SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON PT 72 OF THE FARM BULTFONTEIN, NEAR LANSERIA, GAUTENG PROVINCE.

Part B: Floral Assessment

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Image not taken on site

DOCUMENT GUIDES

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

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
2	**Terrestrial Biodiversity Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions with expertise in the field of terrestrial biodiversity.	Cover Page and Appendix J
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1
2.3	**The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:**	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	Section 3 (field-verified results)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Section 3 (field-verified results)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 3 (field-verified results)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas or Freshwater Ecosystem Priority Area sub catchments;	Part A (background research); and Section 3 (field-verified results)
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and d) species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	Section 3.3 (field-verified results)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Section 4 (site ecological importance); and Section 6 (impact assessment and mitigation recommendations)
2.3.7	**The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:**	
2.3.7.1	Terrestrial Critical Biodiversity Areas, including: *a) the reasons why an area has been identified as a Critical Biodiversity Areas;* *b) an indication of whether or not the proposed development is consistent with maintaining the Critical Biodiversity Areas in a natural or near natural state or in achieving the goal of rehabilitation;* *c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* *d) the impact on ecosystem threat status;* *e) the impact on explicit subtypes in the vegetation;* *f) the impact on overall species and ecosystem diversity of the site; and* g) *the impact on any changes to threat status of populations of species of conservation concern in the Critical Biodiversity Areas;*	Part A (background research); Section 3 (field-verified results); Section 4 (site ecological importance); and Section 6 (impact assessment and mitigation recommendations)
2.3.7.2	Terrestrial Ecological Support Areas, including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the Ecological Support Areas; and* c) *loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-	Part A (background research)

	a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	Part A (background research)
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses);*	Addressed in the Freshwater Report (refer to STS 23-2057, 2024).
2.3.7.6	Freshwater Ecosystem Priority Area sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the Freshwater Ecosystem Priority Area sub catchment;*	Addressed in the Freshwater Report (refer to STS 23-2057, 2024).
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not Applicable based on the current remaining vegetation types associated with the study area.
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Section 3: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities.	
3	**Terrestrial Biodiversity Specialist Assessment Report**	
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Part A: Appendix E
3.1.2	A signed statement of independence by the specialist;	Part A: Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.4
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Part A: Appendix C
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 4 (site ecological importance)
	Impact Assessment Requirements 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect, and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme;	Section 6 (impact assessment and mitigation recommendations)
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	Section 6 (site ecological importance)
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Executive summary; and Section 7
3.1.15	Any conditions to which this statement is subjected.	Section 6 (impact assessment and mitigation recommendations)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the Environmental Management Programme where relevant.	This report is submitted to the Environmental Assessment Practitioner and applicant and will be appended to the Environmental Impact Assessment / Environmental Management Plan by the Environmental Assessment Practitioner in due course as part of the application process
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Plant Species Theme** as published in Government Gazette 43855 dated 30 October 2020 (as amended in Government Notice 3717 of 2023).

Theme-Specific Requirements as per Government Notice No. 1150 Plant Species Theme – Very High and High Sensitivity Rating as per Screening Tool Output		
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:** Floral Assessment A medium sensitivity was confirmed for the study area based on the likelihood of other SCCs being present within the site. A Plant Species Specialist Assessment Report was undertaken.
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:** Floral Assessment Not applicable to this study. A Plant Species Specialist Assessment Report was undertaken.
1.3	Where the nature of the activity is expected to have an impact on species of conservation concern beyond the 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 study area must include the project areas of influence, as determined.	**Part B:** Section 1 and 2.
2	**Plant Species Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	**Part A – B:** Cover Page **Part A:** Appendix E
2.2	The assessment must be undertaken within the study area.	**Part A**: Section 1 **Part B:** Section 1 and 2
2.3	**The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline[1] and must:**	
2.3.1	Identify the SCC which were found, observed or are likely to occur within the study area;	**Part B:** Section 3 and Appendix C
2.3.2	Provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognised online database facility[2] immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	No threatened species were encountered on site.
2.3.3	Identify the distribution, location, viability[3] and detailed description of population size of the SCC identified within the study area;	**Part B:** Appendix C
2.3.4	Identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area;	**Part B:** Section 6
2.3.5	Determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened	**Part B:** Appendix C

[1] Available at https://bgis.sanbi.org/

[2] The preferred platform is iNaturalist.org but any other national or international virtual museum.

[3] The ability to survive and reproduce in the long term.

	Species, South African Red List of Species, and/or other relevant databases;	
2.3.6	Determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	**Part B:** Section 6.2.2
2.3.7	Include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;	**Part B:** Recommendations in Section 6.2.2. and Appendix C.
2.3.8	Identify any dynamic ecological processes occurring within the broader landscape, which might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	**Part B:** Section 3
2.3.9	Identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified SCC and its long-term viability;	**Part B:** Section 3 and Section 6.2.3
2.3.10	Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;	**Part B:** Section 3 and 6.2.2
2.3.11	Discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species[4]; and	**Part B:** Appendix C
2.3.12	Identify any alternative development footprints within the preferred development site which would be of "low" sensitivity or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	**Part B:** Section 4
2.4	The findings of the assessment must be written up in a Plant Species Specialist Assessment Report.	✓
3	Plant Species Specialist Assessment Report[5]	
3.1	**This report must include as a minimum the following information:**	
3.1.1	Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	**Part A – B:** Cover Page **Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part A**: Section 1 **Part B:** Section 1 and Section 2
3.1.4	A description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	**Part A:** Appendix C **Part B:** Section 2 and Appendix A
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data;	**Part B:** Section 1.4
3.1.6	A description of the mean density of observations/number of sample sites per unit area[6] of site inspection observations;	**Part B:** Section 3 and Appendix A
3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	**Part B:** Section 3 and Appendix C
3.1.8	The online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area;	No threatened species were encountered on site.

[4] Undescribed species are to be assessed as "High Sensitivity".

[5] The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

[6] Species Environmental Assessment Guideline.

3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	**Part B:** Section 4
3.1.10	A discussion on the cumulative impacts;	**Part B:** Section 6.2.5
3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Section 6
3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	**Part B:** Section 7
3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" plant species sensitivity and were not considered appropriate.	**Part B:** Section 4
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓

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LIST OF ACRONYMS

AIP	Alien and Invasive Plant
ARC	Agricultural Research Council
BGIS	Biodiversity Geographic Information Systems
BODATSA	Botanical Database of Southern Africa
CBA	Critical Biodiversity Area
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries, and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographic Information System
GN	Government Notice
GNs	Guidance Notes
GPS	Global Positioning System
Ha	Hectares
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
km	Kilometres
kV	Kilovolt
LC	Least Concern
m	Metre
m^2	Square 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] as amended
NP	Not Protected
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
NWA	National Water Act, 1998 [Act No. 36 of 1998] as amended
PES	Present Ecological State
POC	Probability of Occurrence
QDS	Quarter Degree Square
RDL	Red Data Listed
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services [Pty] Ltd
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services [Pty] Ltd
TOPS	Threatened or Protected Species
VU	Vulnerable
ZOR	Zone(s) of Regulation

GLOSSARY OF TERMS

Alien species (syn. exotic species; non-native species) (SANBI, 2020)	(a) a species that is not an indigenous species; or (b) an indigenous species translocated or intended to be translocated to a place outside of its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
Biodiversity priority areas (Skowno et al., 2018)	Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered (CR) and Endangered (En) ecosystems, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), Freshwater Ecosystem Priority Areas (FEPA), high water yield areas, flagship free-flowing rivers, priority estuaries, study areas for land-based protected area expansion, and study areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future. 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))	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.
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.
Conservation Importance (CI)	CI is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the International Union for the Conservation of Nature (IUCN) Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
CR (IUCN Red List category) (Skowno et al., 2018)	**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., 2018)	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Disturbance (van Wilgen et al., 2020)	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.

Driver (ecological) (Nelson, 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.
ESA (Skowno et al., 2018)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
EN (Red List category) (Skowno et al., 2018)	**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.
Functional Integrity (FI)	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.'
Ground·truth	To check the accuracy of (remotely sensed data) by means of 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 previous definition would only be indigenous to the Western Cape.
Indigenous vegetation (National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA))	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
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 (NEMBA)	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. Indigenous species)	See Indigenous Species
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.
Receptor Resilience (RR)	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
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.
Site Ecological Importance (SEI)	SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]).
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., 2018)	An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The NEMBA allows the Minister of Environmental Affairs or a provincial Member of Executive Council (MEC) for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making. Also see Ecosystem threat status.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
VU (Red List category) (Skowno et al., 2018)	Applied to both species/taxa and ecosystems: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (hereafter “STS”) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed mixed-use development, located near the Lanseria airport within the Gauteng Province (hereafter referred to as the “study area”; Figure 1).

The purpose of this report is to define the floral ecology of the study area, to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to describe the Present Ecological State (PES) of the study area. The primary objective of the floral assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of species of conservation concern (SCC) and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

1.1 Reporting Protocol

The site verification and field assessments disputed the **medium plant species theme** sensitivity (as identified by the Department of Forestry, Fisheries, and the Environment’s (DFFE) National Web-based Screening Tool (hereafter “screening tool”)) for the study area. When a low sensitivity rating for the Plant Species Theme is obtained and verified, a Terrestrial Plant Species Compliance Statement is required. To meet the requirements of the Terrestrial Plant Species Compliance Statement, a statement and impact statement have been provided in this report (refer to Section 5.2.2). However, the very high sensitivity for the **terrestrial biodiversity theme** was verified for the study area and aspects thereof as they pertain to the floral report is addressed in this report (following the requirements specified for the “very high” sensitivity protocol as per the document guide in Part A).

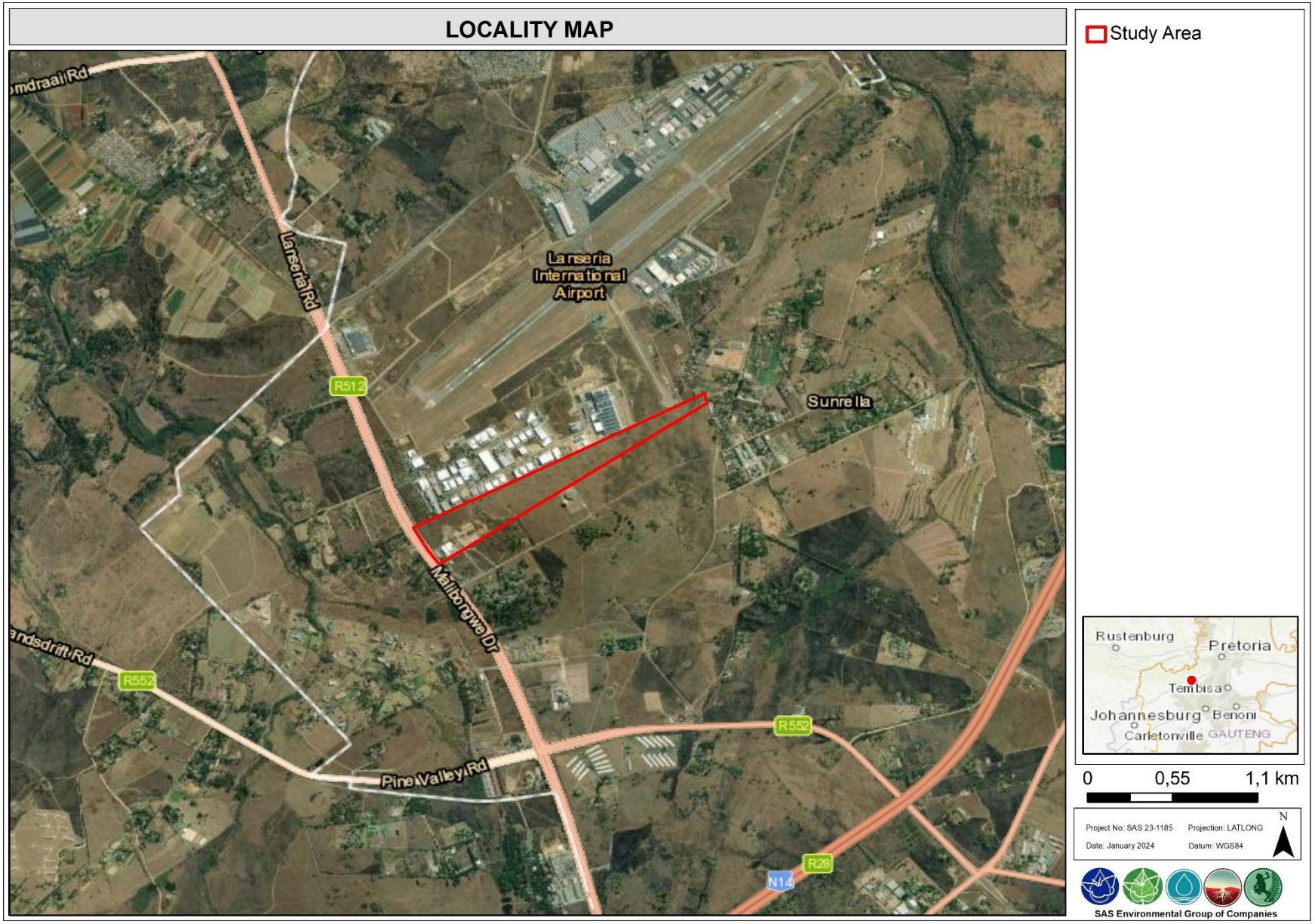


Figure 1: The study area in relation to surrounding areas.

1.2 Scope of Work

Specific outcomes in terms of the report are as follows:

- To determine and describe habitat types, communities and the ecological state of the sites associated with the study area and to rank each habitat type based on conservation importance and ecological sensitivity;
- To provide inventories of floral species as encountered within the study area;
- To identify and consider all sensitive landscapes such as indigenous forests, rocky ridges, wetlands and/ or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- To conduct a Red Data Listed (RDL) floral species assessment as well as an assessment of SCC, including the potential for such species to occur within the study area;
- To provide detailed information to guide the activities associated with the proposed development within the study area;
- To determine the environmental impacts that the construction of the proposed development have on the biodiversity associated with the study area;
- To develop mitigation and management measures for all phases of the development; and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements, to allow regional and national biodiversity targets to be met, and the provision of ecological services in the local area is sustained.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The floral assessment is **confined to the study area** and does not include the neighbouring and adjacent properties. The immediate surroundings were, however, included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- The screening tool provides the names of sensitive species that are likely to be present within the study area and its surrounds. Within the DFFE screening tool outcome, the names of some species are not provided, and these species are rather assigned a number keeping them unidentifiable (e.g., Sensitive species 1). This procedure is followed because of the vulnerability of the species to threats such as illegal harvesting and overexploitation. According to the best practise guidelines provided by the South

African National Biodiversity Institute (SANBI), the name of sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. However, the conservation threat status of such species has been provided;

- Sections of the study area (including areas that overlap with the Degraded Grassland and the Moist Grassland) had been recently burnt. Although the veld had started to recover, it is likely that species were missed or identification not possible (grass species);
- As a low sensitivity for the Plant Species Theme was verified, impacts to floral SCC within the study area are deemed highly unlikely. As such, the impact assessment only pertains to impacts associated with the '*floral habitat and diversity'* and not with impacts pertaining to SCC. However, to meet the requirements of the Terrestrial Plant Species Compliance Statement, a compliance statement and impact statement for floral SCC have been provided in this report (refer to Section 5.2.2); and
- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A field assessment was undertaken from the 24th of October 2023 (spring). According to the Species Environmental Assessment Guidelines (SANBI, 2020) assessments between October and Marh are ideal for the Grassland Biomes (i.e., Egoli Granit Grassland in which the study area is located), however peak flowering time is anticipated to occur between November and February. According to the minimum requirements as stipulated by the Gauteng Department of Agriculture and Rural Development (GDARD) Directorate's, surveys should ideally be conducted from the beginning of November to the end of April. To account for seasonal limitations, on-site data were augmented with all available desktop data, historic studies (e.g., Galago Environmental (2012), STS 190066 (2020), STS 22-2073 (2022), and STS 22-2055 (2023)), together with project experience in the area.

2 ASSESSMENT APPROACH

An on-site visual investigation of the assessment areas was conducted during spring (24th of October 2023) to confirm and ground truth the assumptions made during the consultation of the background maps and to determine whether the sensitivity of the terrestrial biodiversity associated with the assessment areas confirms the results of the screening tool.

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

2.1 General Approach

The vegetation surveys are based on the subjective sampling method which is a technique where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC (refer to the methodology description in **Appendix A**).

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

- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to site, during which broad habitats, vegetation types and potentially sensitive sites were identified. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where targeted investigations were required (e.g., for SCC detection and within the direct footprint of the proposed project);
- All relevant resources and datasets as presented by the SANBI's Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/), including the Gauteng Conservation Plan (C-Plan V3.3, 2011) and the Screening Tool (2023), were consulted to gain background information on the physical habitat and potential floral diversity associated with the assessment areas;
- 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 were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed. The SCC assessment included the below aspects:
    - **Threatened species:** in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), threatened species are RDL species falling into the following categories of ecological

status: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected 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, these species are still considered to be of increased conservation importance and thus are also included in the threatened species assessments. Removal, translocation and/or destruction of these species require authorisation from the DFFE; and

- **Protected Species:** species that do not necessarily classify within the above categories of ecological status (i.e., threatened species), but that are deemed important from a provincial biodiversity perspective including provincially protected floral species (Red and/or Orange[7] Listed (OL) species for the Quarter Degree Square (QDS) grid 2527DD) as provided to STS by GDARD. Activities are restricted for these species and may not occur without permits from the relevant provincial authorities (where necessary). Protected species also include the List of Protected Tree Species (GN No. 536) as published in the Government Gazette 41887 dated 7 September 2018 as it relates to the National Forest Act, 1998 (Act No. 10 of 1998) as amended (NFA) was also considered for the SCC assessment; and

- Photographs were taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photographs of all detected SCC (except for sensitive species as identified by the DFFE's screening tool[8]).

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

2.2 Definitions, descriptions, and taxon nomenclature

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

[7] The concept of an Orange List was introduced as a way of assessing and recording the conservation importance of taxa that are rare and of special concern but are not on a Red List (Victor and Keith, 2004). For Gauteng, this includes species that are endemic to either South Africa or the province, species that have a limited distribution in the country, species that are overharvested for the medicinal plant trade or species that are losing habitat due to urban expansion, to name a few (GDARD, 2014).
[8] The identity of sensitive species **may not appear** in the final EIA report **nor any of the specialist reports** released into the public domain.

2.3 Sensitivity Mapping

All the ecological features of the assessment areas were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery. The sensitivity map should assist the Environmental Assessment Practitioner (EAP) / proponent as to the suitability of the proposed development within the assessment areas. The various habitat types were assigned Site Ecological Importance (SEI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

3 RESULTS OF FLORAL ASSESSMENT

The results of the floral assessment are presented in the below sections.

3.1 Sampling Effort

The 2023 site assessment took place over one day during the spring season (24th of October 2023) by one botanical specialist. The timing of the field assessment is in line with proposed dates for the Grassland Biome as stipulated by the Species Environmental Assessment Guidelines (SANBI, 2020). Although the assessment just misses the preferred data as stipulated by GDARD (between November and April), seasonal limitations were accounted for by augmenting available desktop data, historic studies (e.g., Galago Environmental (2012), STS 190066 (2020) and STS 22-2073 (2022)), together with project experience in the area.

Numerous meanders were walked during the assessment where species were surveyed and habitat conditions noted; meanders were positioned within the various habitat types (i.e., grassland vs wetland communities) to ensure an adequate representation of each broad floral community. Figure 2 presents the specialist's Geographic Positioning System (GPS) tracks in relation to the study area as an indication of the area covered.

Figure 2: The study area (red outlie) and the specialist's GPS tracks (green lines) as per the 2023 field assessment.

3.2 Local Context and Fieldwork Results

The subsequent sections contextualise the study area and provides descriptions of species present on site, the existing impacts on site, as well as ecological processes that remain present within the study area.

3.2.1 Existing Impacts

The study area is located within a peri-urban area that has undergone expansion within the last decade (e.g., several developments have occurred within the surrounding areas (Figure 4)). Since 2008, the Lanseria airport and industrial warehousing have expanded considerably to the north of the study area; similarly, there has been an increase in the number of housing developments to the east of the study area (Figure 3). Historically (prior to approx. 2005), the study area was utilised for agricultural (cultivation) purposes. Although not currently used for cultivation, the study area is utilised by the surrounding communities for grazing of domestic animals (especially cattle). Further to this, the southwestern corner of the study area has undergone complete modification in which buildings and excavation activities have occurred. The study area is also currently subject to secondary impacts, including Alien and Invasive Plant (AIP) species proliferation, altered fire and herbivory regimes, increased fragmentation from surrounding areas (especially from the nearby Lanseria Airport), as well as the dumping of rubble. Collectively, these impacts have resulted in the subsequent degradation of the habitat(s) associated with the study area.

Figure 3: Historic transformation and modification within the surrounding areas of the study area (red polygon). Transformation of the surrounding areas is particularly evident within the north and east of the study area. Transformation within the study area itself (southwest corner) is also evident.

3.2.2 Vegetation types, fine scale habitats, and ecological overview

Following the site assessment, three (3) broad[9] habitat units (and associated subunits) were identified within the study area (approximately 32 hectares (ha)). The habitat units were distinguished based on species composition, vegetation structure and ecological function and integrity. The identified habitat units are as follows:

- **Degraded Grassland Habitat** – this habitat comprised the largest extent of the study area (approx. 19.2 ha). The habitat was dominated by grass species in which a moderately low to intermediately developed herbaceous layer was supported;
- **Moist Grassland –** the floral communities associated with this habitat shared a subset of species with the Degraded Grassland; however, this habitat was unique in that it supported additional species that have an affinity for hydromorphic[10] soils. Two subunits were identified within this habitat; habitats shared the same floral communities but were distinguished on the basis that a section of the Moist Grassland is considered a **Seep Wetland**[11]. The Seep Wetland is considered a watercourse[12] as per the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA) (refer to the Freshwater Assessment STS 23-2057, 2024). The remainder of the Moist Grassland (i.e., the second subunit) will be referred to as **Perched Moist Grassland**; and
- **Transformed Habitat** – this habitat comprised the second largest extent of the study area (approx. 7.2 ha). This habitat was associated with the complete transformation of areas (e.g., buildings or areas of excavation and dumping; Figure 4). Little habitat was available for native plant species and thus a lack of suitable habitat for SCC (both threatened and protected) was also evident within this habitat. Generally, vegetation communities were largely absent or represented mainly by AIP species (in which the abundance thereof was often high). The Transformed Habitat did not provide any unique habitat or areas of important conservation significance (CBAs, ESAs, or threatened ecosystem habitat). Given the lack of importance of this habitat within the study area, the habitats lack of suitable habitat for SCC, and inability to contribute to ecological function within the greater landscape, the Transformed Habitat unit will not

[9] Broad habitat units have been delineated and provide an indication of the main vegetation types associated with the study area.
[10] Hydromorphic is defined as follows: "*of or pertaining to soil having characteristics that are developed when there is excess water all or part of the time which leads to the development of anaerobic conditions in the soil*".
[11] Seep wetlands are located on gently to steeply sloping land and dominated by the colluvial (gravity-driven), unidirectional movement of water and material down-slope. Seep wetlands are often located on the side-slopes of a valley, but they do not typically extend onto a valley floor. Water inputs are primarily via subsurface flows from an up-slope direction. Seep wetlands are often associated with diffuse overland flow during and after rainfall events.
[12] The National Water Act, 1998 (Act No. 36 of 1998) as amended (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. A reference to a watercourse includes, where relevant, its bed and banks (Ollis et al. 2016).

be discussed in more detail within the habitat write-up below (impacts to the habitat are however considered in the impact assessment – Section 6).

Figure 4: Example photographs illustrating the Transformed Habitat associated with the study area: photograph a) illustrates larges sections of dumped rubble within the study area, photograph b) illustrates infrastructure (buildings and roads) associated with the study area, and photograph c) illustrates dumped soil from excavation activities in which mainly AIP species are evident.

For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, please refer to Section 3.2.3 – 3.2.4. Refer to Figure 5 for a visual representation of the habitat units observed within the study area.

Additional details regarding the vegetation's classification are presented in Table 1.

Table 1: Vegetation classification of the habitat units and associated floral communities within the study area.

Aspect	Transformed Habitat	Degraded Grassland Habitat	Moist Grassland	
			Perched Moist Grassland	Seep Wetland
Ecological Condition (refer to glossary of terms)	Poor ecological condition	Fair ecological condition	Fair ecological condition	Fair ecological condition
Indigenous vegetation[13]	✗	✓	✓	✓
Presence of watercourse[14]	Not applicable	Not applicable	Not applicable	✓
Ecological corridors[15]	✗	Stepping stone corridor	Stepping stone corridor	Stepping stone corridor
Representative of reference vegetation type(s)[16]	✗	✗		Not applicable

[13] Indigenous vegetation (As per the definition in NEMA): Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

[14] The Freshwater Habitat meets the definition of a watercourse in terms of the definition contained within the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA): (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. A reference to a watercourse includes, where relevant, its bed and banks.

[15] **In morphological terms, Ćurčić and Đurđić (2013) refer to three types of ecological corridors:**

- Linear corridors - long, uninterrupted strips of vegetation, such as hedges, strips of forest, and the vegetation growing on banks of rivers and streams;
- Steppingstone corridors - series of small, non-connected habitats which are used to find shelter, food, or to rest; and
- Landscape corridors - consist of diverse, uninterrupted landscape elements which offer sufficient cover for a safe journey from one habitat patch to another.

[16] In terms of species composition and vegetation structure.

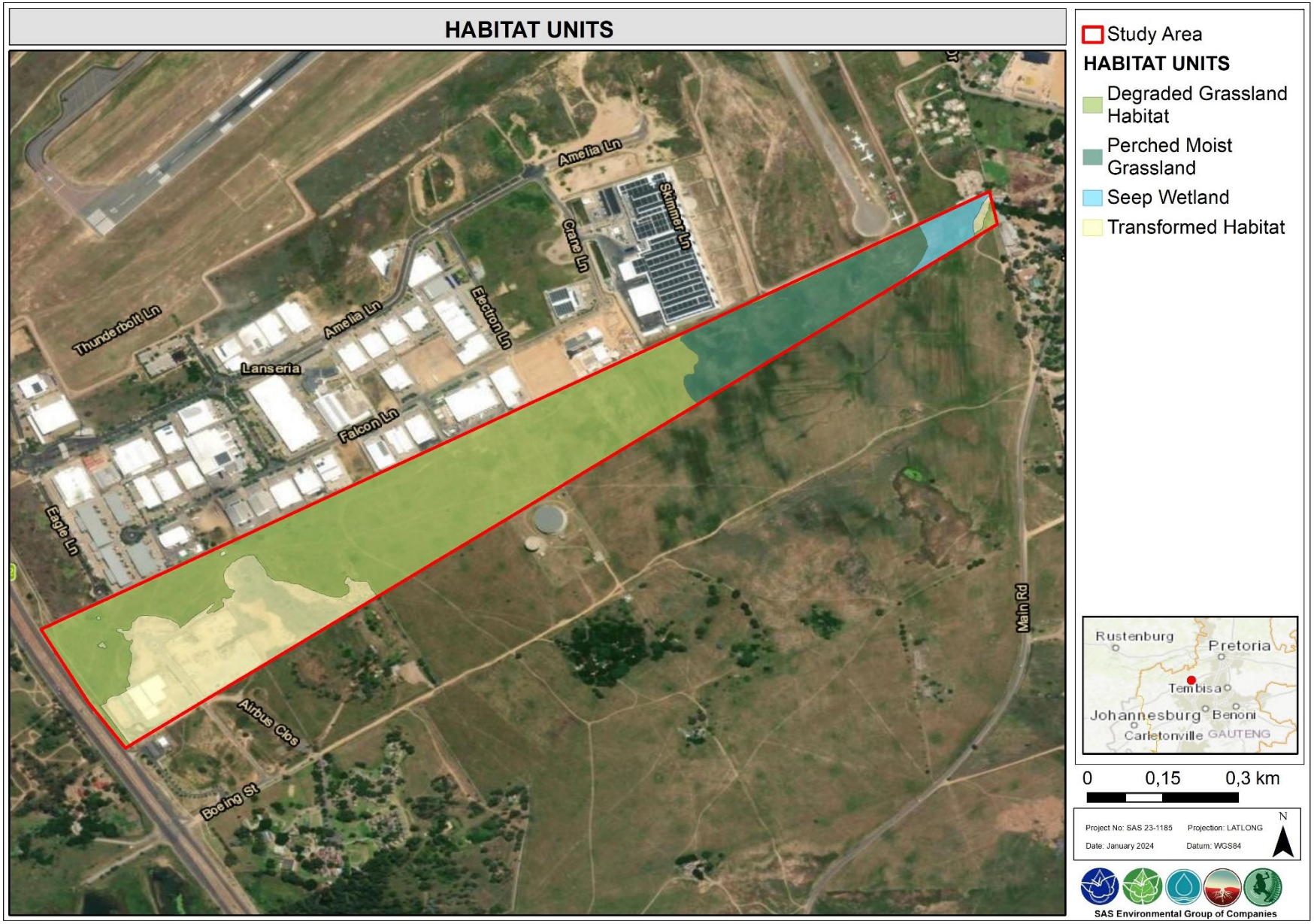


Figure 5: Habitat units associated with the study area.

3.2.3 Degraded Grassland Habitat

HABITAT OVERVIEW

Across the Grassland Habitat, the species composition is characterised by the presence of a homogenous, species poor floral community. Grass species were most dominant and were indicative of a degraded and modified vegetation community (photographs a - c). A moderately low to intermediately developed herbaceous layer was present and was represented by common, widespread species. The woody layer was poorly developed, as expected in for vegetation type; however, scattered woody individuals were recorded (photograph a). The field-based assessments confirmed that the vegetation communities have been impacted by anthropogenic influences which have resulted in habitat degradation and vegetation communities that are not representative of the reference vegetation type and thus not representative of the threatened ecosystem. The vegetation structure of the Degraded Grasslands can be described as **short, open-to-closed** grasslands (as per Diagram A1 in Appendix A).

SPECIES OVERVIEW

Characteristic species recorded within the **Degraded Grassland Habitat** included:

- The woody layer was poorly developed and included only a few scattered individuals: *Searisa pyroides, Seriphium plumosum,* and *Vacheliia karroo*;
- The graminoid layer was well-developed, although homogenous and moderately species poor. Typical grass species included: *Aristida congesta* subsp. *congesta*, *Cynodon dactylon, Eragrostis chloromelas, Eragrostis curvula, Hyparrhenia hirta Melinis repens,* and *Perotis patens;*
- The herbaceous layer consisted mostly of common, widespread species including *Acalypha angustata, Hibiscus microcarpus, Hypoxis obtusa, Lasiosiphon capitatus, Ledebouria ovatifolia, Ocimum obovatum*, *Pelagonium luridum*, and *Pentanisia angustifolia*;
- The succulent layer was represented by occasional individuals of *Aloe greatheadii;* and
- AIP proliferation was not as prolific as within the Transformed Habitat; however, AIP species were still present throughout the Degraded Grassland Habitat. Recorded species included *Agave americana* (not listed (NL)), and *Agave angustifolia* (NL); *Argemone ochroleuca* subsp. *ochroleuca* (NEMBA Category 1b), *Bidens pilosa* (NL), *Conyza bonariensis* (NL), *Glandularia aristigera* (NL), and *Tagetes minuta* (NL).

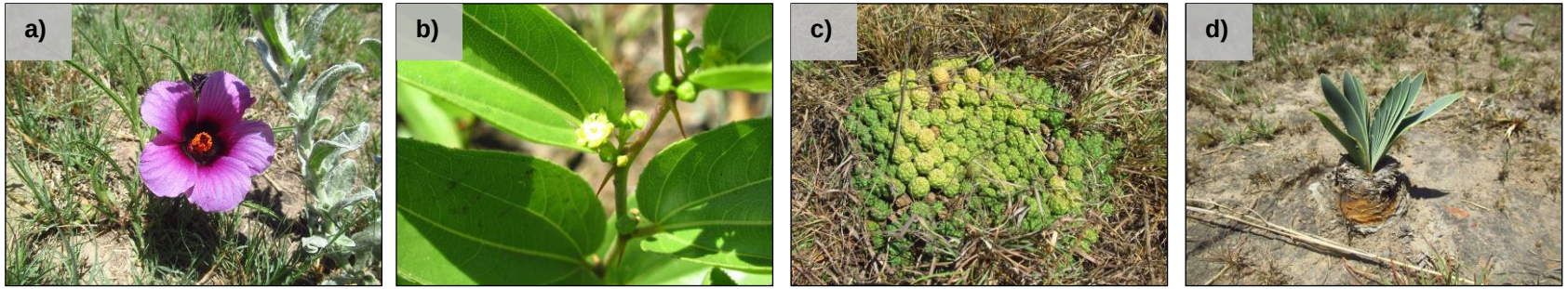
Refer to **Appendix B** for a list of species recorded within this habitat.

SPECIES OF CONSERVATION CONCERN

Protected Species **Refer to Appendix C for the comprehensive SCC assessed.**	The GDARD provided STS with a list of potential Red and/or OL species for the Quarter Degree Square (QDS) grid 2527DD (Table C4, Appendix C). These species were considered as part of the SCC assessment for the study area because they are considered important provincially. The probability of Occurrence (POC) for these species is provided below for the Degraded Grassland Habitat: - ***Boophone disticha*** **(POC = confirmed, Status = LC, declining, OL); and** - ***Hypoxis hemerocallidea*** **(POC = confirmed, Status = LC, declining, OL).** Provincially protected, OL species should be rescued and relocated to similar habitat within the development site or relocated to either registered nurseries or the Agricultural Research Council (ARC) or the SANBI before any development commences. The rescue and relocation must be under the supervision

	of a qualified specialist and relocation should be to suitable, similar habitat near its original location. As per the GDARD (2014) Sensitivity Mapping rules for Biodiversity Assessments, sensitivity mapping is not required for plant taxa listed in the **Declining** category of the OL. Additionally, protected tree species, as per the NFA and/or (non-threatened) species as per the 2007 TOPS List were included in the SCC assessment. However, no suitable habitat for NFA-protected trees or TOPS species was noted within the habitat. Discussions on SCCs and how they will be impacted is presented in Section 6.2.2.
Threatened Species **Refer to Appendix C for the comprehensive SCC assessed.**	No threatened (RDL and/or NT) floral species were recorded during the site assessment. Considering the habitat preferences of the species triggered by the screening tool (e.g., *Melolobium subspicatum* (VU) and Sensitive Species 1248 (VU)) and other RDL species (Table C1; Appendix C) and the likelihood of triggered RDL species to occur within the Degraded Grassland Habitat is low. In terms of the NEMBA TOPS list (2007), no (threatened) TOPS species were identified within the Degraded Grassland Habitat, nor is suitable habitat present to support any such species. Discussions on SCCs and how they will be impacted is presented in Section 6.2.2.

REPRESENTATIVE SPECIES PHOTOGRAPHS



Representative Species: a) *Hibiscus microcarpus* (an herbaceous species); b) *Ziziphus zeyheriana* (a Suffrutex[17]); c) *Euphorbia clavarioides* (a succulent species); and d) *Boophone disticha* (an Orange Listed[18] (OL) bulbous species).

[17] A plant that is intermediate between an herb and a shrub and slightly woody only at the base, a perennial plant woody only at the base. Same as subshrub.

[18] The concept of an Orange List (OL) was introduced as a way of assessing and recording the conservation importance of taxa that are rare and of special concern but are not on a Red List (Victor and Keith, 2004). For Gauteng, this includes species that are endemic to either South Africa or the province, species that have a limited distribution in the country, species that are overharvested for the medicinal plant trade or species that are losing habitat due to urban expansion, to name a few (GDARD, 2014).

3.2.4 Moist Grassland

HABITAT OVERVIEW



From a floral perspective, the Perched Moist Grassland and the Seep Wetland were characterised by the same species composition and vegetation structure, hence these habitats are collectively discussed as Moist Grassland. Specifically, the Moist Grassland and surrounding Degraded Grassland Habitat share a fairly large overlap of terrestrial floral species, however, a different subset of species (that have an increased affinity for moist soils) was present within the Moist Grassland. Although the Moist Grassland does not have permanently saturated soils, it does consist of soils that are associated with seasonal spells of increased soil moisture (i.e., during the rainy season). Additionally, the frequency of *Seriphium plumosum* increased quite substantially within the Moist Grassland areas (presumably in response to increased cattle loads as the species increases significantly under intense grazing pressure); high cattle loads are evident within the trampled areas throughout the Moist Grassland (far right photograph). Typically, the vegetation structure of the Moist Grassland (including both the Perched Moist Grassland and the Seep Wetland) can be descried as **short, open-closed grassland** (as per Diagram A1 in Appendix A).

SPECIES OVERVIEW

In terms of floral composition, the Moist Grassland habitat shared a subset of species with the Degraded Grassland Habitat. Characteristic species recorded within the habitat included:

- The woody layer was typically represented by one species, namely *Seriphium plumosum*. The absence of other woody species from the wetland is not uncommon;
- The graminoid layer was well-developed, although homogenous. Typical grass species included: *Cynodon dactylon*, *Cyperus esculentus*, *Cyperus sexangularis*, and *Sporobolus africana.;*
- The herbaceous layer was poorly represented and represented by only a few common species, including *Acalypha angustata, Denekia capensis*, *Helichrysum rugulosum, Lobelia erinus, Pelagonium luridum*, *Pentanisia angustifolia,* and *Tulbaghia leucantha;*
- The succulent layer was mostly absent and is attributed to the increased seasonal soil moisture conditions associated with the habitat which are unconducive to the survival of most succulent species; and
- AIP proliferation was noted in the Habitat. AIP species recorded included *Conyza bonariensis* (NL), *Trifolium repens* (NL), *and Verbena bonariensis* (NEMBA Category 1b).

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

SPECIES OF CONSERVATION CONCERN	
Protected Species **Refer to Appendix C for the comprehensive SCC assessed.**	The GDARD provided STS with a list of potential Red Listed and/or OL species for the QDS grid 2527DD (Table C4, Appendix C). These species were considered as part of the SCC assessment for the study area because they are considered important provincially. The probability of Occurrence (POC) for these species is provided below for the Moist Grassland Habitat: - *Gunnera perpensa* (POC = medium; Status = LC, declining); and - *Hypoxis hemerocallidea* (POC = medium, Status = LC, declining, OL). Provincially protected, OL species should be rescued and relocated to similar habitat within the development site or relocated to either registered nurseries or the Agricultural Research Council (ARC) or the SANBI before any development commences. The rescue and relocation must be under the supervision of a qualified specialist and relocation should be to suitable, similar habitat near its original location. As per the GDARD (2014) Sensitivity Mapping rules for Biodiversity Assessments, sensitivity mapping is not required for plant taxa listed in the **Declining** category of the OL. Additionally, protected species as per the NFA and/or (non-threatened) species as per the 2007 TOPS were included in the SCC assessment. However, no suitable habitat to support any such species were identified within the Moist Grassland Habitat. Discussions on SCCs and how they will be impacted is presented in Section 6.2.2.
Threatened Species **Refer to Appendix C for the comprehensive SCC assessed.**	No threatened (RDL and/or NT) floral species were recorded during the site assessment. Considering the habitat preferences of the species triggered by the screening tool (e.g., *Melolobium subspicatum* (VU) and Sensitive Species 1248 (VU)) and other RDL species (Table C1; Appendix C) and the likelihood of triggered RDL species to occur within the Moist Grassland Habitat is low. In terms of the NEMBA TOPS list (2007), no (threatened) TOPS species were identified within the Moist Grassland nor is suitable habitat present to support any TOPS listed species. Discussions on SCCs and how they will be impacted is presented in Section 6.2.2.

REPRESENTATIVE SPECIES PHOTOGRAPHS

Representative Species: a) *Seriphium plumosum* (a woody species); b) *Helichrysum rugulosum* (an herbaceous species); c) *Lobelia erinus* (an herbaceous species); and d) *Acalypha angustata* (an herbaceous species).

3.3 Biodiversity Priority Areas[19]/ Conservation Significance

Biodiversity importance/ conservation significance of the study area is largely determined based on triggering features as identified in the screening tool (Terrestrial Biodiversity Theme) as well as additional provincial datasets as presented in Part A. The conservation features and how they pertain to the habitat units identified for the study area are presented in the below table. Overall, the Moist Grassland (more specifically the Seep Wetland) was considered to be of increased biodiversity importance, whereas the Degraded Grassland Habitat and the Transformed Habitat do not contribute towards biodiversity importance.

Table 2: Biodiversity Priority Areas / Conservation Significance.

CBA (Important)[20]	The majority of the study area is located within an Important CBA (refer to Part A). Triggering features of the Important CBA include the presence of Red Listed bird species and primary vegetation[21]. Red listed bird habitat was identified by the Gauteng conservation plan as being located within the south-western corner of the study area (i.e., the area in which the Transformed Habitat is located). Given the modified nature thereof, no habitat for red-listed birds is available within the study area (refer to Part C). Furthermore, as the vegetation communities have been subject to considerable anthropogenic activities (both historically and currently), the subsequent degraded floral communities are not considered primary vegetation; instead, the floral communities are secondary[22] in nature. Given the above, it is concluded that no intact, functioning CBA (Important) habitat is present within the Degraded Grassland, the Moist Grassland, or the Transformed Habitat.
ESA[23]	A small section in the east of the study area overlaps with an ESA (refer to Part A). The overlapping habitat includes the Moist Grassland. Although degraded in nature, the Seep Wetland (specifically) is considered to provide functioning ESA habitat (albeit modified); the wetland contributes to ecological function and connectivity within the greater landscape.
CR Ecosystem: Egoli Granite Grassland	As per the 2022 Red List of Ecosystems Database (refer to Part A), sections of the study area are located within the remaining extent of the CR Egoli Granite Grassland; however, the field-based assessments confirmed that the vegetation communities across the extent of the study area have been impacted by anthropogenic influences which have resulted in habitat degradation and vegetation communities that are not representative of the reference vegetation type (in terms of species composition and structure) and thus not representative of the threatened ecosystem.

[19] 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.

20 CBAs are areas of high biodiversity value and need to be maintained in a natural state. CBA Important Areas are areas considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.

21 Primary vegetation is defined as vegetation in a particular plant assemblage that has **not** been subject to human disturbance or has been so little affected that its natural structure, functions, and dynamics have not undergone any change that exceed the elastic capacity of the ecosystem.

[22] Vegetation communities that have undergone anthropogenic disturbance and have subsequently revegetated and started to recover (communities can be at varying degrees of recovery).

[23] ESAs are important features within the greater landscape and provide unique conditions for flora and important ecological functionality within the ecosystem (e.g., supporting CBA habitat).

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

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

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

[24] Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).

Duty of care related to listed invasive species are referred to in NEMBA Section 73[25]. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US$142 million) each year - this being the amount currently spent by the national government's DFFE - i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

3.4.2 Site Results

A total of 19 AIPs were found within the study area. Of the 19 species encountered on site, nine species are listed under NEMBA Category 1b, whereas the remaining 10 species are not listed under NEMBA; however, several of these species are considered problem plants that often establish in disturbed sites or previously cultivated areas (e.g., *Bidens pilosa*, *Gomphrena celosioides* and *Tagetes minuta*). These species can often become problematic and pose a threat to biodiversity as these species compete with indigenous native floral species and often replace native floral species.

Due to the extent of AIPs within the study area, especially those listed under Category 1b, it is recommended that if the proposed project gets approval, then an Alien and Invasive Species Control and Management Plan be set up and implemented (by the proponent) to ensure further loss of indigenous floral communities do not occur, and that the intact natural communities are not placed under additional pressure due to the presence of AIPs. Refer to Table 3 below for more information on the AIPs recorded on site.

Table 3: Dominant alien floral species identified during the field assessment with their invasive status as per NEMBA: Alien and Invasive Species Lists, GN R1003 of 2020. NL = not listed.

Species	Common Name	Origin	NEMBA Category	Degraded Grassland	Transformed Habitat	Moist Grassland
Woody Species						
Morus alba	Mulberry	China	1b	x	x	
Acacia mearnsii	Black wattle	Australia	1b	x	x	
Lantana camara	Lantana	South America	1b	x	x	
Melia azedarach	Syringa	Asia & Australia	1b	x		

[25] 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.

Species	Common Name	Origin	NEMBA Category	Degraded Grassland	Transformed Habitat	Moist Grassland
Robinia pseudoacacia	Black locust	Eastern North America	1b			
Solanum mauritianum	Bugweed	South America	1b			
Solanum sisymbriifolium	Sticky nightshade	South America	1b	x		
Yukka sp.	Yukka	Americas	NL		x	
Herbaceous Species						
Argemone ochroleuca subsp *ochroleuca*	Mexican poppy	Mexico	1b	x	x	x
Bidens pilosa	Blackjack	South America	NL	x	x	
Conyza bonariensis	Tall fleabean	Americas	NL	x	x	x
Glandularia aristigera	Moss verbena	South America	NL	x	x	x
Gomphrena celosioides	Bachelor's button	South America	NL	x	x	
Tagetes minuta	Khakibos	South America	NL	x	x	
Taraxacum officinale	Common dandilion	Eurasia	NL	x		
Trifolium repens	White clover	Europe	NL	x		x
Verbena bonariensis	Tall verbena	South America	1b	x	x	x
Succulent Species						
Agave americana	Century plant	South America	NL	x		
Agave angustifolia	Caribbean agave	South America	NL	x		

3.5 Medicinal Floral Species

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien invasive weeds. Table 4 presents a list of dominant plant species with traditional medicinal value, plant parts traditionally used and their main applications, which were identified during the field assessment.

Table 4: Dominant traditional medicinal floral species identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn, Gericke, 2009). For species not listed in van Wyk, Oudtshoorn, Gericke, 2009, the source is provided in brackets. Alien species are indicated with an asterisk.

Species	Name	Plant parts used	Medicinal uses
Woody Species			
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]. This plant should be used with caution, preferably under the supervision of a qualified practitioner. Excess causes diarrhoea, vomiting and symptoms of narcotic poisoning. Source: http://tropical.theferns.info/viewtropical.php?id=Melia+azedarach
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* ia a traditional diuretic used for urinary tract infections
Lippia javanica	Fever tea	Leaves and twigs are used, less often than roots	Coughs, colds, fevers, and bronchitis are treated with infused tea. Infusions also used for various chest ailments, influenza, measles, rashes, stomach problems, malaria, headaches, and rashes, to name a few. Weaker infusions are used as general health teas and stronger infusions can be used to treat scabies and lice.
Ziziphus mucronata	Buffalo thorn	Roots, bark, or leaves used separately or in combination.	Warm bark infusions (sometimes together with roots or leaves added) are used as expectorants (also as emetics) in cough and chest problems, while root infusions are a popular remedy for diarrhoea and dysentery. Decoctions of roots and leaves (or chewed leaves) are applied externally to boils, sores and glandular swellings, to promote healing and as an analgesic.
FORBS			
Bidens pilosa	Blackjack	Herb	Astringent, diuretic, inflammation of the digestive tract; antidiarrheal
Tagetes minuta	Khaki bush, Khaki weed,	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.

Species	Name	Plant parts used	Medicinal uses
	African marigold		
Boophone disticha	Century plant, Poison bulb, Sore-eye flower	Bulb scales are used.	*Boophone disticha* has many medicinal uses. Traditional healers use it to treat pain and wounds. Parts of the plant are used by certain African tribes and by some Europeans to cure various ailments: the outer covering of the bulb is applied to boils and abscesses; fresh leaves are used to stop bleeding of wounds.
Helihrysum spp.	Everlastings	Leaves and twigs, sometimes roots	Many ailments are treated, including coughs, colds, fever, headache, and menstrual pain. Also used in wound dressing.
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. Within the past couple of years, *H. hemerocallidea* has become commercialised as a source of extracts used in prostate preparations, as well as in various tonics and so-called immune boosting preparations.
Ledebouria spp.	Ledebouria; Common squill	Various parts	*Ledebouria* has been cited as being used for medicinal purposes, including pregnancy, diarrhoea, influenza, backache, skin irritations, wounds, and lumbago (Long 2005). The genus is also reputed to be poisonous in Africa, although it is reported that bushmen eat the bulbs of *L. apertiflora* and *L. revolute* (Pfosser & Speta 2001).
Polygala hottentotta (KZN Book)	Small Purple Broom	Not Specified	Not Specified

The species listed in Table 4 are common, widespread species and not confined to the study area; nor are they unique within the region. However, *Hypoxis hemerocallidea* and *Boophone disticha* are classified as Declining in the Gauteng Province (OL plants). *Hypoxis hemerocallidea* and *Boophone disticha* species were found in the study area (Degraded Grassland Habitat Unit), albeit in low densities.

Hypoxis hemerocallidea has been exploited extensively since 1997 for commercial use which, especially in Gauteng where rapid urbanisation is resulting in habitat loss for the species, has caused declines in population numbers. This species is however naturally abundant and widespread and therefore not considered in danger of extinction. *Boophone disticha* numbers are declining especially in Gauteng and KwaZulu-Natal where habitat loss is driven by urban expansion. This species is also extensively used in the medicinal trade and according to the SANBI Red List of South African Plants' website, the "trade volumes suggest unsustainable harvesting, especially because large, reproductive individuals are being removed". The long-lived species remains widespread and can readily recolonise new sites due the mode of dispersal.

The study area supports several plants that are used medicinally but due to most of these species being widespread and their populations being stable both provincially and nationally, it is unlikely that the proposed development will result in significant loss of medicinal species. During the site visit there was also no evidence of these species being harvested and utilised by human populations in the area. It is however recommended that were the proposed development authorised, the OL species (*Hypoxis hemerocallidea* and *Boophone disticha*) be rescued and relocated to suitable habitat outside of the disturbance footprint area, which should be undertaken by an aptly qualified specialist. If rescue and relocation is implemented for *Hypoxis hemerocallidea* and *Boophone disticha,* no other risks to their populations within the larger region, or locally, are foreseen.

4 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

Based on the criteria provided in Appendix A of this report, all habitats within the study area were allocated an importance category, i.e., a SEI category. SEI is a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) 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.

Table 5 indicates the individual SEI scoring for each habitat unit respectively. Figure 6 indicates the SEI for the study area.

Table 5: SEI importance for the different habitat units associated with the study area.

Unit	CI	FI	BI	RR	SEI	Development Constraints
Degraded Grasslands Habitat	**Low** No confirmed or highly likely populations of SCC. < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** 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 and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Low**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Seep Wetland	**Low** No confirmed or highly likely populations of SCC. < 50% of receptor contains natural habitat with limited potential to support SCC.	**Low** Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but seed dispersal 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.	**Low**	**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. Although functionality associated with the Seep Wetland is anticipated to take a long time to recover, given the shallow soils associated with the Perched Moist Grassland, (and associated floral communities), recovery to a community akin to the present floral community is also anticipated to take a long period of time.	**Medium**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

Unit	CI	FI	BI	RR	SEI	Development Constraints
Transformed Habitat	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**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.	**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, 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.	**Very Low**	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

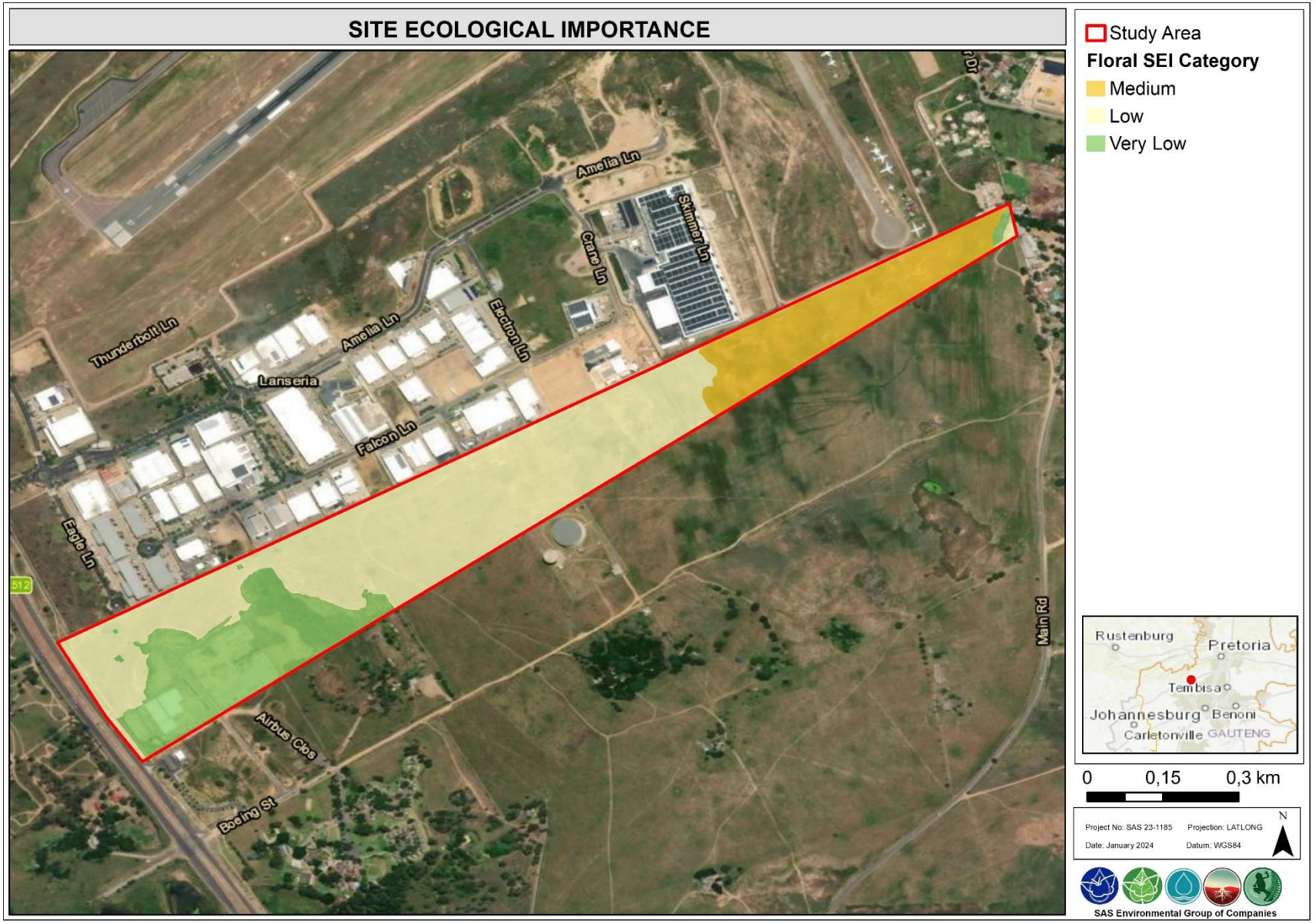


Figure 6: Floral site ecological map for the study area.

5 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed development activities within the study area. For the sake of the impact assessment, it is assumed that all habitats, with the expectation of the Seep Wetland[26] and associated Zone(s) of Regulation (ZOR; refer to the Freshwater Report STS 23-2057, 2024), would be directly impacted by the proposed mixed-use development. As such the impact assessment assumed that the Degraded Grassland, and the Perched Moist Grassland (subunit of the Moits Grassland) and Transformed Habitat would be directly impacted by the proposed development. Potential impacts associated with the development (including secondary impacts and factors such as footprint creep) were considered for the Seep Wetland (subunit of the Moist Grassland). Once layouts have been finalised, the impact assessment may need to be updated accordingly by the biodiversity specialist.

As a low sensitivity for the Plant Species Theme was verified, impacts to floral SCC within the study area are deemed highly unlikely. As such, the impact assessment only pertains to impacts associated with the '*floral habitat and diversity'* and not with impacts pertaining to SCC. However, a compliance statement and impact statement for floral SCC have been provided in this report (refer to Section 5.2.2).

An impact discussion and assessment of all potential (1) Pre-construction & Planning, (2) Construction, and (3) Operational and Maintenance Phase impacts are provided in Section 5.2 and 5.3. All mitigatory measures required to minimise the perceived impacts are presented in Section 5.2.

5.1 Activities and Aspect Register

Table 6 indicates the perceived risks to floral species associated with the activities pertaining to the proposed development.

Table 6: Activities and aspects likely to impact on the floral resources.

ACTIVITIES AND ASPECTS REGISTER	
Pre-Construction & Planning Phase	
-	Potential failure to conduct a walkdown of the approved footprint area before construction activities where floral SCC (mainly comprising OL species and a single threatened species), where present, are marked for rescue and relocation to suitable habitat outside the development footprint.

[26] The proponent has confirmed in writing that development layouts will exclude the Seep Wetland and associated buffers.

ACTIVITIES AND ASPECTS REGISTER
- **Impact**: Permanent loss of floral SCC from the study area.
- Planning of infrastructure placement and design, leading to the loss of floral habitat (even though degraded), as well as unnecessary edge effect impacts on areas outside of the proposed development footprint (especially surrounding Seep Wetland) due to overriding economic and socio-cultural reasons. - **Impact:** Degradation and modification of the receiving environment. Loss of floral habitat.
- 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.
- Potential failure to design and implement rehabilitation plans and erosion control plans before the commencement of construction activities. - **Impact**: further exacerbating the possibility of degradation within the study area and immediate surrounding areas.
Construction Phase
- Site clearing and the removal of indigenous vegetation. - **Impact:** Loss of floral habitat, diversity and potentially occurring floral SCC.
- Potential failure to monitor the success of relocated floral SCC. - **Impact:** Loss of SCC individuals.
- Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native species, including the further transformation of adjacent natural habitat such as open grasslands and watercourses. - **Impact:** Loss of favourable floral habitat outside of the direct development footprint, including a decrease in species diversity and a potential loss of floral SCC.
- Potential failure to demarcate areas in which no development is proposed (e.g., Seep Wetland and associated ZORs). - **Impact:** Loss and/or degradation of Seep Wetland Habitat and associated habitat for potential SCC. - **Impact:** Loss of ecological function and landscape connectivity, especially within functioning CBA (Important) habitat and ESA habitat within surrounding habitats.
- Dumping of construction material within areas where no construction is planned (especially within the Seep Wetland), thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs. - **Impact:** Loss of favourable floral habitat, diversity and SCC as AIPs outcompete and replace these species.
- Potentially poorly managed edge effects: • Potential effective rehabilitation of compacted areas, bare soils, or eroded areas outside of the development of the approved footprint leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and • Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation. - **Impact:** Loss of floral habitat, diversity, and SCC within the direct footprint of the proposed development. Loss of surrounding floral diversity and floral SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
- Possible increased fire frequency during construction. - **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[27] and potentially further decreasing optimal growing/re-establishing conditions. - **Impact:** Potential 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 **l**oss of floral habitat, diversity, and potentially occurring SCC.
- Potential failure to monitor the success of relocated floral SCC. - **Impact:** Loss of SCC individuals
- 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.

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

ACTIVITIES AND ASPECTS REGISTER
- **Impact:** Loss of floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.
- Potential inappropriate design and implementation of stormwater control (especially problematic for the surrounding wetlands). - **Impact:** Degradation and/or loss of favourable habitat within the local area.
- On-going disturbance during operational 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.

5.2 Floral Impact Assessment Results

The below tables indicate the perceived risks to the floral ecology associated with all phases of the proposed development. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Key integrated mitigation measures that are applicable to the proposed project are presented in the below tables and are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed activities.

The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

5.3 Impact Assessment Tables

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

Table 7: Pre-construction & Planning Phase impacts on the floral habitat and diversity from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

Infrastructure	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
PRE-CONSTRUCTION & PLANNING PHASE																
Impact of floral Habitat and Diversity																
Transformed Habitat	1	1	1	1	2	**2**	**4**	**8** **Very Low**	1	1	1	1	1	**2**	**3**	**6** **Very Low**
Degraded Grassland Habitat	3	2	1	1	2	**5**	**4**	**20** **Very Low**	2	2	1	1	1	**4**	**3**	**12** **Very Low**
Perched Moist Grassland	2	3	1	1	2	**5**	**4**	**20** **Very Low**	1	3	1	1	1	**4**	**3**	**12** **Very Low**
Seep Wetland	2	3	1	1	2	**5**	**4**	**20** **Very Low**	1	3	1	1	1	**4**	**3**	**12** **Very Low**
Mitigation Measures for perceived impacts on habitat and species diversity																
- Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as other specialist studies; - It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, are not placed outside of the authorised footprint, especially within the surrounding Seep Wetland (to be excluded from the development activities as per the proponent's communication); - The area in which construction activities is to take place has been fenced off and clearly demarcated (the Seep Wetland and ZOR must be sectioned off accordingly); - Appropriate rehabilitation plans and measures, as well as an Erosion Control Plan must be developed for implementation during the later stages of the development; and - Prior to the commencement of construction activities, an AIP Management/Control Plan must be compiled for implementation: (1) removal of AIP species, especially within the footprint area must preferably commence during the pre-construction phase and continue throughout the construction, operational and maintenance phases. Clearance of AIPs within the footprint area must take place before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread with construction rubble, or soils contaminated with AIP seeds during the construction phase; and (2) an AIP Management/Control Plan must be implemented by a qualified professional. No uncertified chemical control of AIPs to occur without a trained professional or within 30 m of any watercourses.															

Table 8: Construction Phase impacts on the floral habitat and diversity from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

Infrastructure	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
CONSTRUCTION PHASE																
Impact of floral Habitat and Diversity																
Transformed Habitat	5	1	1	2	2	**6**	**5**	**30** **Low**	5	1	1	1	2	**6**	**4**	**24** **Very Low**
Degraded Grassland Habitat	5	2	1	2	2	**7**	**5**	**35** **Low**	5	2	1	1	2	**7**	**4**	**28** **Low**
Perched Moist Grassland	5	3	1	2	2	**8**	**5**	**40** **Low**	5	3	1	1	2	**8**	**4**	**32** **Low**
Seep Wetland	4	3	1	2	2	**7**	**5**	**35** **Low**	3	3	1	1	2	**6**	**4**	**24** **Very Low**

Mitigation Measures for perceived impacts on habitat and species diversity

Development footprint

- The construction footprint must be kept as small as possible in order to minimise impact on the surrounding environment (edge effect management);
- No construction, storage of material or associated wate (e.g., dumping of associated construction material) must be allowed outside of the development footprint (i.e., natural habitat, including the Seep Wetland and surrounding Grassland Habitat);
- Removal of vegetation must be restricted to what is absolutely necessary and must remain within the approved development footprint;
- 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;
- No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC and medicinal species;
- Care must be taken during the construction of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by:
  - Demarcating all footprint areas during construction activities (especially the Seep Wetland and associated buffers);
  - Demarcating sensitive species and habitat that must be maintained as open space;

- A rehabilitation plan must be prepared and implemented, and all rehabilitation actions must be adhered to in order to mitigate edge effects on the receiving environment and surrounds;
- Ensure that no unnatural preferential flow paths are created during construction, i.e., implement appropriate stormwater management must be implemented to ensure that no unnatural preferential flow paths are created and to prevent erosion and siltation;
- All soils compacted (outside of planned footprints) as a result of construction activities must be ripped and profiled and re-seeded; and
- No dumping of litter, rubble or cleared vegetation on site must be allowed. Infrastructure and rubble removed as a result of the construction activities must be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites must be allowed in areas with natural vegetation. 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 facility or garden refuge site;

- If any spills occur, they must be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits must 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 must be practised, preventing the ingress of hydrocarbons into the topsoil;
- No illicit fires must be allowed during the construction of the proposed development;
- Any areas outside of the approved development area that have been left bare because of the construction activities must be rehabilitated using indigenous species; and
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.

Alien Vegetation

- Edge effects arising from the proposed development, such as erosion and AIP species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 3.4 of this report);
- Ongoing AIP monitoring and clearing/control must take place throughout the construction (and operational) phase of the development (especially to prevent further spread into surrounding Grassland and Freshwater Habitats); and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards.

Table 9: Operation and Maintenance Phase impacts on the floral habitat and diversity from the proposed development activities. Required mitigation measures are presented at the bottom of the table.

Infrastructure	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
OPERATIONAL & MAINTENANCE PHASE																
Impact of floral Habitat and Diversity																
Transformed Habitat	1	1	1	1	4	**2**	**6**	**12** **Very Low**	1	1	1	1	4	**2**	**6**	**12** **Very Low**
Degraded Grassland Habitat	1	2	1	1	4	**4**	**6**	**18** **Very Low**	1	2	1	1	4	**3**	**6**	**18** **Very Low**
Perched Moist Grassland	1	3	1	1	4	**5**	**6**	**24** **Very Low**	1	3	1	1	4	**4**	**6**	**24** **Very Low**
Seep Wetland	3	3	2	2	4	**6**	**8**	**48** **Low**	2	3	2	1	4	**5**	**7**	**35** **Low**
Mitigation Measures for perceived impacts on habitat and species diversity																

Development footprint

- No dumping of litter or (cleared) vegetation and/or garden refuse must be allowed on-site. As such it is advised that vegetation cuttings from landscaped/garden areas (if present) be carefully collected and disposed of at a separate waste facility;
- Stormwater management systems must be designed and implemented; and
- If any fires break out, they must be extinguished immediately. Fire extinguishers and hoses must be easily accessible through the proposed infrastructure development to allow for quick use in the case of fire. This is of particular importance given that the study area is surrounded by grassland habitat (which may catch a light easily).

Alien Vegetation

- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2020) (section 3.4 of this report);

- Ongoing AIP monitoring and clearing/control must take place throughout the operational phase, and the project perimeters must be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.

5.4 Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed mixed-use development. After rating impacts on floral ecology resulting from the proposed development, the impacts associated with the floral habitat and diversity are anticipated to range from low to very low prior to the implementation of mitigation measures. These associated impacts are anticipated to be reduce provided that strict mitigation measures are implemented.

For floral habitat and diversity, the construction will have the greatest immediate impacts, with the operational and maintenance phase likely to have ongoing, long-term impacts on habitat and diversity if edge effect management is not appropriately implemented.

5.4.1 Impact on Floral Habitat and Diversity

The data gathered during the site visit indicate that the Seep Wetland was of a medium SEI, the Degraded Grassland was of low SEI and the Transformed Habitat was of very low SEI. The proposed development will impact on these habitat units to varying degrees and is discussed in more detail below.

Prior to mitigation measures implemented

The impact significance on the floral habitat and diversity is anticipated to be **very low**. The *Pre-construction Phase* will have limited direct impacts on floral habitat and diversity with the only direct impact stemming from inconsiderate planning of layouts and failure to implement appropriate rehabilitation, AIP control, and erosion control (stormwater) plans.

The *Construction Phase* will have the greatest impact on floral habitat and diversity due to vegetation clearing activities, with impact significance on habitat and diversity within the Degraded Grassland and Transformed Habitat anticipated to be **low**, resulting in a limited loss of a diversity of floral species. Direct impacts on the Seep Wetland are not anticipated as construction is assumed to occur outside of the Wetland and associated buffers. However, secondary impacts are possible, and if no mitigated, impacts to the Seep Wetland are anticipated (**low significance**). It must be ensured that development is excluded from the Seep Wetland (identified as a watercourse by the NWA), and that the associated regulated buffer zones are implemented – refer to recommendation in the Freshwater assessment (STS 22-2057, 2024). A vegetated corridor around the Seep Wetland should be considered as this will be very beneficial in ensuring connectivity across the landscape (especially for neighbouring CBA and ESA habitat). Impacts on the remaining habitat are anticipated to be **low** (Transformed Habitat). Impacts associated with this habitat is anticipated to be localised with edge effects of limited extent if well managed.

For the *Operational and Maintenance Phase*, impacts on floral habitat and diversity will largely be indirect in nature and will stem from edge effects such as lack of AIP control, poor rehabilitation of areas outside of the approved footprint that has been impacted by construction activities, poor storm water management, as well as increased human movement through natural areas outside of the approved footprint.

With mitigation measures implemented

With mitigation measures implemented, the direct and indirect impacts on the floral habitat and diversity can be reduced to **low** and **low to very low** significance levels. To ensure impacts remain localised, it must be ensured that planned and authorised footprints do not increase during the Construction Phase and/or Operational & Maintenance Phase. It must also be ensured that no footprint creep occurs (especially within the Seep Wetland).

The most significant impacts to affect the floral habitat integrity and species diversity within the study area include, but are not limited to, the following:

- Loss of indigenous floral habitat and diversity resulting from vegetation clearing activities;
- AIP proliferation into adjacent natural vegetation, displacing indigenous flora and altering favourable habitat conditions for the establishment of indigenous species;
- Fragmentation of surrounding CBA and ESA habitat; and
- Increased human populations in the surrounding area resulting in greater pressure on natural floral habitat.

5.4.2 Impacts on Floral SCC

As no threatened species were recorded within the study area and as no habitat to support such species is deemed present within the study area, a Plant Species Compliance Statement is required. Thus, to meet the requirements of the Terrestrial Plant Species Compliance Statement, a statement and impact statement have been provided in this section of the report.

Plant Species Compliance Statement: The findings of the site assessment disputed the screening tool outcome of *medium sensitivity* for the Plant Species Theme and instead verifies a *low sensitivity*.

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

- Loss of SCC habitat during vegetation clearing activities;
- Destruction, removal or harvesting of floral SCC during Pre-construction, Construction, Operational and Maintenance Phase activities; and

- Potentially poorly implemented and monitored rescue and relocation of SCC that will be affected by the proposed project, leading to unsuccessful rescue efforts and loss of SCC individuals. For *Boophone disticha* and *Hypoxis hemerocallidea*, three years of subsequent monitoring is recommended for relocated species.

Impact mitigation: The two (2) OL species recorded within the study area, namely *Boophone disticha* and *Hypoxis hemerocallidea,* are species with large bulbs that require larger areas to be dug up. As such, the relocation activities must be undertaken by a suitably trained individual to minimise impacts to the species and associated habitat to which they are relocated. **Permits for the relocation of OL species within the development footprint area is not required**. However, if these species need to be relocated to surrounding habitat outside of the development footprint area. Although these OL species were recorded within the Degraded Grassland Habitat, the abundance thereof was low, and it is unlikely that other species will be recorded; these species are widespread occurring species (i.e., not restricted to Gauteng) that can tolerate various habitat types and conditions. As such the study area is not regarded as important to support populations of these OL species.

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

According to the Gauteng C-plan (2013) the study area is located within an Important CBA area (also referred to as a CBA 2), an ESA, and a RLE (namely the CR Egoli Granite Grassland).

As per the Gauteng C-Plan, CBA 2 areas overlapped with the Degraded Grassland, the Transformed Habitat, and the Moist Grassland Habitat. The triggering features for the CBA 2 included the presence of primary vegetation and habitat for Red Listed bird species. Red listed bird habitat was identified by the Gauteng conservation plan as being located within the south-western corner of the study area (i.e., the area in which the Transformed Habitat is located). Given the modified nature thereof, no habitat for red-listed birds is available within the study area. Furthermore, as the vegetation communities have been subject to considerable anthropogenic activities (both historically and currently), the subsequent degraded floral communities are not considered primary vegetation; instead, the floral communities are secondary in nature. Given the above, it is concluded that no intact, functioning CBA (Important) habitat is present within the Degraded Grassland, the Moist Grassland, or the Transformed Habitat.

A small section in the east of the study area overlaps with an ESA. The overlapping habitat includes the Moist Grassland. Only the Seep Wetland is considered to provide functioning ESA habitat (albeit modified), especially as the wetland contributes to some ecological function and connectivity within the greater landscape.

According to the RLE (2022) database, the study area is located within the CR Egoli Granite Grassland. Sections of the Degraded Grassland, Transformed Habitat, and Moist Grassland units all overlap with the remaining extent of the RLE. However, given the altered species communities and structure within these habitats, and the associated shift from the typical floral communities that are associated with the reference vegetation type (i.e., Egoli Granite Grassland vegetation), no representative RLE habitat was identified within the study area.

The NPAES (2018) database indicates the study area to be in an area identified as a Priority Focus Area. However, these Priority Focus Areas within the study area somewhat align with the provincial mapping of the CBA Important Areas. As no CBA habitat was recorded on site, and based on the condition of the veld, together with the site's occurrence in an urbanised setting, the study area is not considered a suitable target for protected areas expansion.

The study area is surrounded by peri-urban development and as such continuous degradation of this area will continue, even without development taking place. Should the project get authorisation, mitigation efforts must, therefore, be aimed at limiting edge effects and implementing an AIP management plan.

5.4.4 Probable Residual Impacts[28]

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

- Permanent loss of niche floral habitat on a local scale;
- Permanent loss of and altered floral species diversity on a local scale;
- Edge effects such as habitat fragmentation and AIP proliferation;
- The ongoing loss of SCC and suitable habitat for such species; and
- Disturbed areas not rehabilitated to an ecologically functioning state.

5.4.5 Cumulative Impacts[29]

A major threat to the biodiversity of the study area (including floral biodiversity and the CR vegetation type, namely the Egoli Granit Grassland), and particularly the surrounding areas is the continued expansion of the Lanseria Airport and/or associated infrastructure features.

[28] **Probable Residual Impacts:** Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology, and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.

[29] **Possible Cumulative Impacts**: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Such development may result in the creation of a 'node' of urbanisation which will negatively impact the biodiversity of the area (i.e., through removal and/or transformation of suitable habitat by expensing construction).

Apart from development/urban expansion, another threat to the floral ecology within the study area is the continued proliferation of AIP species, resulting in the overall loss of native floral communities within the local area. The proposed development will increase the movement of humans within the area and could lead to increased harvesting of floral SCC and / or the degradation of suitable floral habitat for SCC due to continued exposure to anthropogenic disturbances.

6 CONCLUSION

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

The proposed activities will impact on the habitat units within the study area to varying degrees. The biggest impact from the proposed activities will be within habitat of **low** and **very low SEI's**, whereas only a small aspect of the proposed activities has the potential to impact on habitat with **high SEI's**. However, given the mitigation measures as provided in section 6.1 (and any additional mitigation measures provided in the freshwater report) the anticipated impact from the proposed development is considered to vary between **low** and **very low** impact significance.

This study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.

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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 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)[30], 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[31]). 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.
- 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

[30] Larsen, T.H. ed., 2016. Core standardized methods for rapid biological field assessment. Conservation International.
[31] 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.

and hence, longer surveys in certain areas are necessary (skewing the timed approach). This is especially true for the pre-defined broad habitats within more sensitive areas such as the Sekhukhune Centre of Plant Endemism where desktop databases may not be a true reflection of on-site habitat extent and heterogeneity. 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:

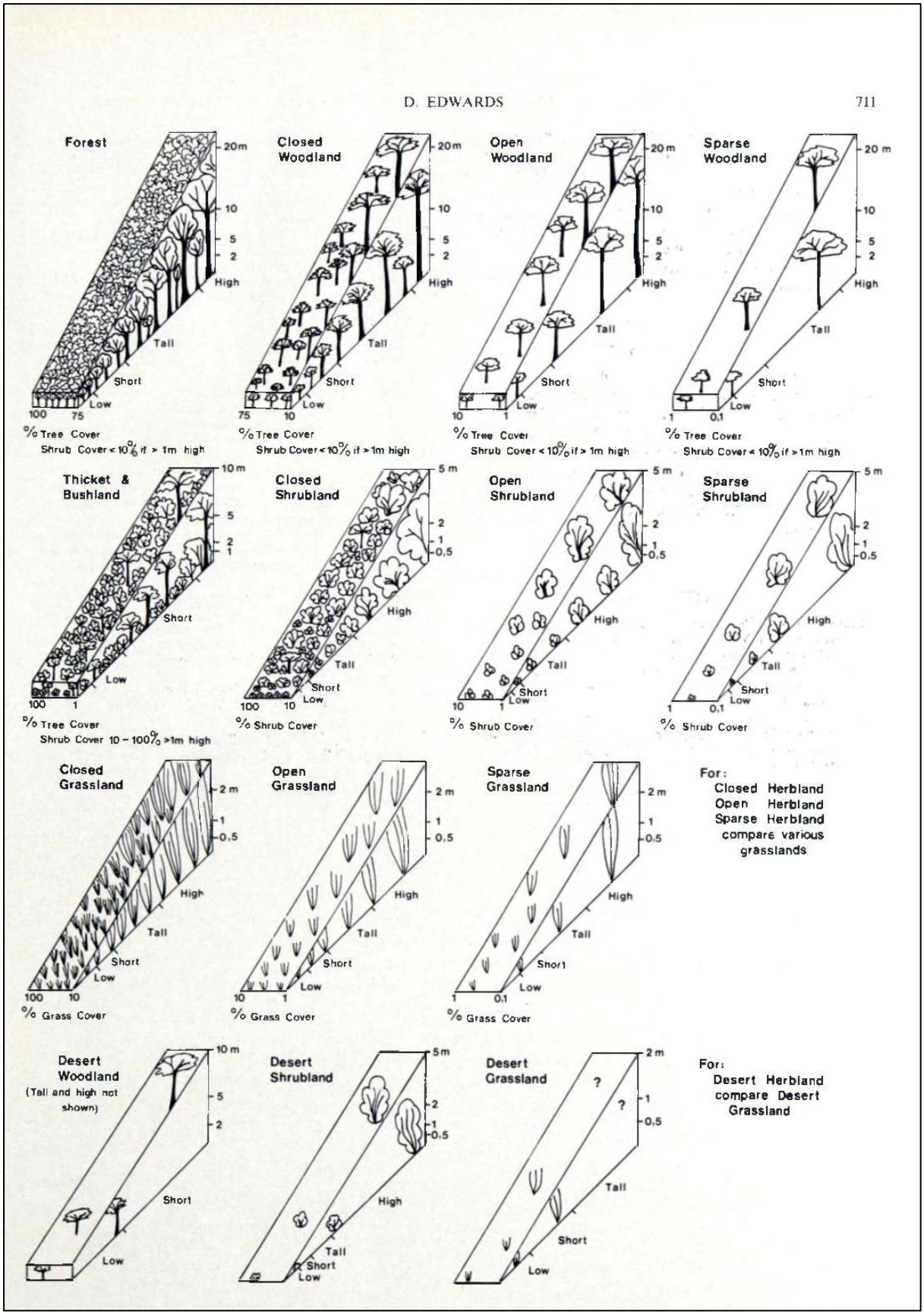

Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

Floral Species of Conservational Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the study area, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g., NT and DD taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, two 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[32]:

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

BRAHMS Online Website

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

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the BODATSA, which contains records from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).
- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (http://redlist.sanbi.org/).

[32] 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

- Typically, data is extracted for the Quarter Degree Square (QDS) in which the study area is situated but where it is deemed appropriate, a larger area can be included.

NEMBA TOPS Species

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

NFA Species

The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA), as per government Notice 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA, provide a list of nationally protected tree species within South Africa. These species were taken into consideration during the field assessment.

GDARD SPECIES STATUS REPORT FOR THE QDS 2527DD

The Gauteng Department of Agriculture and Rural Development (GDARD) provided data on SCC recorded within the QDS 2527DD. 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.

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, a 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 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[33]) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

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

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

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

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

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

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

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

BI = CI + FI

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

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

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

[33] 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.

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[34] 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[35].

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.

[34] 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.

[35] 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.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[36] or Critically Rare[37] species that have a global EOO of < 10 km^2. - Any area of natural habitat[38] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[39]) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).
High	- Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. - Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. - Presence of Rare species. - Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	- Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. - Any area of natural habitat of threatened ecosystem type with status of VU. - Presence of range-restricted species. - > 50% of receptor contains natural habitat with potential to support SCC.
Low	- No confirmed or highly likely populations of SCC. - No confirmed or highly likely populations of range-restricted species. - < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	- No confirmed and highly unlikely populations of SCC. - No confirmed and highly unlikely populations of range-restricted species. - No natural habitat remaining.

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

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

These criteria can be defined as:

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

[36] For butterflies, as per Armstrong *et al*. (2013).
[37] For plants, as per Raimondo *et al*. (2009).
[38] 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.
[39] 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).

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

Observed Floral Species

Table B1 provides a list of the floral species recorded during the site assessment.

Table B1: Dominant floral species recorded during the field assessment. Alien species identified during the field assessment are indicated with an asterisk (*). SCC are indicated in bold.

Species	Degraded Grassland	Transformed Habitat	Moist Grassland
Woody Species			
**Acacia mearnsii*	x	x	
**Lantana camara*	x	x	
**Melia azedarach*	x		
**Morus alba*	x	x	
**Robinia pseudoacacia*		x	
**Solanum mauritianum*		x	
**Solanum sisymbriifolium*	x	x	
**Yukka* sp.		x	
Asparagus laricinus	x	x	
Elephantorrhiza elephantina	x		
Gomphocarpus fruticosus	x	x	
Gymnosporia buxifolia		x	
Lantana rugosa	x		
Lippia javanica	x		
Searsia lancea	x	x	
Searsia pyroides	x	x	
Seriphium plumosum	x		x
Vachellia karroo	x		
Ziziphus mucronata	x		
Herbaceous Species			
**Argemone ochroleuca* subsp. *ochroleuca*	x	x	x
**Bidens pilosa*		x	
**Conyza bonariensis*	x	x	x
**Glandularia aristigera*	x		
**Gomphrena celosioides*	x		x
**Plantago lanceolata*	x	x	x
**Tagetes minuta*	x	x	
**Taraxacum officinale*	x		x
**Trifolium repens*	x		x
**Verbena bonariensis*	x	x	x
Acalypha angustata	x		x
Berkheya radula	x		x
***Boophone disticha* (GDARD)**	x		
Chamaecrista comosa	x	x	x
Commelina africana	x		x
Cyanotis speciosa	x		x
Denekia capensis			x
Gazania krebsiana subsp. *serrulata*	x		x

Geigeria burkei	x		
Gerbera viridifolia	x		
Graderia subintegra	x		
Helichrysum argyrophyllum	x		
Helichrysum rugulosum	x		x
Hermannia depressa		x	
Hilliardiella oligocephala	x		x
Hypoxis acuminata			x
***Hypoxis hemerocallidea* (GDARD)**	x		
Hypoxis obtusa	x		
Kohautia amatymbica	x		
Lasiosiphon capitatus	x		
Ledebouria ovatifolia	x		x
Ledebouria revoluta	x		
Lobelia erinus			x
Nidorella hottentotta	x		x
Ocimum obovatum	x		
Pelargonium luridum	x		x
Pentanisia angustifolia	x		
Polygala hottentotta	x		
Tulbaghia acutiloba	x		x
Tulbaghia leucantha			x
Succulent Species			
**Agave americana*	x	x	
**Agave angustifolia*	x	x	
Aloe greatheadii	x		
Euphorbia clavarioides	x		
Graminoid Species			
Aristida congest subsp. *congesta*	x	x	
Bulbostylis burchellii			x
Cymbopogon caesius	x		
Cynodon dactylon	x	x	x
Cyperus esculentus		x	x
Cyperus obtusiflorus	x		x
Cyperus semitrifidus			x
Cyperus sphaerocephalus	x		
Digiatria eriantha	x		
Eragrostis capensis	x		x
Eragrostis chloromelas	x	x	
Eragrostis curvula	x		x
Eragrostis gummiflua	x		
Eragrostis racemosa	x		
Heteropogon contortus	x	x	
Hyparrhenia hirta	x	x	
Melinis repens	x		x
Sporobolus africana			x
Themeda triandra	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 (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalised population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- ^{N}**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- ^{N}**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km^2, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km^2, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern (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 (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in Plants of southern Africa: an online checklist are species that do not qualify for national listing because they are naturalised 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.

Floral Species of Conservation Concern (SCC) that were assessed for the study area are listed within the tables below:

NATIONAL SCC

RDL & Floral SCC obtained from BODATSA and the National Web-based Screening Tool

Table C1: Red Data Listed plant species recorded in the QDS 2527DD and the National Web-based Screening Tool. Species list obtained from the new Plants of southern Africa (new POSA) online catalogue. Information on species distributions and conservation status were derived from the Red List of South African Plants website (http://redlist.sanbi.org/index.php). See also Table C4

Scientific Name	IUCN	Habitat Description	POC
Cineraria longipes	VU	**Range**: Klipriviersberg and Suikerbosrand. **Major habitats**: Waterberg Mountain Bushveld, Carletonville Dolomite Grassland. **Description**: Southwest-facing soil pockets and rock crevices in chert rock. **Population trend**: Decreasing.	Low
Cleome conrathii	NT	**Range**: Kuruman to Pretoria. **Major habitats**: Grassland & Savanna. **Description**: Stony quartzite slopes, usually in red sandy soil, grassland or deciduous woodland, all aspects. **Population trend**: Stable.	Low
Delosperma leendertziae	NT	**Range:** Magaliesberg, Roodepoort Ridge and Suikerbosrand **Major habitats**: Gold Reef Mountain Bushveld, Dwarsberg-Swartruggens Mountain Bushveld, Loskop Mountain Bushveld, Andesite Mountain Bushveld, Gauteng Shale Mountain Bushveld **Description**: Steep, south-facing slopes of quartzite in mountain grassland **Population trend**: Decreasing.	Low
Dicliptera magaliesbergensis	VU	**Range:** Krugersdorp to Onderstepoort. **Major habitats**: Carletonville Dolomite Grassland, Gold Reef Mountain Bushveld, Rand Highveld Grassland, Norite Koppies Bushveld, Gauteng Shale Mountain Bushveld. **Description**: Riverine Forest and bush. **Population trend**: Decreasing.	Low
Drimia sanguinea	NT	**Range:** Northern Cape and across to Limpopo and Mpumalanga Provinces, Namibia, Botswana, and Zimbabwe. **Major habitats**: Savanna. **Description**: Open veld and scrubby woodland in a variety of soil types. **Population trend**: Decreasing.	Low
Habenaria barbertoniae	NT	**Range**: Gauteng and Mpumalanga. **Major habitats**: Savanna. **Description**: Rocky hillsides, in bushveld in association with acacias, 1000-1500 m. **Population trend**: Decreasing.	Low
Habenaria kraenzliniana	NT	**Range:** Mainly in Gauteng, with a few isolated records from the Wolkberg Mountains in Limpopo and northern KwaZulu-Natal **Major Habitats:** Grassland **Description:** Stony, grassy hillsides, 1000-1400 m **Population Trend:** Decreasing	Low
Habenaria mossii	EN	**Range:** Johannesburg, Pretoria, and Krugersdorp **Major Habitats:** Andesite Mountain Bushveld, Carletonville Dolomite Grassland	Low

Scientific Name	IUCN	Habitat Description	POC
		Description: Open grassland on dolomite or in black, sandy soil. **Population Trend:** Decreasing	
Holothrix randii	NT	**Range**: Gauteng and Limpopo Province, Zimbabwe, Tanzania, and Kenya. **Major habitats**: Grassland. **Description:** Grassy slopes and rock ledges, usually southern aspects. **Population trend**: Decreasing.	Low
Melolobium subspicatum	VU	**Range**: Krugersdorp to Pretoria. **Major habitats**: Soweto Highveld Grassland, Egoli Granite Grassland, Carletonville Dolomite Grassland. **Description**: Grassland. **Population trend**: Stable.	Low
Pearsonia bracteate	NT	**Range**: Wolkberg and Pretoria to Klerksdorp. **Major habitats**: Grassland & Savanna. **Description**: Plateau grassland **Population trend**: Decreasing.	Low
Prunus africana	VU	**Range**: Widespread in Africa from the southern Cape, through KwaZulu-Natal, Swaziland and northwards into Zimbabwe and central Africa and the islands of Madagascar and Comoros. **Major habitats**: Eastern Valley Bushveld, Gold Reef Mountain Bushveld, Ohrigstad Mountain Bushveld, Poung Dolomite Mountain Bushveld, Mamabolo Mountain Bushveld, Soutpansberg Mountain Bushveld, Northern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotemperate Forest. **Description**: Evergreen forests near the coast, inland mistbelt forests and Afromontane forests up to 2100 m. **Population trend**: Decreasing.	Low
Xerophyta adendorfii	VU	**Range**: Magaliesberg and Witwatersberg ranges between Brits and Lanseria Airport in north-western Gauteng. **Major habitats**: Gold Reef Mountain Bushveld, Moot Plains Bushveld, Gauteng Shale Mountain Bushveld, Carletonville Dolomite Grassland. **Description**: Dolomite and quartzite ridges and outcrops. **Population trend**: Decreasing.	Low
Cheilanthes deltoidea subsp. *Silicola*	**VU**	**Range**: Waterberg, Centurion and Irene, Gauteng. **Major habitats**: Grassland, Savanna **Description**: 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. **Population trend**: Decreasing	Low
Sensitive Species 1248	**VU**	Not provided to protect species identity.	Low
Melolobium subspicatum	**VU**	**Range**: Krugersdorp to Pretoria. **Major habitats**: Soweto Highveld Grassland, Egoli Granite Grassland, Carletonville Dolomite Grassland. **Description**: Grassland. **Population trend**: Stable.	Low

NEMBA TOPS List for South Africa[40]

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**
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**

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

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Encephalartos 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**
Encephalartos laevifolius	Kaapsehoop Cycad	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga **Description**: Steep, rocky slopes in mistbelt grassland, 1300-1500 m.	**CR**
Encephalartos lanatus	No common name	**Low**	**Provincial distribution**: Gauteng and western Mpumalanga **Description**: Sheltered, wooded ravines in sandstone ridges, 1200-1500 m.	**NT; P**
Encephalartos latifrons	Albany Cycad	**Low**	**Provincial distribution**: Eastern Cape	**CR**
Encephalartos lebomboensis	Lebombo Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal, Mpumalanga **Description**: Cliffs and rocky ravines in savanna and grassland.	**EN**
Encephalartos lehmannii	No common name	**Low**	**Provincial distribution**: Eastern Cape	**NT; P**
Encephalartos longifolius	No common name	**Low**	**Provincial distribution**: Eastern Cape	**NT; P**
Encephalartos middelburgensis	Middelburg Cycad	**Low**	**Provincial distribution**: Gauteng, Mpumalanga **Description**: Open grasslands and in sheltered valleys.	**CR**
Encephalartos msinganus	Msinga, Cycad	**Low**	**Provincial distribution**: KwaZulu-Natal	**CR**
Encephalartos natalensis	Natal Giant Cycad	**Low**	**Provincial distribution**: Eastern Cape, KwaZulu-Natal	**NT; P**

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

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Warburgia salutaris	Pepper-bark Tree	**Low**	**Provincial distribution**: KwaZulu-Natal, Limpopo, Mpumalanga **Range**: North-eastern KwaZulu-Natal, Mpumalanga, and Limpopo Province. Also occurs in Swaziland, Mozambique and Zimbabwe and Malawi. **Description**: Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets.	**EN**
Zantedeschia jucunda	Yellow Arum Lilly	**Low**	**Provincial distribution**: Limpopo	**VU**

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

NFA Protected Trees

Table C3: NFA plant list for species with a known distribution range falling within the study area.

SCIENTIFIC NAME	POC	HABITAT & DISTRIBUTION[41] & [42]	CONSERVATION STATUS
Boscia albitrunca	**Low**	Habitat mainly includes dry, open woodland and bushveld, mostly in hot, arid, semi-desert areas, often on termitaria. The vast distribution range covers Botswana, Limpopo, Gauteng, North-West, Swaziland, the Free State, Northern Cape, and KwaZulu-Natal. It also extends into Zambia, Zimbabwe, and Mozambique.	**LC** **P**
Pittosporum viridiflorum	**Low**	*Pittosporum viridiflorum* is widely distributed in the eastern half of South Africa, occurring from the Western Cape up into tropical Africa and beyond to Arabia and India. It grows over a wide range of altitudes and varies in form from one location to another. *Pittosporum viridiflorum* grows in tall forest and in scrub on the forest margin, kloofs and on-stream banks.	**LC** **P**
Podocarpus elongatus	**Low**	*Podocarpus elongatus* is confined to the winter-rainfall Western Cape. It occurs from the Van Rhynsdorp area in the north through the Cedarberg and Bokkeveld Mountains to Swellendam in the south and does not occur naturally on the Cape Peninsula. It is found growing on deep sandy soils, often along rivers and streams. Large trees can be seen on the banks of the Breede River at the Bontebok National Park near Swellendam. *Podocarpus elongatus* is the only member of the family that is endemic to southern Africa.	**LC** **P**
Podocarpus henkelii	**Low**	In its natural environment *Podocarpus henkelii* is a tall to very tall, straight stemmed forest tree, reaching 20 to 30 m in height. It is found from the former Transkei in the Eastern Cape to KwaZulu-Natal. It is most abundant in moist inland forest, locally common in montane forest of the Northern KwaZulu-Natal Drakensberg. The largest concentrations of *Podocarpus henkelii* are found in areas between Mt Ayliff, Kokstad and Harding.	**LC** **P**

[41] http://pza.sanbi.org/
[42] http://redlist.sanbi.org/index.php

SCIENTIFIC NAME	POC	HABITAT & DISTRIBUTION[41] & [42]	CONSERVATION STATUS
Podocarpus latifolius	**Low**	The real yellowwood grows naturally in mountainous areas and forests in the southern, eastern, and northern parts of South Africa, extending into Zimbabwe and further north. It is also found on rocky hillsides and mountain slopes but does not get as tall where it is exposed as it does in the forests.	**LC P**
Prunus africana	**Low**	*Prunus africana* is a medium to large, handsome evergreen tree with a spreading crown of 10 to 20 m when mature. It is confined to evergreen forests from near the coast to the mist belt and montane forests in KwaZulu-Natal, Eastern Cape, Swaziland, Mpumalanga, Zimbabwe, and tropical Africa. This It is a moderately fast-growing tree which is sensitive to heavy frost, preferring areas where there is regular rain; it will tolerate moderate frosts.	**VU P**

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

Provincially Protected Species as per GDARD

Table C4: Floral SCC expected to occur within the QDS 2527DD in which the study area is located as obtained from GDARD. Additional information on species threat status as defined in The Red List of South African Plants (http://redlist.sanbi.org/index.php) is presented. See also Table C1.

Family	Species	Status	Habitat	POC
AMARYLLIDACEAE	*Boophone disticha*	LC	**Range**: Throughout South Africa and up to Uganda. **Major habitats**: Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, Succulent Karoo. **Description**: Dry grassland and rocky areas. **Population trend:** Decreasing.	**Confirmed**
HYACINTHACEAE	Sensitive species 1248	VU	Not provided to protect the species identity	Low
ASTERACEAE	*Callilepis leptophylla*	LC	**Range**: Widespread in eastern half of South Africa, and Swaziland. **Major habitats**: Grassland, Savanna. **Description**: Grassland or open woodland, often on rocky outcrops or rocky hill slopes. **Population trend:** Decreasing.	Low
PTERIDACEAE	*Cheilanthes deltoidea* subsp. *Silicola*	VU	**Range**: Waterberg, Centurion and Irene, Gauteng. **Major habitats**: Grassland, Savanna **Description**: 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. **Population trend**: Decreasing	Low
ASTERACEAE	*Cineraria longipes*	VU	**Range**: Klipriviersberg and Suikerbosrand.	Low

Family	Species	Status	Habitat	POC
			Major habitats: Waterberg Mountain Bushveld, Carletonville Dolomite Grassland. **Description**: Southwest-facing soil pockets and rock crevices in chert rock. **Population trend**: Decreasing.	
BRASSICACEAE	*Cleome conrathii*	NT	**Range**: Kuruman to Pretoria. **Major habitats**: Grassland & Savanna. **Description**: Stony quartzite slopes, usually in red sandy soil, grassland or deciduous woodland, all aspects. **Population trend**: Stable.	Low
AIZOACEAE	*Delosperma leendertziae*	NT	**Range:** Magaliesberg, Roodepoort Ridge and Suikerbosrand **Major habitats**: Gold Reef Mountain Bushveld, Dwarsberg-Swartruggens Mountain Bushveld, Loskop Mountain Bushveld, Andesite Mountain Bushveld, Gauteng Shale Mountain Bushveld **Description**: Steep, south-facing slopes of quartzite in mountain grassland **Population trend**: Decreasing.	Low
ACANTHACEAE	*Dicliptera magaliesbergensis*	VU	**Range:** Krugersdorp to Onderstepoort. **Major habitats**: Carletonville Dolomite Grassland, Gold Reef Mountain Bushveld, Rand Highveld Grassland, Norite Koppies Bushveld, Gauteng Shale Mountain Bushveld. **Description**: Riverine Forest and bush. **Population trend**: Decreasing.	Low
HYACINTHACEAE	*Drimia altissima*	LC	**Range:** Western Cape to Limpopo Province and Swaziland, and through southern Africa up to Angola and the Congo. **Major habitats**: Albany Thicket, Fynbos, Grassland, Savanna. **Description**: Hot, dry bushveld and thicket. **Population trend**: Decreasing.	Low
HYACINTHACEAE	*Drimia sanguinea*	NT	**Range:** Northern Cape and across to Limpopo and Mpumalanga Provinces, Namibia, Botswana and Zimbabwe. **Major habitats**: Savanna. **Description**: Open veld and scrubby woodland in a variety of soil types. **Population trend**: Decreasing.	Low
GUNNERACEAE	*Gunnera perpensa*	LC	**Range**: Western Cape to Ethiopia. **Major habitats**: Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna. **Description**: Damp marshy area and vleis from coast to 2400 m. **Population trend**: Decreasing.	Medium

Family	Species	Status	Habitat	POC
ORCHIDACEAE	*Habenaria barbertoniae*	NT	**Range**: Gauteng and Mpumalanga. **Major habitats**: Savanna. **Description**: Rocky hillsides, in bushveld in association with acacias, 1000-1500 m. **Population trend**: Decreasing.	Low
ORCHIDACEAE	*Habenaria kraenzliniana*	NT	**Range:** Mainly in Gauteng, with a few isolated records from the Wolkberg Mountains in Limpopo and northern KwaZulu-Natal **Major Habitats:** Grassland **Description:** Stony, grassy hillsides, 1000-1400 m **Population Trend:** Decreasing	Low
ORCHIDACEAE	*Habenaria mossii*	EN	**Range:** Johannesburg, Pretoria and Krugersdorp **Major Habitats:** Andesite Mountain Bushveld, Carletonville Dolomite Grassland **Description:** Open grassland on dolomite or in black, sandy soil. **Population Trend:** Decreasing	Low
ORCHIDACEAE	*Holothrix randii*	NT	**Range**: Gauteng and Limpopo Province, Zimbabwe, Tanzania and Kenya. **Major habitats**: Grassland. **Description:** Grassy slopes and rock ledges, usually southern aspects. **Population trend**: Decreasing.	Low
HYPOXIDACEAE	*Hypoxis hemerocallidea*	LC	**Range**: Widespread in the eastern part of southern Africa from the Eastern Cape to Botswana and Mozambique. **Major habitats**: Albany Thicket, Grassland, Indian Ocean Coastal Belt, Savanna. **Description**: Occurs in a wide range of habitats, including sandy hills on the margins of dune forests, open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus. Appears to be drought and fire tolerant. **Population trend**: Decreasing.	**Confirmed**
AQUIFOLIACEAE	*Ilex mitis* var. *mitis*	LC	**Range**: Widespread from Table Mountain in the Western Cape to Ethiopia and also Madagascar. **Major habitats**: Albany Thicket, Forest, Fynbos, Grassland, Indian Ocean Coastal Belt, Savanna. **Description**: Along rivers and streams in forest and thickets, sometimes in the open. Found from sea level to inland mountain slopes. **Population trend**: Decreasing	Low
FABACEAE	*Melolobium subspicatum*	VU	**Range**: Krugersdorp to Pretoria.	Low

Family	Species	Status	Habitat	POC
			Major habitats: Soweto Highveld Grassland, Egoli Granite Grassland, Carletonville Dolomite Grassland. **Description**: Grassland. **Population trend**: Stable.	
FABACEAE	*Pearsonia bracteate*	NT	**Range**: Wolkberg and Pretoria to Klerksdorp. **Major habitats**: Grassland & Savanna. **Description**: Plateau grassland **Population trend**: Decreasing.	Low
ROSACEAE	*Prunus africana*	VU	**Range**: Widespread in Africa from the southern Cape, through KwaZulu-Natal, Swaziland and northwards into Zimbabwe and central Africa and the islands of Madagascar and Comoros. **Major habitats**: Eastern Valley Bushveld, Gold Reef Mountain Bushveld, Ohrigstad Mountain Bushveld, Poung Dolomite Mountain Bushveld, Mamabolo Mountain Bushveld, Soutpansberg Mountain Bushveld, Northern Coastal Forest, Scarp Forest, Northern Mistbelt Forest, Southern Mistbelt Forest, Northern Afrotemperate Forest. **Description**: Evergreen forests near the coast, inland mistbelt forests and Afromontane forests up to 2100 m. **Population trend**: Decreasing.	Low
VELLOZIACEAE	*Xerophyta adendorfii*	VU	**Range**: Magaliesberg and Witwatersberg ranges between Brits and Lanseria Airport in north-western Gauteng. **Major habitats**: Gold Reef Mountain Bushveld, Moot Plains Bushveld, Gauteng Shale Mountain Bushveld, Carletonville Dolomite Grassland. **Description**: Dolomite and quartzite ridges and outcrops. **Population trend**: Decreasing.	Low