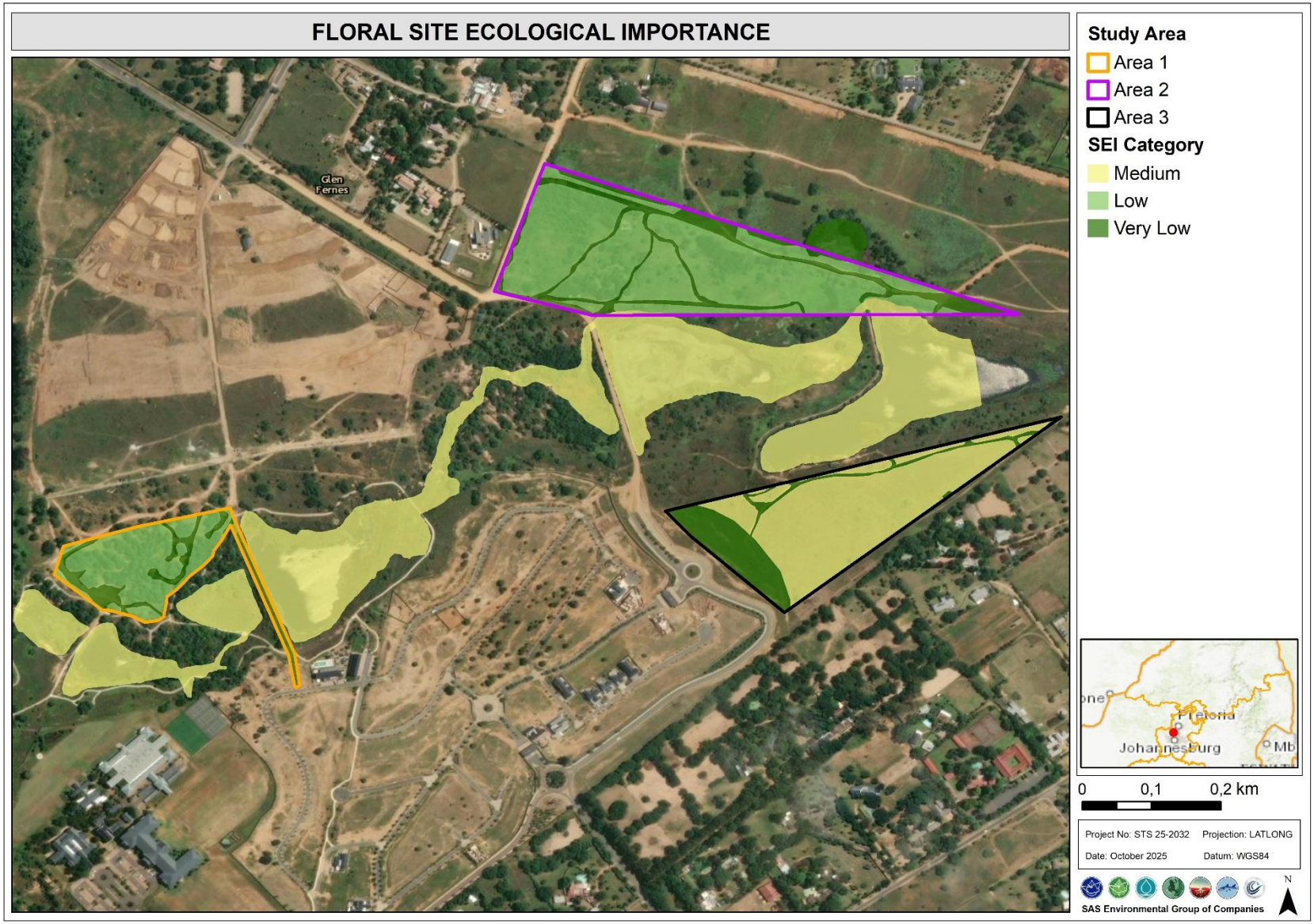


Figure 8: Conceptual illustration of the floral SEIs within the study area.

Table 8: SEI importance for the different habitat units (i.e., receptors) in the study area. Acronyms in the table header row include BI = biodiversity importance, CI = conservation importance, FI = functional integrity, RR = receptor resilience, and SEI = Site Ecological Importance.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Secondary Highveld Grasslands	**Low** No confirmed or highly likely populations of SCC.	**High** Some good habitat connectivity with potentially functional ecological corridors (i.e., connectivity with surrounding Freshwater Ecosystems). Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat 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 to high impact acceptable followed by appropriate restoration activities.
Rocky Areas	**Low** No confirmed or highly likely populations of SCC.	**Low** Small (> 1 ha but < 5 ha) area, with almost no habitat connectivity. Low rehabilitation potential. Several minor and major current negative ecological impacts.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat 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**.**
Alien Dominated Woodland	**Low** No confirmed or highly likely populations of SCC.	**Medium** Semi-intact area for any conservation status of ecosystem type. Mostly minor current negative ecological impacts with several minor and major historical negative ecological impacts.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat 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.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Transformed Habitat	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**Low** Almost no habitat connectivity across some modified or degraded habitat. Several minor and major current negative ecological impacts.	Very Low	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality. Species in this habitat have a very 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.
Freshwater Ecosystems: Artificial Dam	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**Low** Almost no habitat connectivity across some modified or degraded habitat. Several minor and major current negative ecological impacts.	Very Low	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat have a moderate 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.
Freshwater Ecosystems: Eastern Valley Bottom Wetland	**Low** No confirmed or highly likely populations of SCC.	**Medium** Semi-intact area for any conservation status of ecosystem type. Mostly minor current negative ecological impacts with several minor and major historical negative ecological impacts.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period more than 15 years required to restore less than 50% of the original species composition and functionality of the receptor functionality.	Medium	**Minimisation and restoration mitigation –** development activities of medium impact acceptable followed by appropriate restoration activities.

5 IMPACT ASSESSMENT AND IMPACT STATEMENT

This section of the report aims to (1) provide a compliance statement for the verified "low sensitivity" of the screening tool's Plant Species Theme (Section 5.1) and (2) provide a comprehensive impact assessment and discussion for the Terrestrial Biodiversity Theme (Section 5.2).

No layout has been provided therefore the assumption is made that the entire study area (total area of approx. **14** ha), excluding the watercourse: Eastern Unchanneled Valley Bottom Wetland (and associated zone of regulation and buffers) will be cleared for the construction of mixed-use (residential and commercial) developments. Should a layout become available the impact assessment will have to be re-evaluated.

5.1 Plant Species Compliance Statement

The triggered screening tool species, namely Sensitive species 1248 (VU), and *Melolobium subspicatum* (VU), were not present within the study area. These species are also not anticipated to occur within the study area as the vegetation and habitat conditions are not considered suitable. Table 9 presents an overview of the SCCs triggered by the screening tool, along with species provided by GDARDE that have previously been recorded within a radius of 20 km of the study area[15], and an indication of their POC within the study area.

Table 9: Floral SCC that may occur within the study area (including POC calculations).

Triggered Species	SANBI STATUS	POC	Habitat and Description	Motivation for disputing the presence of the triggered species
Sensitive species 1248	VU	Low	It grows in low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes. In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations.	The study area has no thickly vegetated river valleys, however the Alien Dominated Woodland has some Rocky Areas that has a closed woodland vegetation structure but no steep rocky hills persist (rather rock sheets).
Melolobium subspicatum	VU	Low	Found in Grasslands, typically Soweto Highveld Grassland, Egoli Granite Grassland, Carletonville Dolomite Grassland.	The presence of Egoli Granite Grassland disputed for the study area based on homogenous grassland with sign of poor land management.
Adromischus umbraticola subsp. *umbraticola*	NT	Low	Plants grow on south-facing rock crevices on ridges, restricted to Gold Reef	The study area does not have any ridges and is not associated with any Bushveld habiat.

[15] No Red List Taxa was triggered within the study area or within 5 km from the study area.

Triggered Species	SANBI STATUS	POC	Habitat and Description	Motivation for disputing the presence of the triggered species
			Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south.	
Brachycorythis conica subsp. *transvaalensis*	CR	Low	Short, open grassland and wooded grassland, on sandy gravel overlying dolomite, sometimes also on quartzite, 1 000-1 705 m.	The Secondary Grassland Habitat is considered to be short and open in structure the likelihood of B. *conica* subsp. *transvaalensis* being present is unlikely given the integrity of the grassland.
Ceropegia decidua subsp. *pretoriensis*	VU	Low	Associated with ridges and quartzitic rocky outcrops in pockets of soil among rocks in direct sunshine or shaded areas.	The study area is not associated with any ridges.
Cheilanthes deltoidea subsp. *silicicola*	VU	Low	Southwest-facing soil pockets and rock crevices in chert rock.	The small rocky area does not provide many crevices and the area is more prone to rocky sheets than boulders.
Cineraria austrotransvaalensis	NT	Low	Amongst rocks on steep hills and ridges, at the edge of thick bush or under trees on a range of rock types: quartzite, dolomite and shale, 1400-1700 m.	The study area is not associated with densely vegetated steep hills and therefore, there is no suitable habitat present.
Cleome conrathii	NT	Low	Stony quartzite slopes, usually in red sandy soil, grassland or deciduous woodland, all aspects.	The study area is not associated with sloped topography, and the soils was more rocky than sandy.
Delosperma leendertziae	NT	Low	Steep, south-facing slopes of quartzite in mountain grassland.	Study area does not consist of any steep slopes.
Dicliptera magaliesbergensis	VU	Low	It occurs in riverine forest and bush.	No riverine forest present within the study area.
Drimia sanguinea	NT	Low	Plants grow in open veld and scrubby woodland in a variety of soil types.	The Secondary Grassland Habitat can potentially provide habitat for this species however likelihood of this species being present is considered low.
Habenaria barbertoni	NT	Low	Rocky hillsides, in bushveld in association with *Acacias*, 1000-1500 m.	No rocky hillsides present within the study area.
Habenaria kraenzliniana	NT	Low	Stony, grassy hillsides, 1000-1400 m.	No rocky hillsides present within the study area.
Habenaria mossii	EN	Low	Open grassland on dolomite or in black, sandy soil.	The study area was not associated with any black sandy soils.
Holothrix randii	NT	Low	Grassy slopes and rock ledges, usually southern aspects.	The study area has not rocky hillside or ledges.
Xerophyta adendorffii	VU	Low	Dolomite and quartzite ridges and outcrops.	The small rocky area does not provide many crevices and the area is more prone to rocky sheets than boulders.

The study area is in an area where no threatened plant species are present and where none are expected due to the lack of suitable habitat for such species. The proposed activities will therefore not impact any SCCs, and no mitigation measures related to SCCs are required. Refer, however, to Section 5.2 for proposed mitigation measures related to vegetation and terrestrial biodiversity that will be affected by the proposed developments.

5.2 Terrestrial Biodiversity Theme Impact Assessment

The sections below outline the significance of the perceived impacts arising from the proposed activities within the focus area.

5.3 Impact Assessment Results

This impact assessment will focus on the following:

- Loss of habitat (refer to Figure 8 below) and species diversity (including protected species); and
- Loss of significant biodiversity features such as ESA 1.

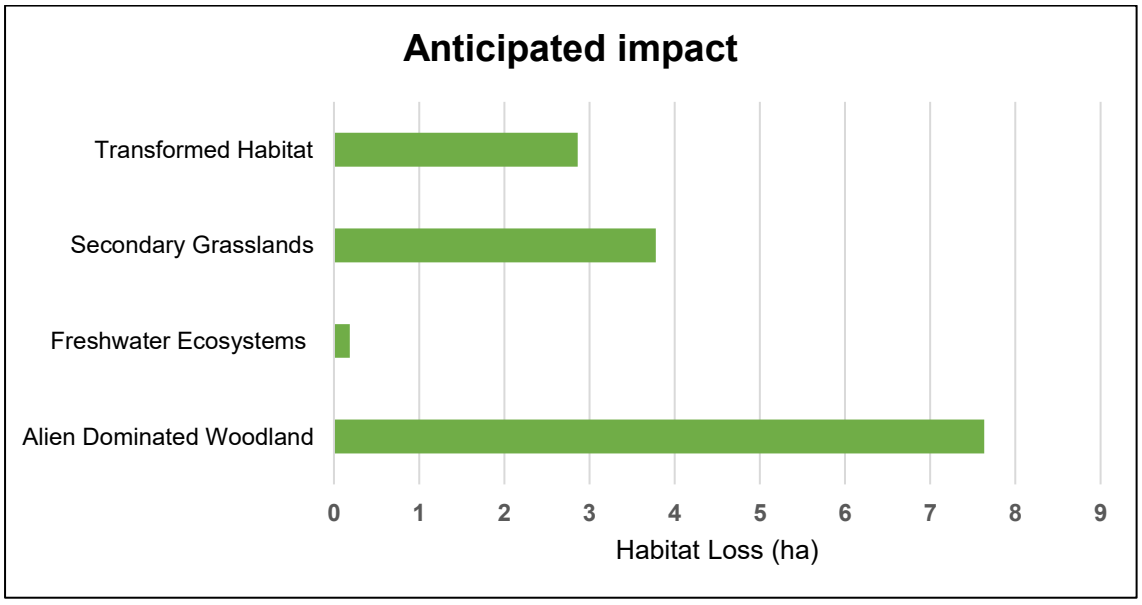


Figure 9: Graph depicting the extent of habitat units presumed to be impacted by the proposed development.

An impact assessment and discussion of all potential i) pre-construction phase, ii) construction phase, and iii) operation and maintenance phase impacts are provided in Sections 5.2.1 and 5.2.2. All mitigatory measures required to minimise the calculated impacts are presented in Section 5.2.1. Table 10 indicates the perceived risks to floral species associated with the activities pertaining to the proposed development.

Table 10: Activities and Aspects likely to impact on the floral resources within the study area.

ACTIVITIES AND ASPECTS REGISTER
Pre-Construction Phase
- Potential failure to conduct a walkdown of the approved footprint areas before construction activities commence where floral SCC (provincially protected), where present, are marked for rescue and relocation to suitable habitat outside the development footprint. - Potential failure to obtain floral permits from GDARDE for the rescue and relocation of provincially protected flora. ➢ **Impact**: Permanent loss of floral SCC (provincially protected) from the study area.
- Inconsiderate planning of infrastructure placement and design (including culverts and stormwater infrastructure), leading to the loss of intact floral habitat, as well as avoidable edge effect impacts on areas outside of the proposed development footprint. This is of important with regards to the sensitive Freshwater Ecosystems. - Inconsiderate planning of zones of regulations and freshwater buffers when designing the layout. ➢ **Impact:** Degradation and modification of the receiving environment and areas outside of the planned footprints. Loss of floral habitat. Loss and degradation of sensitive habitat such as the Freshwater Ecosystems (namely the Unchanneled Valley Bottom Wetland).
- Potential failure to implement an Erosion Control Plan and a stormwater management plan leading to sedimentation of the Freshwater Ecosystem, the loss of a nutrient-rich topsoil layer and degradation of soil structure. ➢ **Impact**: Loss of favourable floral habitat and consequently declines in floral diversity and floral SCC (provincially protected).
- Potential failure to design and implement an AIP Management/Control plan before the commencement of construction activities, further exacerbating the spread of AIPs from the development footprint to surrounding natural habitat. ➢ **Impact:** Spread of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat, as well as loss of habitat integrity.
- Potential failure to design a landscape and rehabilitation plan utilising native species to integrate the proposed development with the surrounding environment (especially regarding the Freshwater Ecosystem). ➢ **Impact**: Loss and/or degradation of habitat earmarked for open space, resulting in overall loss of favourable habitat for native floral species and wildlife.
- Potential failure to develop/design measures to mitigate edge effects to sensitive habitat outside of the footprint areas (e.g., Freshwater Ecosystems, especially watercourses). ➢ **Impact**: Ongoing loss of ecological integrity of the Watercourse and associated buffer, as well as increased fragmentation of the vegetation.
Construction Phase
➢ Potential inadequate layout optimisation and demarcation of the boundaries of "no-go" areas (watercourse: Valley Bottom Wetland) along with the associated specialist recommended buffer zones), resulting in site clearing beyond what is approved. ➢ Impacts and fragmentation of ESA 1 habitat associated with portions of the study area as a result of poor layout and design. ➢ **Impact:** Loss of important floral habitat and the potential loss of SCC (provincially protected). Loss of indigenous vegetation and infringement on sensitive habitat such as the Eastern Unchanneled Valley Bottom Wetland. Loss of and fragmentation of ESA 1.
➢ Site clearing and the removal of vegetation. ➢ **Impact:** Loss of floral habitat, diversity and potentially occurring floral SCC (provincially protected).
- Potential failure to relocate SCC (provincially protected) that were marked for relocation during the floral walkdown of the site (if applicable). - Potential failure to monitor the success of relocated floral SCC (provincially protected). ➢ **Impact:** Loss of SCC individuals.
- Potential poorly designed and implementation of the landscaping and/or rehabilitation plan. ➢ **Impact:** Loss of floral habitat, diversity, and the possible loss of floral SCC (provincially protected) within the project area and immediate surroundings.
➢ Potentially poorly managed edge effects: o Ineffective rehabilitation of compacted areas, bare soils, or eroded areas. Limited vegetation cover exposes the soil to the impact of rain, which may lead to increased erosion; o Areas left disturbed may promote the ongoing proliferation of AIP species and subsequent spread to surrounding natural areas, altering the floral habitat beyond the project footprints; and o Compaction of soils, habitat disturbance and fragmentation outside of the footprint areas due to indiscriminate driving of construction vehicles through remaining natural vegetation.

ACTIVITIES AND ASPECTS REGISTER
➢ **Impact:** Loss of and degradation of floral habitat and associated diversity within the direct footprint of the proposed development, but also the potential degradation of surrounding floral habitat and diversity through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
- 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 (provincially protected) as AIPs outcompete and replace these species.
- Overexploitation through the removal and/or collection of important or sensitive medicinal and floral SCC (provincially protected) beyond the direct development footprint area by construction personnel. ➢ **Impact:** Local loss of floral SCC (provincially protected) abundance and diversity
- Possible increased fire frequency during construction. ➢ **Impact:** Loss or alteration of floral habitat and species diversity.
- Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[16] 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.
Operational and Maintenance Phases
- Increased introduction and proliferation of AIPs due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area. ➢ **Impact:** Ongoing or permanent loss of floral habitat, diversity and potentially occurring SCC (provincially protected).
- Increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection of medicinal plants or an increased risk of fire frequency impacting on floral communities outside of the development footprint. ➢ **Impact:** Loss of floral habitat, medicinal flora, and SCC (provincially protected), as well as overall species diversity within the local area.
- On-going disturbance during operational and maintenance phase may lead to erosion and sedimentation of surrounding floral habitat. ➢ **Impact:** Degradation of favourable habitat and limited potential for floral re-establishment leading to loss of floral habitat and diversity within the local area.
- Potential failure to implement developed measures to mitigate edge effects to sensitive habitat outside of the footprint areas. ➢ **Impact:** Loss of floral habitat, diversity, and SCC (provincially protected) within the direct footprint of the proposed development. Loss of surrounding floral diversity and floral SCC (provincially protected) through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas. Degradation of the ecological integrity of the Watercourse Habitat.

5.4 Floral Impact Assessment Results

The tables (Table 11- 13) below present the findings of the impact assessment, which was conducted with reference to the impacts both before and after the implementation of mitigation measures.

The impacts on the watercourses within the Freshwater Ecosystems are considered with a 30 m buffer zone (referred to as Watercourse Buffer), as required for wetlands occurring within an urban area (GDARD 2014 & STS 200036, 2020). Impacts were not assessed for the Secondary Grassland, Alien Dominated Woodland or Transformed Habitats during the operational and maintenance phase as these areas are expected to be completely cleared

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

and developed on, i.e., the entire extent of these habitats will be transformed during the construction phase.

Additionally, impacts to TNCO floral species are expected to be minimum due to their low probability occurrence, therefore impacts on SCC plants are not considered for each habitat unit separately but broadly across the whole study area.

The mitigated results of the impact assessment have been calculated on the assumption that all mitigation measures stipulated in this report are adhered to and implemented. If such actions are not adhered to, post-mitigation impact scores will likely increase

Table 11: Planning Phase impacts on the floral habitat, diversity, and significant biodiversity features from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance
Habitat and Diversity																
Secondary Grasslands	3	3	2	1	2	6	5	**30 Low**	2	3	2	1	2	5	5	**25 Very Low**
Alien Dominated Woodlands	4	2	2	1	2	6	5	**30 Low**	2	2	1	1	2	4	4	**16 Very Low**
Rocky Areas	3	2	2	1	2	5	5	**25 Low**	2	2	2	1	2	4	5	**20 Very Low**
Eastern Unchanneled Valley Bottom Wetland	3	3	2	2	2	8	6	**36 Low**	2	3	2	2	2	5	6	**30 Low**
Anthropogenically Derived Dam	3	1	2	1	2	4	5	**20 Ver Low**	2	1	1	1	2	3	4	**12 Very Low**
Floral SCC (Provincially protected)																
Entire study area	2	3	2	1	2	5	5	**25 Low**	1	3	1	1	1	4	3	**12 Very Low**
Biodiversity Priority Areas																
ESA 1	3	3	2	2	2	6	6	**36 Low**	3	3	1	1	1	6	3	**18 Very Low**
Mitigation Measures for perceived impacts on habitat and species diversity																
➢ It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of habitat units with increased sensitivity (notably the Freshwater Ecosystems); ➢ Including "green" or open space in the design and thereby potentially creating an area that can be used to relocated any SCC observed; ➢ All proposed crossings over watercourses must be adequately designed to prevent impacts on habitat, instream flow, pattern and timing of water and water quality; ➢ A freshwater assessment need to be completed (updated) for the study area (and investigation area) by a qualitied freshwater specialist and any / all mitigation measures provided therein implemented; ➢ It is recommended that prior to the commencement of construction activities that the construction servitude be clearly demarcated to prevent footprint creep into areas beyond the authorised footprints. Ensure sound stormwater management planning and erosion control; ➢ Prior to the commencement of construction activities, an AIP Management/Control Plan, Stormwater Management Plan, Erosion Plan, Landscaping and Rehabilitation plans should be in place for implementation. The Landscaping plan can make use of rescued species following a flora walkdown;																

- Removal of alien invasive species should, as far as possible, commences during the planning phase and continue throughout all project phases. It is recommended that AIPs be cleared within the construction footprints before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble or with native vegetation, or soils contaminated with AIP seeds during the construction phase. However, if this is not feasible, it will be of utmost importance to ensure that all vegetation cuttings that contains AIP propagules must be disposed of appropriately (refer to mitigation measures under the construction phase) to prevent further spread to adjacent natural areas;
- A floral walkdown should take place prior to any construction starting whereby a qualified specialist (i.e., botanist or floral ecologist) identify any provincially protected species that require permit to relocate (if applicable) and which must be obtained form the regulatory bode (i.e., GDARDE);
- The walkdown must be conducted during a time period which most of the anticipated TNCO species are expected to be in flower (i.e., during summer); and
- A rescue and relocation plan must be drafted and approved by the relevant authorities for all TNCO-protected flora that will be impacted by the proposed development (pending the outcome of final site walkdowns).

Table 12: Construction Phase impacts on the floral habitat, diversity, and significant biodiversity features from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance
Habitat and Diversity																
Secondary Grasslands	5	3	5	2	3	8	10	**80 Medium High**	5	3	5	1	3	8	9	**72 Medium Low**
Alien Dominated Woodlands	5	2	3	2	3	7	8	**56 Medium Low**	5	2	3	1	3	7	7	**49 Low**
Rocky Areas	5	2	5	2	3	7	10	**63 Medium Low**	5	2	4	1	3	7	8	**56 Medium Low**
Eastern Unchanneled Valley Bottom Wetland	5	3	3	2	3	8	9	**64 Medium Low**	3	3	2	1	3	8	6	**36 Low**
Anthropogenically Derived Dam	5	1	3	1	3	6	7	**42 Low**	5	1	2	1	3	6	6	**36 Low**
Floral SCC (Provincially protected)																
Entire study area	3	3	2	1	3	6	6	**36 Low**	2	3	2	1	3	5	6	**30 Low**
Biodiversity Priority Areas																
ESA 1	5	3	3	2	3	8	8	**64 Medium Low**	5	3	2	2	3	8	7	**56 Medium Low**
Mitigation Measures for perceived impacts on habitat and species diversity																

Development Footprint:

- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint – manage footprint creep to surrounding areas (especially within sensitive areas);
- Ensure construction activities do not impact on areas earmarked as open space, or areas demarcated as sensitive (Freshwater Ecosystems; especially the Eastern Unchanneled Valley Bottom Wetland);
- The construction footprint must be kept as small as possible to minimise impact on the surrounding environment. Care should be taken during the construction phase of the proposed development to limit edge effects to surrounding habitat outside of the authorised footprint. This can be achieved by:
  - Ensuring continued demarcation of all footprint areas during construction activities as well as ongoing monitoring of demarcated areas to ensure footprints remain in the approved areas;
  - Demarcating habitat that must be maintained as open space (if applicable);
  - Construction rubble and cleared alien vegetation are to be disposed of in a sustainable and environmental responsible manner, e.g., taken to a registered waste disposal or garden refuse site. No construction rubble or cleared alien vegetation to be left on site, especially not within areas earmarked as open space, or demarcated as sensitive (Freshwater Ecosystems);
  - Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management. For stormwater management, best practice must be adhered to, and erosion and siltation subsequently prevented;
  - All soils compacted because of construction activities should be ripped and profiled and reseeded with indigenous seed mixes. Limited vegetation cover exposes the soil to the impact of rain, which may lead to increased erosion; and
  - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Specific mention in this regard is made of Category 1b species identified within the study area (refer to Section 3.4 of this report).
- No collection of indigenous floral species must be allowed by construction personnel;
- Vehicles must be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction must be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- Informal fires by construction personnel must be prohibited, and no uncontrolled fires must be allowed. Ensure fire management is in place;
- 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 must be allowed outside of designated areas, especially when the vegetation cuttings include AIPs. Infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites allowed in areas with natural vegetation – especially within more sensitive habitat (i.e., the Freshwater Ecosystems with associated buffer). Waste disposal containers and bins must be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste /garden refuge facility or in a designated and demarcated area outside of any natural vegetation;
- If any spills or leaks from construction vehicles and/or machinery occur, they must be cleaned up immediately to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed areas outside of the footprints. Where landscaping is planned, use of indigenous species is recommended.

Alien vegetation management:

- An AIP Management/Control Plan should be implemented by a qualified professional. No uncertified chemical use for AIP control may take place. All required Personal Protective Equipment (PPE) to be used during chemical and mechanical AIP clearing and control.

- Disturbed areas within the Freshwater Ecosystems are at particularly high risk for AIP invasions and special attention should be paid to these areas to ensure no AIP species are able to establish;
- Edge effects arising from the proposed development, such as erosion and AIP proliferation, which may affect adjacent natural areas, must be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020). Ongoing AIP monitoring and clearing/control should take place throughout the construction phase of the development; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared AIP material to be disposed of at a licensed waste facility which complies with legal standards or garden refuge facilities, or within designated and demarcated areas as long as it is outside of any natural habitat.

Table 13: Operation and Maintenance Phase impacts on the floral habitat, diversity, and significant biodiversity features from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance	Probability	Sensitivity	Severity	Spatial Scale	Duration	Likelihood	Consequence	Significance
Habitat and Diversity																
Watercourse Buffer (30 m)	5	3	2	1	5	8	8	**64 Medium Low**	3	3	1	1	5	7	7	**42 Low**
Floral SCC (Provincially protected)																
Entire study area	3	3	2	1	5	6	8	**48 Low**	2	3	1	1	5	5	7	**35 Low**
Biodiversity Priority Areas																
ESA 1	5	3	2	1	5	8	8	**64 Medium Low**	4	3	2	1	5	7	8	**56 Medium Low**
Mitigation Measures for perceived impacts on habitat and species diversity																

Development footprint:

- Disturbed areas outside of the approved footprints must be rehabilitated with indigenous species from the reference state;
- Ensure sound erosion control and stormwater control measures are in place during the operation and maintenance phase of the project;
- Monitor the Freshwater Ecosystems and its associated 30 m buffer to ensure that floral communities are not degraded further, additionally should any open space be envisioned these areas have to monitored to ensure they are kept in good conditions and do not become degraded and proliferated with AIPs;
- No vehicles are allowed to indiscriminately drive through any remaining sensitive habitat and natural areas. All vehicles must stick to designated roads and no additional roads may be developed unless absolutely necessary;
- Where formal landscaped gardens are envisioned, use should be made of indigenous species or ornamental alien species that are i) not listed within the NEMBA Alien Species List (2020) , ii) that are not considered problem plants or iii) rescued floral SCC (TNCO species);
- Open space areas (if envisioned) must be managed in terms of AIPs and, where necessary, reinstating of native species from the reference vegetation type must take place;
- Ongoing AIP monitoring and clearing/control should take place throughout the operational and maintenance phase, and the project perimeters must be checked, regularly, for AIP establishment to prevent spread into and degradation of surrounding natural areas; and
- Focused AIP monitoring within the Freshwater Ecosystems where it has been disturbed.

5.5 Discussion and Recommendations

The proposed activities will result in the loss of floral habitat, primarily impacting habitats of low and medium SEI. The sections below provide a detailed discussion of the impact assessment outcome.

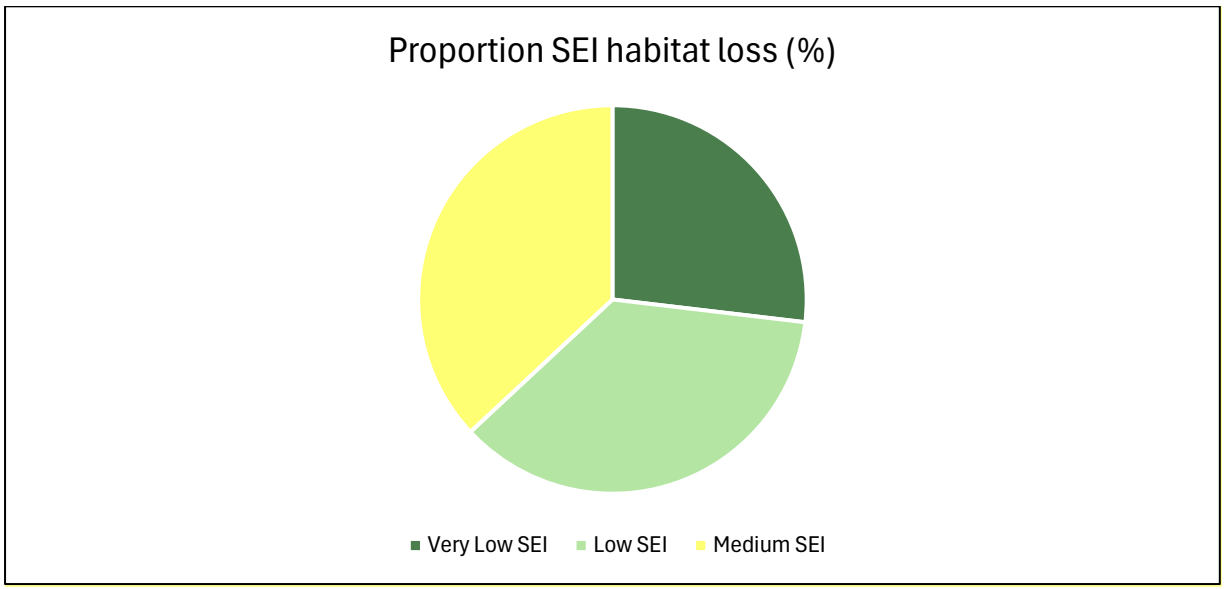


Figure 10: Portion of SEI habitat anticipated to be impacted by the proposed activities.

5.5.1 Impacts on Floral Diversity and Habitat Integrity

The proposed development spans approximately 14.5 ha, of which 11.6 ha is natural habitat – Secondary Grassland (approx. 3.7 ha impacted), Freshwater Ecosystems (approx. 0.18 ha impacted), and Alien Dominated Woodland (approx. 7.6 ha impacted) – and 2.9 ha is modified habitat (i.e. Transformed Habitat). Of this 14.5 ha footprint to be impacted, no important floral communities (i.e., threatened vegetation) will be lost. The proposed site location is also within an area where species diversity is moderate to moderately low, and where there was significant proportion is made up of AIPs. As such, the resultant loss of habitat and floral species diversity is low, resulting in only localised loss of floral resources.

With adequate implementation of mitigation measures, the loss of floral habitat will be of medium-low to very low significance. These levels of habitat and species loss are acceptable and will not lead to any significant negative residual impacts on floral resources.

5.5.2 Impacts on Floral SCC: TNCO-protected species

Two TNCO-protected species were recorded during the site assessment, namely *Crinum graminicola* and *Scadoxus puniceus*, however the species were not present in large populations as only one *Crinum* and two *Scadoxus* individuals were identified. Nevertheless, some additional species from the TNCO can likely occur within the study

area. Therefore, a walkdown of the site will be required prior to vegetation being cleared. This necessitates walkdowns during the summer when these species are more easily detectable. Permits for removing, harming, or destroying species on the TNCO list will require permits from the GDARDE.

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

The proposed development will affect an ESA 1. Since, based on the 2024 Gauteng C-Plan natural and secondary habitat is considered to be the trigger of ESA 1 under the habitat patch, wetland life zone and natural and secondary habitat. The entire Area 1, centre of Area 3 and the western extent of Area 2 coincide with ESA 1 habitat, since these areas are still considered natural and secondary in nature. The loss and fragmentation of the ESA habitat, along with the associated movement and dispersal corridors, will minimally affect ecological processes and drivers within the landscape. Since connectivity between semi- natural areas in the surrounding areas will remain largely intact, as movement corridors in the northern and central sections of the study area will be minimally affected by the fragmentation of the ESA within the proposed project footprint.

With adequate implementation of mitigation measures, the loss and fragmentation of the ESA habitat will be of medium-low significance, which is an acceptable level and will not result in any significant negative residual impacts on the ESA and the functions it provides. Impacts to ESA will need to be discussed with the local authorities during the EA procedure for any possible development constraints or conditions.

5.5.4 Probable Residual Impacts

No significant negative residual impacts on terrestrial biodiversity have been identified for the proposed project. However, even with extensive mitigation, residual impacts on the receiving floral ecological environment are possible. 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, AIP proliferation, bush encroachment (specifically concerning *Seriphium plumosum* and *Vachellia karoo*), overexploitation of flora; and
- Disturbed areas not rehabilitated to an ecologically functioning state, with resulting loss of floral habitat, species diversity, and protected floral species, are likely to be permanent.

5.5.5 Cumulative Impacts

For the assessment of potential cumulative impacts to 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. Two areas of concern were identified:

- Habitat fragmentation: Remaining portions of natural vegetation will be further fragmented; however, the movement corridors (especially Freshwater Ecosystems) will remain intact and largely unimpeded. Overall, the remaining natural areas still present within urban areas are already isolated, fragment and most of these areas are no longer connected to functioning corridors;
- Spread of AIPs: Potential poor AIP management and additional disturbances from edge effects associated with the proposed activities may contribute to the introduction and spread of AIPs with a consequent cumulative decrease in habitat integrity within the surrounding natural areas which include a sensitive habitat (i.e., watercourse); and
- Additional developments: The probability of additional or new developments in the area is highly likely base don the setting and locating of the study area. The surrounding development will have cumulative impacts on habitat loss and residual impacts (such as AIP proliferation and soil erosion) on the remaining semi-natural habitat.

Given the available information, the proposed project is unlikely to have significant cumulative impacts on floral ecology.

6 CONCLUSION AND RECOMMENDATIONS

The proposed project activities are not expected to have a significant impact on important or sensitive floral resources. In terms of both the Plant Species Theme there is no impacts anticipated for threatened floral SCC and for the Terrestrial Biodiversity Theme, the impact is expected to be medium-low to low. Consequently, the specialist believes that, provided strict implementation of mitigation measures occurs together with sound environmental procedures , the project can be considered for approval strictly from a botanical and terrestrial biodiversity standpoint.

This study provides the relevant information necessary to implement Integrated Environmental Management (IEM) and ensure the optimal long-term use of ecological resources in the study area, in support of the principle of sustainable development. 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.

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APPENDIX A: Floral Method of Assessment

The methods outlined in this document are aligned with the assessment guidelines provided by the South African National Biodiversity Institute (SANBI) (SANBI, 2020). SANBI is the regulatory body within South Africa that is responsible for ensuring sustainable development through facilitating access to biodiversity data, generating information and knowledge, building capacity, providing policy advise, and showcasing and conserving biodiversity in respective botanical and zoological gardens.

As the regulatory body for biological data, SANBI provides assessment and reporting protocols. These protocols provide a minimum set of assessment and reporting criteria that must form the basis of specialist investigations required for many of the country's environmental processes. As such, the proposed methodology, as described below, is in accordance with in-country standardised field assessment methodologies.

Vegetation Surveys

Various field sampling methods are available for the purpose of collecting floristic data. Generally, the selection of chosen field methods is dependent on serval factors, including the size of the area to be assessed, the heterogeneity of the vegetation/habitat present, time and budget allocated for field assessments, the scale and magnitude of potential project impacts, and the scope of work to be assessed.

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 species of conservation concern (SCC) (SANBI, 2020). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed pre-construction walkdown efforts.

Given the restricted time frames in which the proposed field surveys need to be conducted and the combined objective of accurately demarcating sensitive habitats within the area of interest, the method chosen needs to allow for:

I. Rapid, accurate data collection; and
II. The optimisation of time spent in habitats that are likely to sustain SCC.

Several survey methods, known as rapid biological assessments (Larsen, 2016)[17], can be employed. Example of rapid biological assessments include plot-based assessments or transect-based assessments. SANBI (2020) recommends the use of a transect-based approach, namely timed-meander searches (TMS; Goff et al., 1982[18]). The vegetation surveys presented below are a modified version of the TMS methods (hereafter referred to as modified-meander searches (MMS)). The TMS and MMS are subjective sampling methods which employs techniques where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC.

The difference in the TMS and MMS is that the MMS is not timed. The below list presents the reasons for selection of a modified approach:

- Time, access, and safety constraints are often unpredictable and cannot be planned for prior to a site assessment, especially within remote areas and areas where local communities may not provide consent to specialist to survey their lands. As such, a timed approach may result in disproportionate efforts in some pre-defined habitats.

[17] Larsen, T.H. ed., 2016. Core standardized methods for rapid biological field assessment. Conservation International.
[18] Goff, F.G., Dawson, G.A. and Rochow, J.J., 1982. Site examination for threatened and endangered plant species. Environmental Management, 6(4), pp.307-316.

- Vegetation surveys are conducted at the same time as the SCC assessments which limits the potential for timed assessments as SCC often occur either sporadically, or are difficult to detect and hence, longer surveys in certain areas are necessary (skewing the timed approach). Micro habitats where SCC are often found, are often difficult to detect on digital satellite imagery. As such, timing the surveys according to unverified field data will increase the risk of overlooking importance SCC data or habitat integrity features.
- Subjective decisions need to be made on-site that would otherwise interfere with a times-meander approach.

The employment of the presented field methods is beneficial because they allow for rapid data collection and subjective placement (based on professional experience and previous fieldwork knowledge) of the MMSs in habitats that have a higher likelihood of sustaining SCC. Furthermore, this method allows for extensive coverage of the subject property, thus increasing the probability of SCC and micro habitat detection. Extensive coverage of the area of interest will also be advantageous where properties are of large extents that need to be assessed.

Based on the broad habitat units delineated before going to site and the pre-identified points of interest, which is updated based on on-site observations and access constraints, the selected sample areas are surveyed on foot, following the subjective MMT, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed. Photographs are taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photos of all detected SCC (sensitive species will not be presented in the report).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure A1 below:

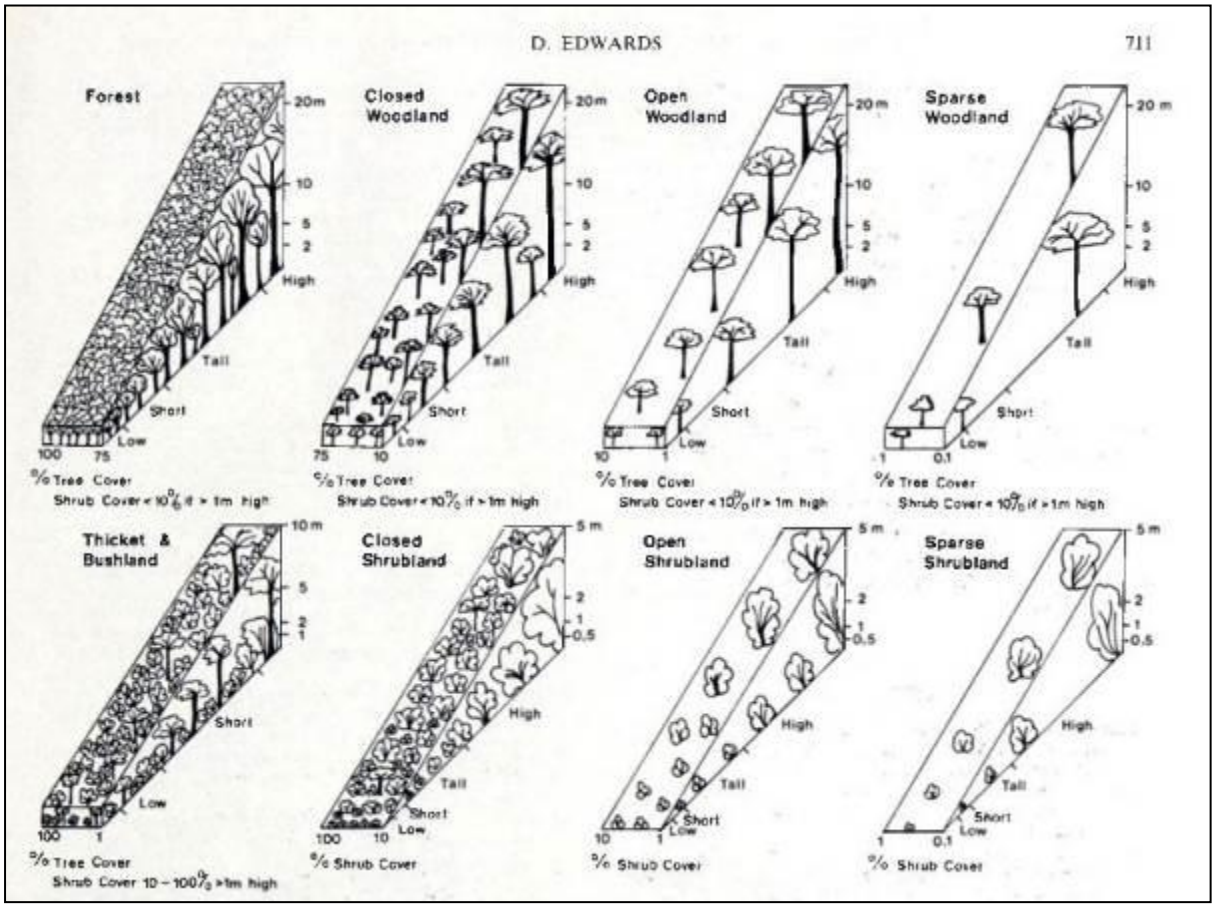


Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

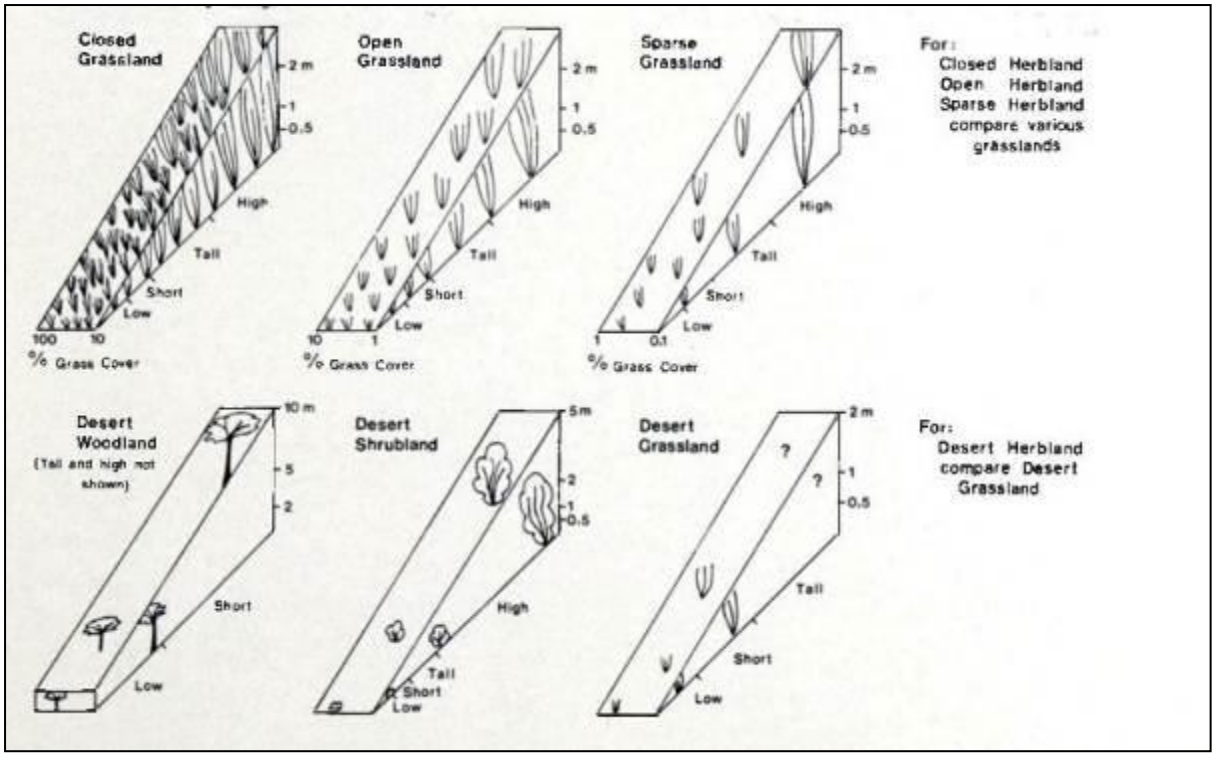


Figure A1 (continued): Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

Floral Species of Conservational Concern Assessment

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

The National Web-Based Environmental Screening Tool

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

- **Very High**: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 square kilometres (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

[19] More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:
- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & 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

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 metre (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 percent (%) 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.

IUCN RED LIST OF THREATENED SPECIES

The IUCN Red List of Threatened Species (IUCN, 2024), the world's most comprehensive information source on the global conservation status of animal, fungi and plant species, was accessed to obtain a list of all SCCs previously recorded in the area. Using the advanced search option, a list of known SCCs for the area was generated. The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX).

iNATURALIST

iNaturalist, a crowdsourced species identification system and an organism occurrence recording tool, was utilised to determine whether any SCCs were recorded within and/or surrounding the study area and to gauge the habitat types in which such species were previously recorded (primarily used before the site assessment as part of field preparation).

NEMBA TOPS SPECIES

The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007.

LIST OF PROTECTED TREE SPECIES (GOVERNMENT GAZETTE NO. 41887, NOTICE 536 OF 2018) LIST OF PROTECTED TREE SPECIES (GOVERNMENT GAZETTE NO. 41887, NOTICE 536 OF 2018) UNDER THE NATIONAL FORESTS ACT, 1998 (ACT NO. 84 OF 1998) (NFA)

In terms of section 15(1) of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. As these species are considered important, listed trees formed part of the SCC assessment.

GDARD SPECIES STATUS REPORT FOR THE QDS 2528CC

The Gauteng Department: Agriculture, Rural Development and Environment (GDARDE) provided data on SCC recorded within the QDS 2528CC. This dataset includes confirmed recordings of SCC and provides details of how far from the study area the species were recorded. Exact localities are not provided.

SPECIALLY PROTECTED AND PROTECTED SPECIES

The Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO) provides a list of provincially protected plants under Schedule 11 (Protected Plants) and Schedule 12 (Specially Protected Species). These species formed part of the SCC assessment. The list is available online at the following link: https://cer.org.za/wp-content/uploads/2017/01/North-West-Biodiversity-Management-Act.pdf

Determining the likelihood of a species occurring within the assessment area

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.

Consideration and application of the precautionary approach

The precautionary principle is defined by Tickner & Raffensperger (1999) as follows:

"*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically*".

Given time and resource constraints within the field, it is not always feasible to definitively state the presence or absence of particular Species of Conservation Concern (SCC) or sensitive habitats. In such instances, the precautionary principle should be applied (SANBI, 2020). By applying such principles, preventative action is taken in the face of uncertainty. Furthermore, for cryptic species that are often difficult to detect, it is not always easy to provide undeniable proof that a species occurs within a particular area within a subject property. As such, if a suitable habitat is identified within the subject property and there is potential evidence to suggest the species did or can occur within the subject property (i.e., confirmed sightings in adjacent properties), then the precautionary principle will be to assume that the species does indeed occur within the area of interest. Appropriate mitigation and management efforts would then need to follow accordingly.

Floral Site Ecological Importance (SEI)

SEI is considered to be 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[20]) 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:

[20] 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.

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

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[21] 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[22].

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.

Table A4: Conservation importance (CI) criteria.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[23] or Critically Rare[24] species that have a global EOO of < 10 km^2. - Any area of natural habitat[25] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[26]) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).

[21] 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.

[22] 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.

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

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

[25] 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.

[26] 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).

Conservation importance	Fulfilling criteria
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 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 considered to 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 considered to 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.

APPENDIX B: Floral Species List

Table B1: Floral species encountered during the field assessment. Species protected under the TNCO, NFA, TOPS, or that are threatened are emboldened in the table below. NL= Not listed.

Habit	Species Name	Common Name	AIP	Secondary Grasslands	Alien Dominated Woodland	Freshwater Ecosystems
GRAMINOID	*Arundo donax*	Giant Reed	**x**			x
	Cynodon dactylon	Brmunda quick grass		x		
	Digitaria eriantha	Common Finger Grass		x	x	
	Enneapogon scoparius	Bottlebrush Grass		x		
	Eragrostis chloromelas	Curly leaf		x		
	Eragrostis gummiflua	Gum Grass		x		
	Eragrostis lehmanniana	Lehmann's Love Grass		x		
	Hyparrhenia hirta	Common thatching grass		x		x
	Imperata cylindrica	Silver spike				x
	Melinis repens	Natal red top		x	x	
	Phragmites australis	Whistling reed				x
	Pogonarthria squarrosa	Herringbone Grass			x	
	Pontederia crassipes	Common Water Hyacinth	**x**			x
	Schoenoplectus muricinux					x
	Setaria sphacelata var. torta	Creeping Bristle Grass		x	x	
	Tragus berteronianus	Carrot seed Grass		x	x	
	Typha capensis	Cattail				x
HERBACEOUS	*Amaranthus hybridus*	Smooth pigweed	**NL**			x
	Argemone ochroleuca	Mexican Poppy	**x**	x	x	x
	Barleria macrostegia			x		
	Bidens pilosa	Black jack	**NL**	x	x	
	Campuloclinium macrocephalum	Pompom Weed	**x**	x		
	Conyzan bonariensis	Flax-leaved Horseweed	**NL**	x	x	x
	Chascanum hederaceum	White Trumpets			x	
	Chlorophytum cooperi	Common Green Lily		x		
	Commelina africana	African Yellow Dayflower		x		
	Commelina erecta	Whitemouth Dayflower			x	
	Convolvulus sagittatus	Arrow Bindweed			x	
	Crinum graminicola	Grass Swamplily		x		
	Cyanotis speciosa	Showy Blue Ear		x	x	
	Cycnium tubulosum	Vlei Ink-Flower		x		x
	Dipcadi viride	Green Daintybells		x	x	
	Elephantorrhiza elephantina	Elephant's foot		x		
	Felicia muricata	Wild Aster		x		

Habit	Species Name	Common Name	AIP	Secondary Grasslands	Alien Dominated Woodland	Freshwater Ecosystems
	Gazania krebsiana	Terracotta Gazania		x		
	Gomphrena celosioides	Batchelor's Button	**NL**	x		
	Guilleminea densa	Small Matweed		x		
	Heliotropium amplexicaule	Fragrant Heliotrope	**x**		x	
	Hibiscus microcarpus			x	x	x
	Hilliardiella elaeagnoides	Bicoloured Vernonia		x		
	Hirschfeldia incana	Shortpod Mustard	**NL**	x	x	
	Hypericum aethiopicum	Small Hypericum			x	
	Hypoxis argentea	Small Yellow Stargrass		x		x
	Hypoxis hemerocallidea	African Stargrass		x	x	
	Hypoxis obtusa	Shiny Stargrass			x	
	Iris pseudacorus	Yellow Iris				x
	Kohautia amatymbica	Charm Trembletop		x	x	
	Ledebouria ovatifolia	Flat-leaved African Hyacinth		x		
	Leonotis nepetifolia	Lion's Ear			x	
	Lobelia flaccida	Floppy Lobelia				x
	Nemesia fruticans	Grassveld Lionface				x
	Neorautanenia ficifolia	Figleaf Gemsbokbean			x	
	Oenothera rosea	Rose Evening Primrose	**NL**			x
	Pellaea calomelanos	Pellaea calomelanos			x	
	Pelargonium luridum	Lurid Storksbill		x		x
	Physalis viscosa	Gooseberry	**NL**		x	
	Plantago lanceolata	Ribwort Plantain		x	x	
	Potentilla indica	Mock Strawberry	**NL**			x
	Richardia brasiliensis	Tropical Mexican Clover	**x**	x		
	Riocreuxia polyantha				x	
	Rumex crispus	Curled Dock	**x**			x
	Scabiosa columbaria	Wild scabious		x		
	Scadoxus puniceus	Paintbrush Lily			x	
	Senecio inaequidens	Narrow-leaved Ragwort		x	x	
	Seriphium plumosum	Bankrupt bush		x		
	Solanum sisymbriifolium	Red Buffalo-Bur	**x**		x	
	Sonchus oleraceus	Common Sow-Thistle	**NL**	x	x	x
	Tagetes minuta	Wild marigold	**NL**	x	x	
	Taraxacum officinale	Dandelion	**NL**	x	x	
	Verbena aristigera	South American Mock Vervain	**NL**	x	x	
	Verbena bonariensis	Purpletop Vervain	**x**	x	x	x
	Vigna vexillata	Wild Cow Pea		x		
	Wahlenbergia undulata	African Blue Bell				x
SUC CU	*Agave americana*	American Century Plant	**x**		x	
	Agave sisalana	Sisal	**x**		x	

Habit	Species Name	Common Name	AIP	Secondary Grasslands	Alien Dominated Woodland	Freshwater Ecosystems
	Aloe davyana	Highveld Spotted Aloe		x	x	
	Cereus jamacaru	Queen-of-the-Night	x		x	
	Crassula nodulosa	Redspot Stonecrop			x	
	Delosperma herbeum	Witberg Sheepfig		x	x	
	Opuntia ficus-indica	Prickly Pear	x		x	
WOODY	*Acacia dealbata*	Black Wattle	x		x	
	Acacia podalyriifolia	Queensland Silver Wattle	x		x	
	Asparagus laricinus				x	x
	Celtis africana	White stinkwood			x	
	Cestrum parqui	Green Cestrum	x	x		
	Crotalaria agatiflora	Canary Bird Bush	x			x
	Eucaluptus camaldulensis	Red River Gum	x			x
	Gleditsia triacanthos	Honey Locust	x		x	
	Gomphocarpus fruticosus	Narrow-leaf Cotton Bush		x	x	
	Jacaranda mimosifolia	Jacaranda	x		x	
	Lantana camara	Common Lantana	x	x	x	
	Manihot grahamii	Hardy Tapioca	x		x	
	Melia azedarach	Chinaberry	x		x	
	Morus alba	White Mulberry	x		x	
	Pinus patula	Cluster pine	x		x	
	Populus alba	White Poplar	x		x	x
	Pyracantha angustifolia	Narrowleaf Firethorn	x	x		
	Robinia pseudoacacia	Black Locust	x		x	
	Salix babylonica	Weeping willow	NL			x
	Searsia pyroides	Fire-thorn karree		x	x	
	Sesbania punicea	Scarlet Sesbane	x		x	x
	Solanum mauritianum	Bugweed	x		x	
	Tipuana tipu	Pride of Bolivia	x	x	x	x
	Vachellia karoo	Sweet thorn			x	

APPENDIX C: 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. Due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. Because the Red List of South African plants is used widely in South African conservation practices such as systematic conservation planning or protected area expansion, we use an amended system of categories designed to highlight those species that are at low risk of extinction but of conservation concern.

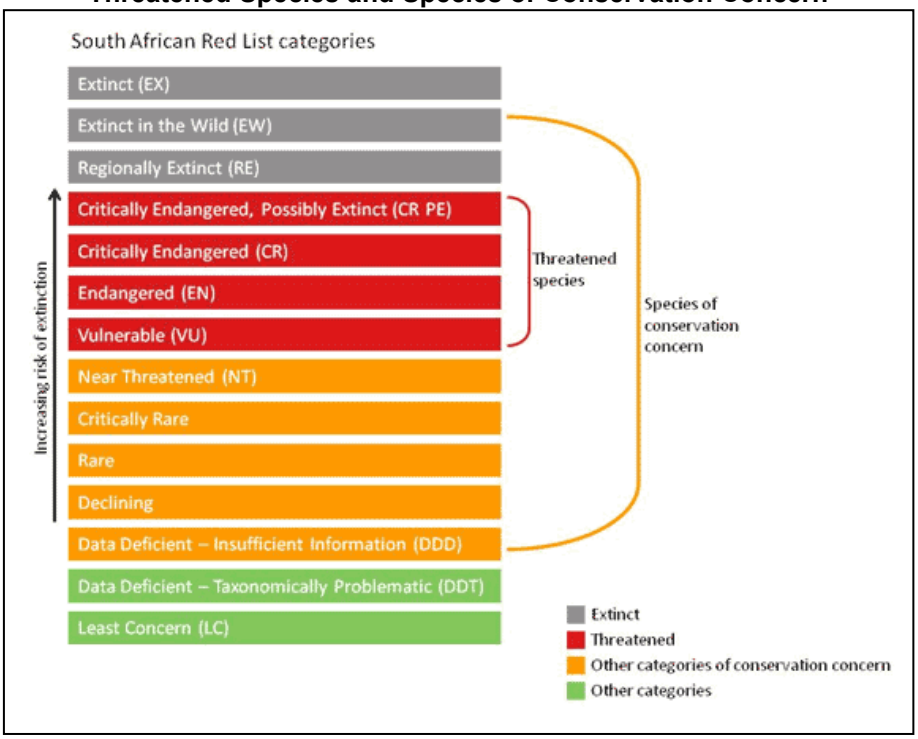
Definitions of the national Red List categories

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** 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** 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** 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 specialised 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 (LC)** 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** 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.

Threatened Species and Species of Conservation Concern



Screening Tool Species

Table C1: POC assessment outcome (scores, threat status, species habitat requirements, etc.) for the RDL species obtained from the SANBI Biodiversity Advisor, National Web Based Screening Tool, as well as from iNaturalist and GBIF (where applicable). Information on species distributions, conservation status, and habitat type were derived from 1) the Red List of South African Plants website (http://redlist.sanbi.org/index.php), the 2) SANBI Biodiversity Advisor (https://biodiversityadvisor.sanbi.org/), 3) various hardcopy resources such as Saunders et al. (2021), and 4) where deemed necessary, sites such as JSTOR (https://www.jstor.org/) was used.

Triggered Species	SANBI STATUS	POC	Habitat and Description
Sensitive species 1248	VU	Low	It grows in low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes. In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations.
Melolobium subspicatum	VU	Low	Found in Grasslands, typically Soweto Highveld Grassland, Egoli Granite Grassland, Carletonville Dolomite Grassland.

POC = Probability of Occurrence.

NEMBA TOPS List for South Africa[27]

Table C2: 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**

[27] 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**
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**
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**

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
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 the savanna and the 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	**Low**	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**
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**

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
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, 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.

TNCO-protected Species

Table C3: POC assessment results for Schedule 11 provincially protected floral species. **Protected Plants as per the Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO), which provides a list of Protected Plants (Schedule 11) and Specially Protected Species (Schedule 12). This Ordinance will be repealed as far as it relates to the North West Province when the North West Biodiversity Management Act, 2017, comes into force. Subject to the provisions of this Ordinance, no person shall pick a protected plant, unless he is the holder of a permit which authorises him to do so.

Schedule 11 (Protected Plant Species)			
Common Name	**Scientific Name**	**Status**	**POC**
All species of tree moss	*Porothamnium, Pilotrichella* and *Papillaria* spp.	LC	**Low**
All species of true ferns excluding the bracken fern	Class Filicinae excluding *Pteridium aquilinum*	LC	**Low**
All plants of cycads not occurring in Transvaal	All plants of the genus *Encephalartos* not occurring and the seedlings of the species of cycads in Transvaal and the seedlings of the species referred to in Schedule 12 (a) of *Encephalartos* referred to in Schedule 12 (a). *No species of *Encephalartos* recorded on site with no suitable habitat conditions available for these species.	Species-specific	**Low**
All species of yellow wood	*Podocarpus* spp.	LC	**Low**
All species of wild cypress	*Widdringtonia* spp.	Species-specific	**Low**
Borassus palm	*Borassus* aethiopicum	LC	**Low**

Schedule 11 (Protected Plant Species)			
Common Name	**Scientific Name**	**Status**	**POC**
All species of arum lilies	*Zantedeschia* spp.	Species-specific	**Medium**
All species of flame lilies	*Gloriosa* spp.	LC	**Low**
All species of Christmas bells	*Littonia* spp.	LC	**Low**
All species of red-hot pokers	*Kniphofia* spp.	Species-specific	**Medium**
All species of aloes excluding **(a)** All species not occurring in the Transvaal; **(b)** the following species: *Aculeata, Ammophilla, Arborescens, Barbertoniae, Castanea, Davyana, Globuligemma, Grandidentata, Grandidentata, Lutescens, Marlothii, Mutans, Parvibracteata, Transvaalensis* and *Wickensii*	All species of *Aloes* excluding **(a)** All species not occurring in the Transvaal; **(b)** the following species: *A. aculeata, A. ammophilla, A. arborescens, A. barbetoniae, A. castanae, A. davyana, A. globulligemma, A. grandidentata, A. lutescens, A. marlothii, A. mutans, A. parvibracteata, A. transvaalensis*, and *A. wickensii*	Species-specific	**Low**
All species of agapanthus	*Agapanthus* spp.	Species-specific	**Low**
blue squill	*Schilla natalensis*	NT	**Low**
All species of pineapple flower	*Eucomis* spp.	Species-specific	**Medium**
All species of galtonia	*Galtonia* spp.	Species-specific	**Low**
All species of dracaena	*Dracaena* spp.	Species-specific	**Low**
All species of paint brush	*Haemanthus* spp.	Species-specific	**Low**
All species of paint brush	*Scadoxus* spp.	LC	**Confirmed**
All species of clivia	*Clivia* spp.	Species-specific	**Low**
All species of nerine	*Nerine* spp.	Species-specific	**Low**
Pink brunsvigia	*Brunsvigia radulosa*	LC	**Low**
All species of crinum	*Crinum* spp.	LC	**Confirmed**
Ground lily	*Ammocharis coramica*	LC	**Low**
All species of fire lily	*Cyrtanthus* spp.	Species-specific	**Low**
All species of elephant's foot	*Dioscorea* spp.	Species-specific	**Low**
All species of irises	*Dietes* spp.	Species-specific	**Low**
River lily	*Schizostylis coccinea* (=*Hesperantha coccinea*)	LC	**Low**
All species of hairbells	*Dierama* spp.	Species-specific	**Low**
All species of babiana	*Babiana* spp.	Species-specific	**Low**
All species of gladioli	*Gladiolus* spp.	Species-specific	**Medium**
All species of laparousia	*Lapeirousia* spp.	Species-specific	**Low**
All species of watsonias	*Watsonia* spp.	Species-specific	**Low**
Wild banana	*Ensete ventricosum*	LC	**Low**
Transvaal strelitzia	*Strelitzia caudata*	LC	**Low**
Wild ginger	*Kaempferia aethiopica* (=*Siphonochilus aethiopicus*)	CR	**Low**
Wild ginger	*Burmannia madagascariensis*	LC	**Low**
All species of orchids excluding those species not occurring in Transvaal occurring in Transvaal	Orchidaceae spp. excluding those species not occurring in Transvaal occurring in Transvaal.	Species-specific	**Medium**

Schedule 11 (Protected Plant Species)			
Common Name	**Scientific Name**	**Status**	**POC**
All species of proteas excluding those species not occurring in Transvaal occurring in Transvaal	*Protea* spp. excluding those species not occurring in Transvaal occurring in Transvaal.	Species-specific	Low
Pincushion	*Leucospermum gerrardii*	VU	Low
Stone plant	*Frithia pulchra*	Rare	Low
Stone plant	*Lithops leslieii*	VU	Low
Schreber's waterlily	*Brasenia schreberi*	LC	Low
All species of waterlilies	*Nymphaea spp.*	Species-specific	Low
Wonderplant	*Tinospora fragosum*	LC	Low
Black stinkwood	*Ocotea bullata*	EN	Low
Stinkwood	*Ocotea kenyensis*	VU	Low
Kiaat	*Pterocarpus angolensis*	LC	Low
Tamboti	*Spirostachys africana*	LC	Low
The following species of the genus Euphorbia:	*E. barnardii* (EN), *E. clivicola* (CR), *E. grandialata* (Rare), *E. groenewaldii* (CR), *E. knobelli* (EN), *E. perangusta* (DDT), *E. restricta* (Rare), *E. rowlandii* (NT), *E. tortirama* (LC), *E. waterbergensis* (Rare).	Species-specific	Low
Baobab	*Adansonia digitata*	LC	Low
All species of begonias	*Begonia* spp.	Species-specific	Low
All species of cabbage trees	*Cussonia* spp.	LC	Medium
The following species of Ericas (heaths): Alopecurus, Cerinthoides and Oatesii	The following species of the genus *Erica*: *E. alopecurus, E. cerinthoides* and *E. oatesii*	LC	Low
Big leaf fever tree	*Anthocleista grandiflora*	LC	Low
The following species of impala lilies: Obesum, Oleifolium and Swazicum	the following species of the genus *Adenium*: *A. obesum, A. oleifolium* and *A. swazicum*	Species-specific	Low
Kudu lily	*Pachypodium saundersii*	LC	Low
All species of *Brachystelma*	*Brachystelma* spp.	Species-specific	Low
All species of *Ceropegia*	*Ceropegia* spp.	Species-specific	Low
All species of *Riocreuxias*	*Riocreuxia* spp.	Species-specific	Low
All species of Ghaap	*Tavaresia* spp.	Species-specific	Low
All species of *Huerniopsis* and *Heurnia*	*Huerniopsis* and *Huernia* spp.	Species-specific	Low
All species of *Duvalia*	*Duvalia* spp.	Species-specific	Low
All species of stapeliads	*Stapelia* spp.	Species-specific	Low
Stapeliad	*Hoodia lugardii*	LC	Low
All species of *Orbeanthus*	*Orbeanthus* spp.	Species-specific	Low
All species of *Orbeas*	*Orbea* spp.	Species-specific	Medium
All species of P*achycymbiums*	*Pachycymbium* spp.	Species-specific	Low
All species of O*rbeopsis*	*Orbeopsis* spp.	Species-specific	Low
All species of Primulas	*Streptocarpus* spp.	Species-specific	Low

CR= Critically Endangered**, EN** = Endangered**, LC** = Least Concern; **NT =** Near Threatened**,** POC = Probability of Occurrence; VU = Vulnerable.

Table C5: POC assessment results for Schedule 12 provincially protected floral species. **Protected Plants as per the Transvaal Nature Conservation Ordinance, 1983 (Ordinance No. 12 of 1983) (TNCO), which provides a list of Protected Plants (Schedule 11) and Specially Protected Species (Schedule

12). This Ordinance will be repealed as far as it relates to the North West Province when the North West Biodiversity Management Act, 2017, comes into force. Subject to the provisions of this Ordinance, no person shall pick a protected plant, unless he is the holder of a permit which authorises him to do so.

Schedule 12 (Specially Protected Plant Species)		
Common Name	**Scientific Name**	**POC**
In this schedule "seedling" means a cultivated plant of which the diameter of the trunk or bulb, either above or below the ground, does not exceed 150 mm.		
(a) All plants, excluding seedlings, of the following cycads of the Genus *Encephalartos*:		
Dolomiticus	*E. dolomiticus*	**Low**
Dyer	*E. dyerianus*	**Low**
Middelburg	*E. middelburgensis*	**Low**
Eugene marais	*E. eugene*	**Low**
Maraisii heenan	*E. heenanu*	**Low**
Inopinus	*E. inopinus*	**Low**
Laevifolius	*E. laevifolius*	**Low**
Lanatus	*E. lanatus*	**Low**
Lebombo	*E. lebomboensis*	**Low**
Ngoyanus	*E. ngoyanus*	**Low**
Paucidentatus	*E. paucidentatus*	**Low**
Modjadje	*E. transvenosus*	**Low**
Villosus	*E. villosus*	**Low**
(b) All plants of the following cycad *Encephalartos* species:		
Cupidus	*E. cupidus*	**Low**
Humilus	*E. humilus*	**Low**