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**FLORAL ECOLOGICAL SCAN AND INDIGENOUS
VEGETATION VERIFICATION ASSESSMENT AS PART OF
THE ENVIRONMENTAL AUTHORISATION PROCESS FOR
THE PROPOSED MOGALAKWENA THIRD
CONCENTRATOR (M3C) PRE-ASSEMBLY AREA, LIMPOPO
PROVINCE**

Prepared for

SRK Consulting (South Africa) (Pty) Ltd

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SAS Environmental Group of Companies

EXECUTIVE SUMMARY

Scientific Terrestrial Services CC (STS) was appointed to conduct an assessment for indigenous vegetation¹ and floral ecological assessment as part of the Environmental Authorisation (EA) process to authorise the third concentrator (known as the M3C) pre-assembly area, hereafter referred to as the “**study area**”, for the Mogalakwena Complex.

Following the field assessment, two habitat units were identified within the study area for which no indigenous vegetation was identified within either of the habitat units. The presence (or absence) of indigenous vegetation was determined based on the definition provided in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Listing Notices – Activity 27 of Listing Notice 1 (GNR 327) and Activity 12 of Listing Notice 3 (GNR 324) were checked for relevance. The habitat units were determined based on species composition, vegetation structure, ecological function, biophysical environment, and habitat condition. The habitat units identified included:

- **Secondary Thornveld Habitat:** this habitat unit comprises the largest extent of the study area (approximately 15 hectare (ha)). The Secondary Thornveld habitat is associated with a poor floristic diversity and is typically characterised by vegetation communities that are dominated by encroaching *Dichrostachys cinerea* and *Vachellia tortilis* subsp. *heteracantha*; and
- **Heavily Degraded Habitat:** this habitat unit (the smaller of the habitats, approximately 2.8 ha) was largely associated with areas of little to no vegetation or with areas of very poor floristic diversity. The habitat is typically characterised by transformed areas (e.g., areas cleared for parking) as well as areas that were historically built-up and which has subsequently become dilapidated and have not been the subject of any rehabilitation efforts.

The sensitivities, from a floral perspective, of each of the habitat units were as follows: The Heavily Degraded Habitat was of a **low floral sensitivity** whereas the Secondary Thornveld Habitat was of **moderately low floral sensitivity**.

No Threatened or Protected Species (TOPS) species or species as listed under the Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) were observed during the field assessment. However, two protected tree species as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA), namely *Sclerocarya birrea* subsp. *caffra* and *Ealeodendron transvaalense* (near-threatened (NT)), were identified within the study area. If the construction of the proposed pre-assembly laydown area is authorised, a summer season walkdown of the footprint area is recommended in which all species of conservation concern (SCC) are recorded and marked for permit application purposes (be it for rescue and relocation initiatives, or destruction of the specimens).

From a desktop database perspective, the study area is not located within any protected areas, threatened vegetation types, or threatened ecosystems. According to the Limpopo Conservation Plan (C-Plan – 2018 database), the study area is located entirely within an Ecological Support Area 1 (ESA1). However, given the largely transformed and/or modified nature of the Heavily Degraded Habitat and the Secondary Thornveld Habitats and an overall lack of intact dispersal corridors, the presence of ESA habitat within these habitats was not confirmed during the field assessments.

With no indigenous vegetation present within the study area, the proposed project will not impact on indigenous vegetation. The overall, combined significance of impacts on floral ecology prior to the implementation of mitigation measures was medium across the study area. With the implementation of mitigation measures, the proposed impact significance is anticipated to be low.

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

¹ As per the NEMA listing notice definition, “indigenous vegetation” refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years.



DOCUMENT GUIDE

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

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
2	Terrestrial Biodiversity Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	Appendix H
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	Section 4
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Section 4
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 4
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	Section 3 <i>Please refer to Freshwater Assessment (SAS 202277, 2022) for additional details and explanations.</i>
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: <ul style="list-style-type: none"> 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 (desktop analysis) Section 4
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Not Applicable
2.3.7	The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: <ul style="list-style-type: none"> a) <i>the reasons why an area has been identified as a CBA;</i> b) <i>an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i> c) <i>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);</i> d) <i>the impact on ecosystem threat status;</i> e) <i>the impact on explicit subtypes in the vegetation;</i> f) <i>the impact on overall species and ecosystem diversity of the site; and</i> g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i> 	Section 3 (desktop analysis), Section 4, & Section 6



2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: <ul style="list-style-type: none"> a) <i>the impact on the ecological processes that operate within or across the site;</i> b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i> c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i> 	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2003 including- <ul style="list-style-type: none"> a) <i>an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i> 	Section 3 (desktop analysis), Section 4, & Section 6
2.3.7.4	Priority areas for protected area expansion, including- <ul style="list-style-type: none"> a) <i>the way in which the proposed development will compromise or contribute to the expansion of the protected area network;</i> 	Section 3 (desktop analysis)
2.3.7.5	SWSAs including: <ul style="list-style-type: none"> a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i> b) <i>the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses);</i> 	Section 3 (desktop analysis) Please refer to Freshwater Assessment (SAS 202277, 2022) for additional details and explanations.
2.3.7.6	FEPA sub catchments, including- <ul style="list-style-type: none"> a) <i>the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;</i> 	Not Applicable. Please refer to Freshwater Assessment (SAS 202277, 2022) for additional details and explanations.
2.3.7.7	Indigenous forests, including: <ul style="list-style-type: none"> a) <i>impact on the ecological integrity of the forest; and</i> b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i> 	Not Applicable. No forests associated with the study area.
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.	
	Results of the Floral Assessment as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities are in Sections 4 – 6 .	
3	Terrestrial Biodiversity Specialist Assessment Report	
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix H
3.1.2	A signed statement of independence by the specialist;	Appendix H
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.3
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 2 Appendices C, D & E
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.3
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 5
	Impact Assessment Requirements	
	3.1.7 Additional environmental impacts expected from the proposed development;	Section 6
	3.1.8 Any direct, indirect and cumulative impacts of the proposed development;	
	3.1.9 The degree to which impacts and risks can be mitigated;	
	3.1.10 The degree to which the impacts and risks can be reversed;	
	3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;	



	3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	Not Applicable to this report
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Executive Summary & Section 7
3.1.15	Any conditions to which this statement is subjected.	Section 5 & 6
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Environmental Authorisation Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	This report is submitted to the Environmental Assessment Practitioner (EAP) and applicant and will be appended to the EA by the EAP in due course as part of the application process
3.3	A signed copy of the assessment must be appended to the Environmental Authorisation Report or Environmental Impact Assessment Report.	



TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
DOCUMENT GUIDE	ii
TABLE OF CONTENTS	v
LIST OF FIGURES	vi
LIST OF TABLES	vi
GLOSSARY OF TERMS	vii
LIST OF ACRONYMS	ix
1. INTRODUCTION	1
1.1 Project Description	1
1.2 Project Scope	2
1.3 Assumptions and Limitations	6
1.4 Legislative Requirements	6
2. ASSESSMENT APPROACH	7
2.1 Desktop Research Approach	7
2.2 General Approach	8
2.3 Sensitivity Mapping.....	10
3. RESULTS OF THE DESKTOP ANALYSIS	11
3.1 Conservation Characteristics of the Study Area.....	11
4. BIODIVERSITY ASSESSMENT RESULTS	19
4.1 Broad-scale vegetation characteristics	19
4.2 Ground-truthed vegetation characteristics	19
4.3 Floral Assessment Results	21
4.4 Alien and Invasive Plant (AIP) Species.....	25
4.4.1 Legal Context	25
4.4.2 Site Results	26
5. SENSITIVITY MAPPING	27
6. IMPACT ASSESSMENT	30
6.1 Impact Assessment Tables.....	30
6.2 Impact Discussion	39
6.2.1 Impact on Floral Ecology	39
7. CONCLUSION	41
8. REFERENCES	43
APPENDIX A: Indemnity and Terms of Use of this Report	45
APPENDIX B: Legislative Requirements	46
APPENDIX C: Floral Method of Assessment	49
APPENDIX D: Impact Assessment Methodology (SRK)	53
APPENDIX E: Vegetation Type(s)	56
APPENDIX F: Species List	57
APPENDIX G: Floral SCC	59
APPENDIX H: Declaration and Specialists CV's	69



LIST OF FIGURES

Figure 1:	Digital Satellite image depicting the location of the study area in relation to surrounding areas.....	4
Figure 2:	The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.....	5
Figure 3:	The vegetation type, as identified by the 2018 VEGMAP, associated with the study area.....	14
Figure 4:	The remaining extent of Makhado Sweet Bushveld vegetation type according to the National Biodiversity Assessment (NBA, 2018) in relation to the study area. According to the NBA (2018) the study area does not fall within the remaining extent of the vegetation type.....	15
Figure 5:	National protected & conservation areas within a 10 km radius of the study area as identified by the SAPAD (2021, Q3) and NPAES (2010).	16
Figure 6:	The study area in relation to the various CBA categories as indicated in the Limpopo Biodiversity Conservation Plan (2018).	17
Figure 7:	The importance of the study area in relation to Mining & Biodiversity Guidelines (2012).	18
Figure 8:	Map illustrating the Habitat units associated with the study area. No indigenous vegetation was recorded within either of the habitat units.	20
Figure 9:	Map illustrating the floral sensitivity associated with the study area.	29

LIST OF TABLES

Table 1:	Summary of the terrestrial conservation characteristics for the study area (Quarter Degree Square (QDS) 2328DD).	11
Table 2:	Alien and invasive plant species associated with the study area.	27
Table 3:	A summary of the floral sensitivity of each habitat unit and implications for development.	28
Table 4:	Summary of the Impact Assessment of the i) Pre-Construction & Planning, ii) Construction & Mining, and iii) Decommissioning & Rehabilitation Phases of the proposed construction of a pre-assembly laydown area.	31



GLOSSARY OF TERMS

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

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome - as per Mucina and Rutherford (2006)	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (as per the definition in NEMBA)	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Indigenous vegetation (as per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed alien species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.



Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.



LIST OF ACRONYMS

AIP	Alien and Invasive Plant
ARC	Agricultural Research Council
BA	Basic Assessment
BAP	Biodiversity Action Plan
BGIS	Biodiversity Geographic Information Systems
BODATSA	Botanical Database of Southern Africa
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
C-Plan	Conservation Plan
CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries, and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
EW	Extinct in the Wild
FEPA	Freshwater Ecosystem Priority Area
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectare
IEM	Environmental Management
IUCN	International Union for Conservation of Nature
LC	Least Concern
LEDET	Limpopo Department of Economic Development, Environment & Tourism
LEMA	Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)
M3C	Mogalakwena Third Concentrator
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress (% of days when evaporative demand was more than double the soil moisture supply)
MAT	Mean Annual Temperature
MFD	Mean Frost Days
NBA	National Biodiversity Assessment
NFA	National Forest Act, 1998 (Act No. 84 of 1998)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NPAES	National Protected Area Expansion Strategy
NT	Near threatened
P	Protected
PES	Present Ecological State
POC	Probability of Occurrence
QDS	Quarter Degree Square
RDL	Red Data Listed
SABAP 2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professionals
SANBI	South African National Biodiversity Institute
SanParks	South African National Parks



SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services CC
SWSA	Strategic Water Source Area
TOPS	Threatened or Protected Species
TSP	Threatened Species Programme
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WSAs	Water Source Areas



1. INTRODUCTION

Scientific Terrestrial Services CC (STS) was appointed to conduct an assessment for indigenous vegetation² and floral ecological assessment as part of the Environmental Authorization (EA) process to authorise the third concentrator (known as the M3C) pre-assembly area, hereafter referred to as the “**study area**” (Figure 1), for the Mogalakwena Complex.

The study area is situated approximately 30 km northwest of the town of Mokopane (formerly Potgietersrus) within the Mogalakwena Local Municipality, which forms part of the greater Waterberg District Municipality of the Limpopo Province. The study area is bordered on the western side by Bakenberg Road and the main Mogalakwena North Concentrator access road, to the south by the Ga-Molekana gravel access road and on the northern side by the existing contractor laydown. For a detailed project description, please refer to Section 1.1 below.

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

1.1 Project Description

The Mogalakwena Complex is a wholly owned subsidiary of Anglo-American Platinum Limited and was originally called the Potgietersrust Platinum Mine.

In 2019, an environmental authorisation (EA) amendment process was undertaken to authorise several new activities and associated infrastructure at Mogalakwena Complex for the expansion of its existing operations in order to improve production capacity. A new third concentrator plant (known as the M3C) and associated water management infrastructure formed part of the authorisation process which was approved in August 2020. In addition to this a contractor’s laydown area was also approved however according to AAP this area is not sufficient for the proposed M3C pre-assembly activities and that an additional area is required.

² As per the NEMA listing notice definition, “indigenous vegetation” refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years.



To support the construction of the M3C, an additional footprint area of approximately 18 hectares is required to accommodate the necessary temporary construction facilities, the laydown of equipment and materials as well as the pre-assembly of structures required for the M3C (conveyors, gantries, and pipe racks).

Mogalakwena Complex would like to establish a pre-assembly yard to the south of the existing return water dam which is within the mine lease area on the Farm Vaalkop 819 LR. The area is bordered on the western side by Bakenberg Road and the main Mogalakwena North Concentrator access road, to the south by the Ga-Molekana gravel access road and on the northern side by existing contractor laydown facilities and tanks directly adjacent to the proposed buffer dam. The area is bordered on the eastern side by a 22kV Eskom line which branches off from the 132kV Eskom overhead powerline. The location and extent of the study area in relation to surrounding areas is illustrated in Figures 1 & 2.

1.2 Project Scope

Specific outcomes in terms of this report are outlined below:

- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix H);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report);
- Compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute (SANBI)'s Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) and the Environmental Geographical Information Systems (E-GIS) website (<https://egis.environment.gov.za/>). The desktop assessment aims to gain background information on the physical habitat and potential floral ecology associated with the study area;
- To determine the presence and/or absence of indigenous vegetation within the study area (including the extent thereof);
- To determine and describe habitats, communities and the ecological state of the study area;
- To conduct a floral Species of Conservation Concern (SCC) assessment, including the potential of suitable habitat to occur within the study area for SCC;
- To identify and consider all sensitive landscapes, including rocky ridges, wetlands or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- To determine the environmental impacts that the construction of the proposed pre-assembly area might have on the floral biodiversity associated with the study area; and



- To develop mitigation and management measures for all phases of the proposed project activities as they relate to the clearance of indigenous vegetation and floral ecology.



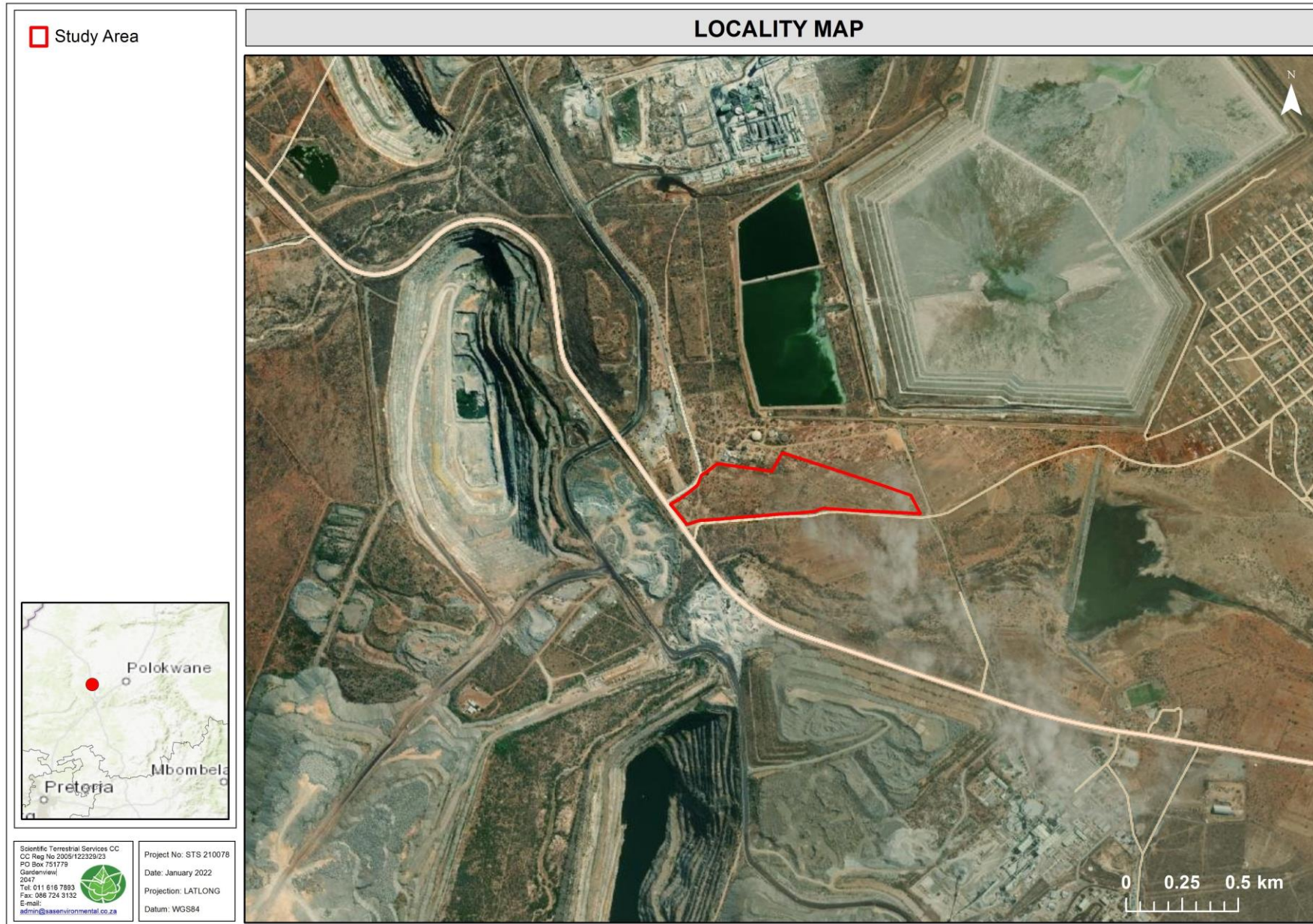


Figure 1: Digital Satellite image depicting the location of the study area in relation to surrounding areas.



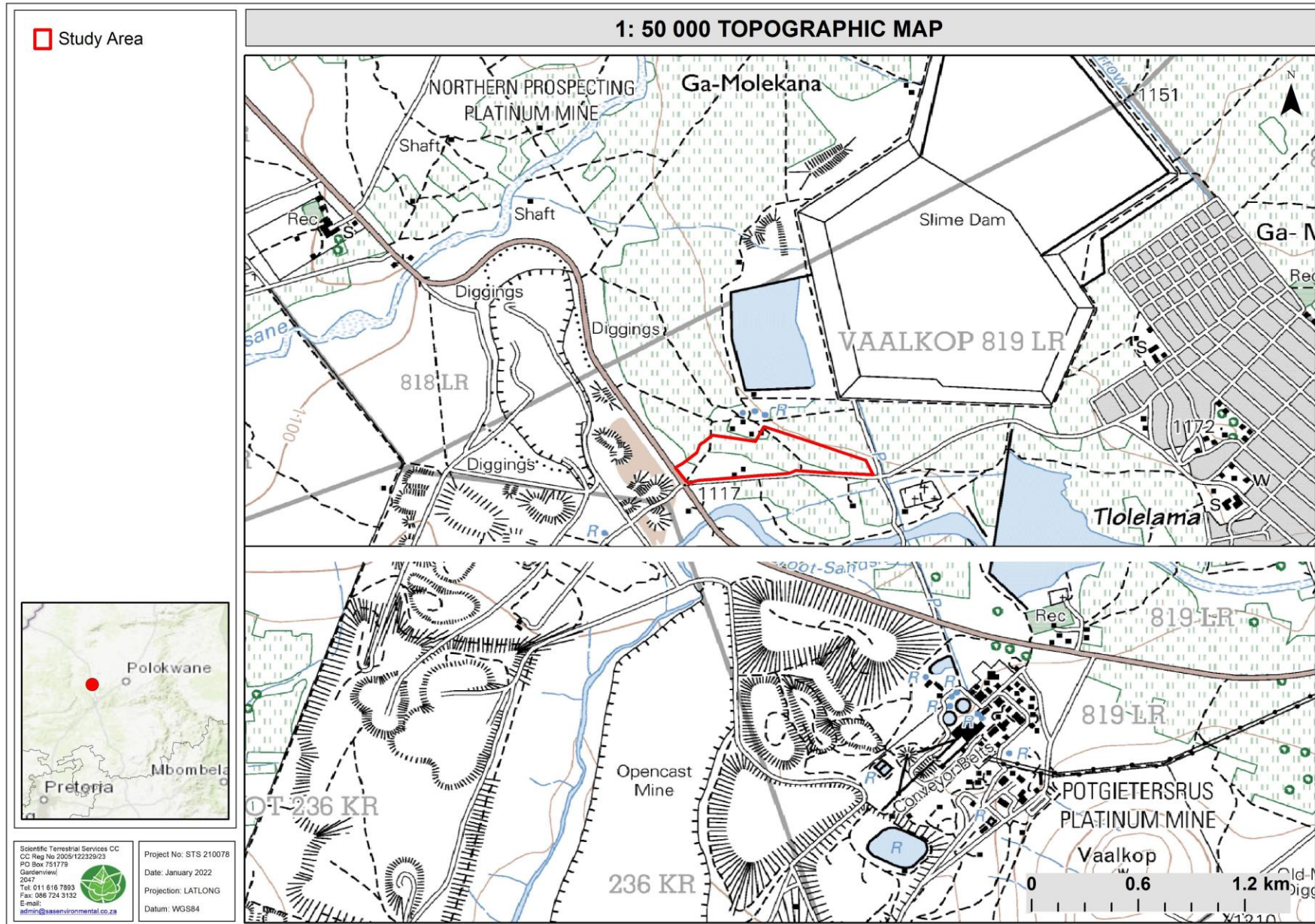


Figure 2: The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.



1.3 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the surrounding areas or adjacent properties although ecologically important or sensitive areas according to the desktop databases of the surrounding areas have been included on the relevant maps;
- Sampling, by its nature, means that not all individuals are assessed and identified. Some species associated with the study area may have been missed during the assessment. It is, however, expected that most floral communities have been accurately assessed and considered. Relevant online sources, background information and previous studies (e.g., STS 210037, 2021; STS 210042, 2021; and STS 200035, 2020), were further assessed to improve on the overall understanding of the study area's ecology; and
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. The data presented in this report are based on one site visit undertaken on the 25th – 26th November 2021. A more comprehensive assessment would require that assessments take place in all seasons of the year. However, on-site data were augmented with all available desktop data. Together with project experience in the area (e.g., STS 210037, 2021; STS 210042, 2021; and STS 200035, 2020), the findings of this assessment are considered an accurate reflection of the ecological characteristics of the study area.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996³;
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
 - Government Notice (GN) number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 October 2020 as it relates to the NEMBA;

³ Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.



- GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 October 2020;
- Government Gazette 45421 dated 10 May 2019 as it relates to the Department of Forestry, Fisheries, and the Environment (DFFE's) (previously the Department of Environmental Affairs (DEA)) national environmental screening report required with an application for EA as identified in regulation 16(1)(v) of Environment Impact Assessment (EIA) Regulations, 2014, as amended:
 - GN No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020; and
 - GN No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020.
- The Limpopo Environmental Management Act, 2003 (Act No.7 of 2003) (LEMA).

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

2. ASSESSMENT APPROACH

2.1 Desktop Research Approach

Maps and digital satellite images were generated prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the study area and does not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the study area included ⁴:

- 2010 National Protected Area Expansion Strategy (NPAES) (Government of South Africa. 2010; DEA & SANBI, 2009), including the below-listed vector datasets:
 - NPAES Focus Areas 2010: National Protected Areas Expansion Strategy: Focus areas for protected area expansion (South African National Parks (SanParks), 2010);

⁴ Datasets obtained from:

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



- NPAES Formal: Polygons of formal protected national parks areas in South Africa (SANParks/SANBI, 2013); and
- NPAES Protected Areas – Informal: Informal conservation areas in South Africa (SANParks/SANBI, 2012).
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2021);
- The South African Protected Areas Database, Quarter 3 (SAPAD, 2021);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
 - 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018a).
- The National List of Threatened Ecosystems 2011 (SANBI 2011; South Africa, 2011);
- From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno et al., 2019):
 - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
 - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).
- The National Screening Tool (accessed 2021);
- From the 2017 Strategic Water Source Areas (SWSA) project:
 - 2017 SWSA **Surface water** (Water Research Commission, 2017); and
- The Limpopo Conservation Plan (C-Plan) v2 CBAs 2018 (LEDET, 2018).

2.2 General Approach

The presence (or absence) of indigenous vegetation was determined based on the definition provided in the NEMA Listing Notices – Activity 27 of Listing Notice 1 (GNR 327) and Activity 12 of Listing Notice 3 (GNR 324) were checked for relevance (see Box 1 below).

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



BOX 1
Activity 27 of Listing Notice 1 (GNR 327)
The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- <ol style="list-style-type: none"> i. the undertaking of a linear activity; or ii. maintenance purposes undertaken in accordance with a maintenance management plan.
Activity 12 of Listing Notice 3 (GNR 324)
The area that will be cleared for development will be more than 300 m ² of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan <p style="text-align: center;">Within the Limpopo Province:</p> <ol style="list-style-type: none"> i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; <ol style="list-style-type: none"> ii. Within critical biodiversity areas identified in bioregional plans; or iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

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**).

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

- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to the site, during which broad habitats, vegetation types and potentially sensitive sites were identified. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where targeted investigations were required (e.g., for SCC detection and within the direct footprint of the proposed parking area);
- Databases used for background information include the SANBI Threatened Species Programme (TSP), the NBA (2018), National Threatened Ecosystems (2011), SAPAD & SACAD (Quarter 3, 2021), and NPAES (2010);
- The subjective sampling method requires that field assessment take place on foot. Based on the broad habitat units delineated before going to the site, and points of interest recorded, which is updated based on on-site observations, the selected sample areas were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed;
- Photographs were taken of each vegetation community that are representative of the typical vegetation structure of that community, as well as photos of all detected SCC (where such species were not flagged on the National Screening Tool as sensitive species for which identities may not be made known); and



- As part of the SCC assessment, the following classes were considered:
 - 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 Red Data Listed (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 (General Notice (GN) R152 of 2007, as amended). Removal, translocation and/or destruction of these species require authorisation from the DFFE.
 - Protected Species. Species that do not necessarily fall in the above categories of ecological status, but that are deemed important from a provincial biodiversity perspective, e.g., LEMA provides a list of Specially Protected Plants (Schedule 11) and Protected Plants (Schedule 12) for the Limpopo Province for which restricted activities may not occur without permits from the relevant provincial authorities. 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 NFA was also considered for the SCC assessment.

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

2.3 Sensitivity Mapping

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



3. RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics of the Study Area

The following table contains data accessed as part of the desktop assessment. It is important to note, that although all data sources used provide useful and often verifiable high-quality data, the various databases do not always provide an entirely accurate indication of the area's actual biodiversity characteristics. However, this information is useful as background information to the study and is important in legislative contextualisation of risk and impact and was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process.

Table 1: Summary of the terrestrial conservation characteristics for the study area (Quarter Degree Square (QDS) 2328DD).

Details of the study area of interest in terms of Mucina & Rutherford (2006)		Description of the vegetation type associated with the study area	
Biome	The study area is situated within the Savanna Biome .	Vegetation Type	Makhado Sweet Bushveld (SVcb 20)
Bioregion	The study area is located within the Central Bushveld Bioregion	Climate	Summer rainfall with very dry winters
Vegetation Type (Figure 3)	The study area is located within the Makhado Sweet Bushveld (SVcb 20) vegetation type.	Altitude (m)	850 to 1200
		MAP* (mm)	454
		MAT* (°C)	18.5
Conservation details pertaining to the area of interest (various databases)		MFD* (Days)	7
NBA (2018) (Figure 4)	According to the NBA (2018), the study area is not located within the remaining extent of the Least Concerned and Poorly Protected Makhado Sweet Bushveld. Ecosystem types are categorised ⁵ as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected	MAPE* (mm)	2174
		MASMS* (%)	81
		Distribution	Limpopo Province
		Conservation	Vulnerable. Target 19%. About 1% statutorily conserved, mainly in the Bellevue Nature Reserve. Some 27% transformed, mainly by cultivation, with some urban and

⁵ The ecosystem protection level status is assigned using the following criteria:

- i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either A or B, it is classified as Well Protected;
- ii. When less than 100% of the biodiversity target is met in formal A or B protected areas it is classified as Moderately Protected;
- iii. If less than 50% of the biodiversity target is met, it is classified as Poorly Protected; and
- iv. If less than 5% it is Hardly Protected.



	Areas Act, 2003 (Act No. 57 of 2003), and compared with the biodiversity target for that ecosystem type.		built-up areas. The southwestern half of the unit has densely populated rural communities. Erosion is low to high.
National Threatened Ecosystems (2011)	<p>The study area is not situated within a threatened ecosystem, according to the National Threatened Ecosystem Database (2011).</p> <p>The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The first national list of threatened terrestrial ecosystems for South Africa was gazetted on 9 December 2011 (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).</p> <p>Note: <i>The National List of Threatened Terrestrial Ecosystems published in terms of the NEMBA in 2011 remains in legal force. The data contained in NBA 2018 represents an update of the assessment of threat status for terrestrial ecosystems, but the National List of Threatened Terrestrial Ecosystems has not yet been revised.</i></p>	Geology and Soils	<p>The area is underlain by the gneisses and migmatites of the Hout River Gneiss (Randian Erathem) and the potassium-deficient gneisses of the Goudplaats Gneiss (Swazian Erathem). Sandstones and mudstones of the Matlabas Subgroup (Mokolian Waterberg Group) are also found. Soils include deep, greyish sands, eutrophic plinthic catenas, red, yellow apedal freely drained soils with high base status, clayey in bottomlands. Land types⁶ mainly Bd, Bc, Ae and Ia.</p>
SAPAD (2021)⁷; SACAD (2021)⁸; NPAES (2010) (Figure 5)	<p>According to the SAPAD (2021_Q3) and the NPAES (2010), a protected area, namely the Witvinger Nature Reserve, is located within a 10 km radius of the study area (however not within 5 km of the study area⁹). Although the extent of the reserve (as indicated by the SAPAD and NPAES) vary, the SAPAD (2021_Q3) extent provides the most recent indication of the reserve's current extent.</p> <p>The SACAD (2021_Q3) does not indicate the presence of any additional conservation areas within 10 km of the study area.</p>	Vegetation landscape features &	<p>Slightly to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poorly developed grass layer.</p> <p>Remark: This area is transitional between the higher-lying Polokwane Plateau and the lower-lying vegetation units of the Limpopo River Valley.</p>

⁶ Land types refer to a class of land with specified characteristics. In South Africa it has been used as a unit denoting land at 1:250 000 scale, over which there is a marked uniformity of climate, terrain form and soil pattern. Land type Bd refers to non-red soils (Hu, Bv <33%) that are usually more dystrophic/mesotrophic than they are eutrophic, Land type Bc refers to upland duplex and marginalitic soils that have a Plinthic catena less than 10%, Land type Ae refers to Red (yellow soils <10%) that are more eutrophic than dystrophic/mesotrophic, and Land type Ia refers to a miscellaneous soil class.

⁷ **SACAD (2021):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.

⁸ **SAPAD (2021):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the "System of Protected Areas", which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

⁹ The Listing details applicable to the Limpopo Province (according to Listing Notice 3: List of Activities and Component Authorities Identified in Terms of Sections 24(2) and 240) state that "Areas within 10 km from national parks or world heritage sites or 5 km from any other protected area identified in terms of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA) or from the core area of a biosphere reserve" will trigger a Listing Activity. The Wit Vinger Nature Reserve is over 5 km from the study area. As per the listing notices, the listings are triggered only if the development is within 10 km of a World Heritage Site or a National Park or within 5 km of Nature Reserves. As the proposed development associated with the study area is not within 5 km of the Wit Vinger Nature, no listings are triggered



Detail of the area of interest in terms of the Limpopo Conservation Plan (2018) – Figure 6	
ESA 1	<p>The entire study area is located within a Category 1 Ecological Support Area (ESA). These are natural, near natural and/or degraded areas that are selected to support CBAs by maintaining ecological processes.</p> <p>Land Management Recommendations: Implement appropriate zoning and land management guidelines to avoid impacting on ecological processes. Avoid intensification of land use and fragmentation of natural landscapes. Incompatible Land-Use: Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). Note: Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to maintain the overall ecological functioning of ESAs.</p>
Mining And Biodiversity Guidelines (2012) - Figure 7	
High Biodiversity Importance	<p>The entire study area is located within in an area of High Biodiversity Importance. These areas are regarded to pose a high risk for mining.</p> <p>Implications for mining: An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and red flags for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.</p>
National Web-based Screening Tool (2020)	
<p>The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. this assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant Protocols are described below:</p> <ul style="list-style-type: none"> ➤ 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 km² 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. ➤ Medium: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. ➤ Low: Areas where no SCC are known or expected to occur. 	
Terrestrial Biodiversity Theme	For the terrestrial biodiversity theme, the study area is considered to have an overall sensitivity of High . The triggering feature includes the presence of an ESA1.
Plant Species Theme	For the plant species theme, the entire study area is considered to have a low sensitivity .

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



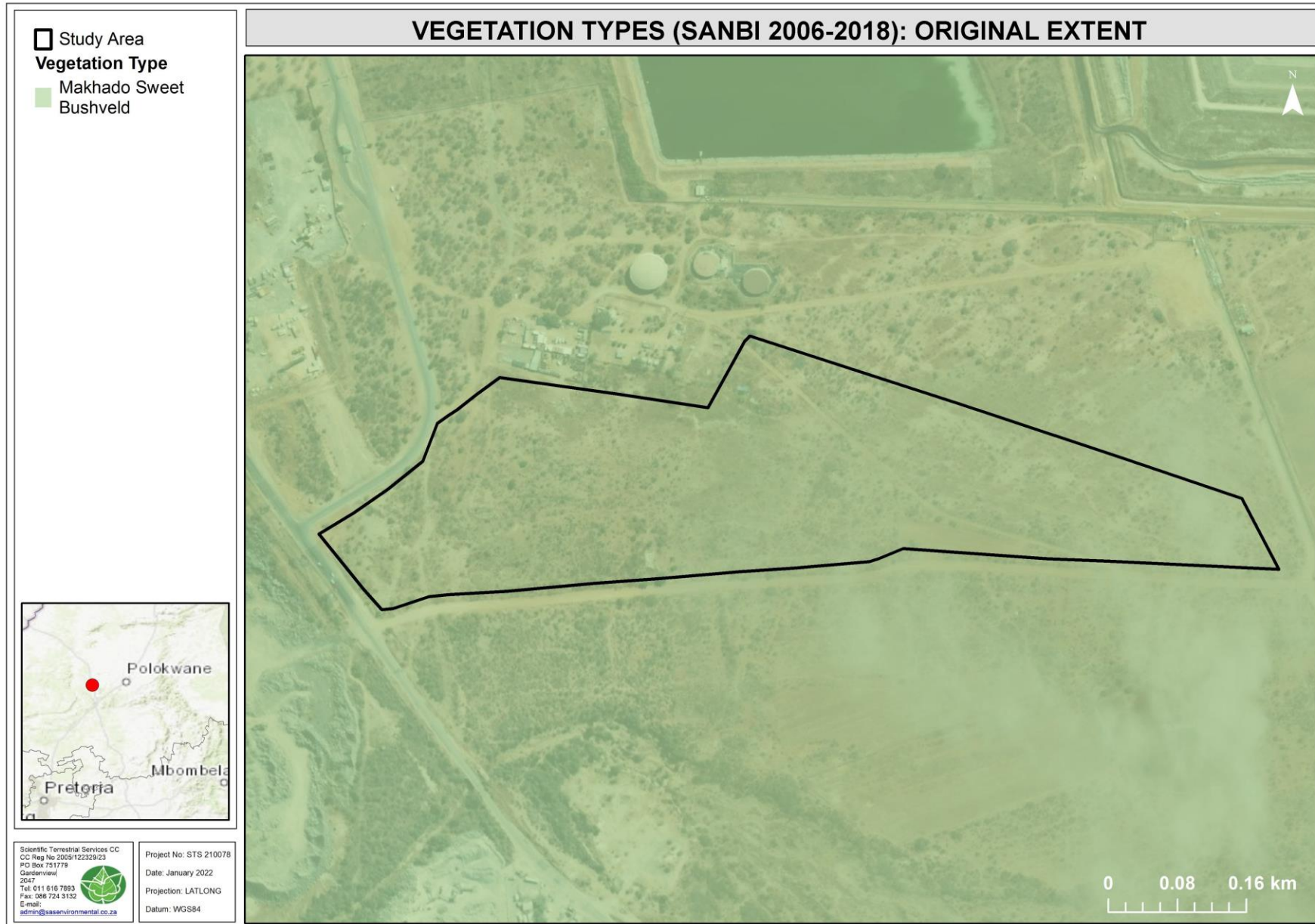


Figure 3: The vegetation type, as identified by the 2018 VEGMAP, associated with the study area.



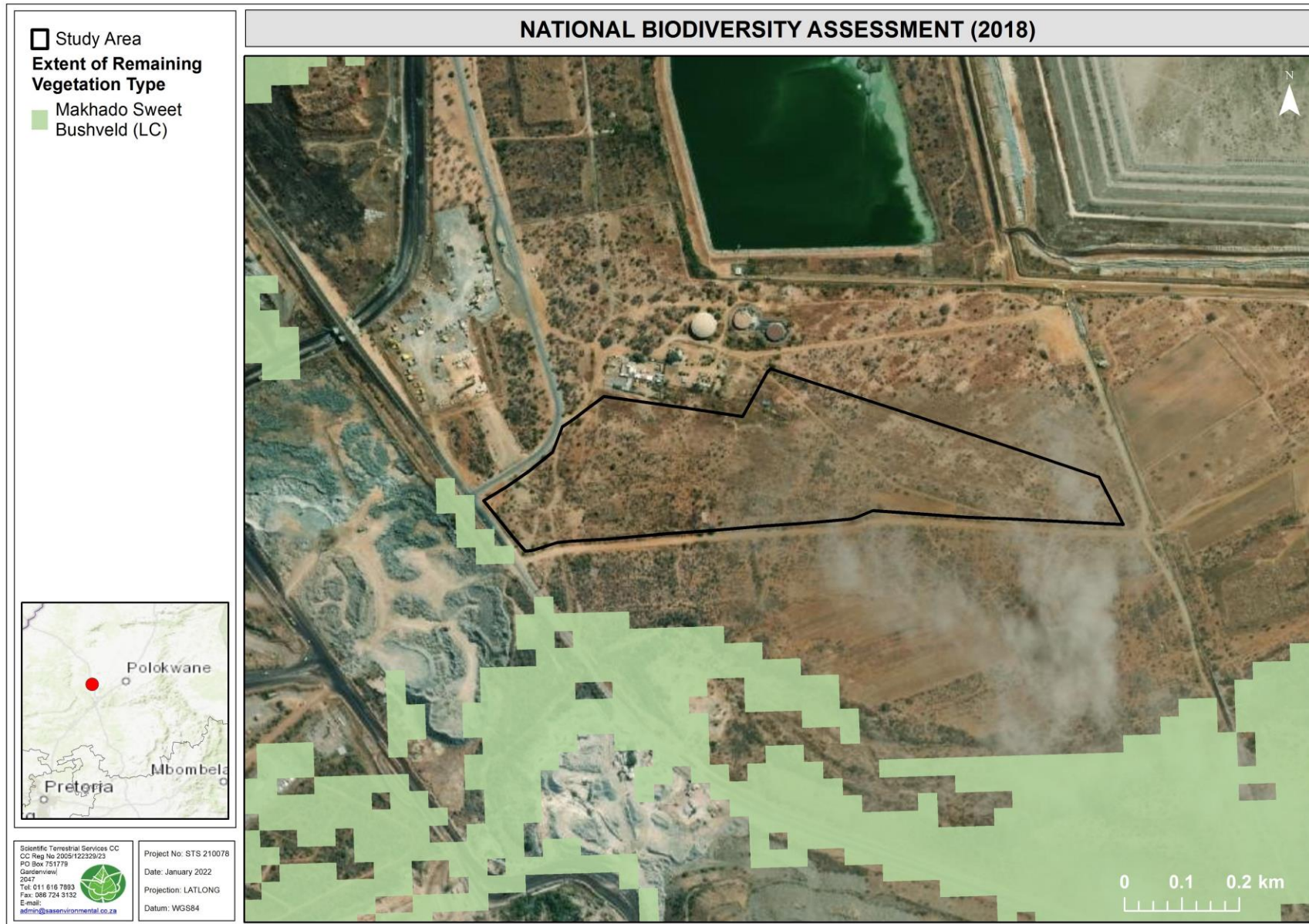


Figure 4: The remaining extent of Makhado Sweet Bushveld vegetation type according to the National Biodiversity Assessment (NBA, 2018) in relation to the study area. According to the NBA (2018) the study area does not fall within the remaining extent of the vegetation type.



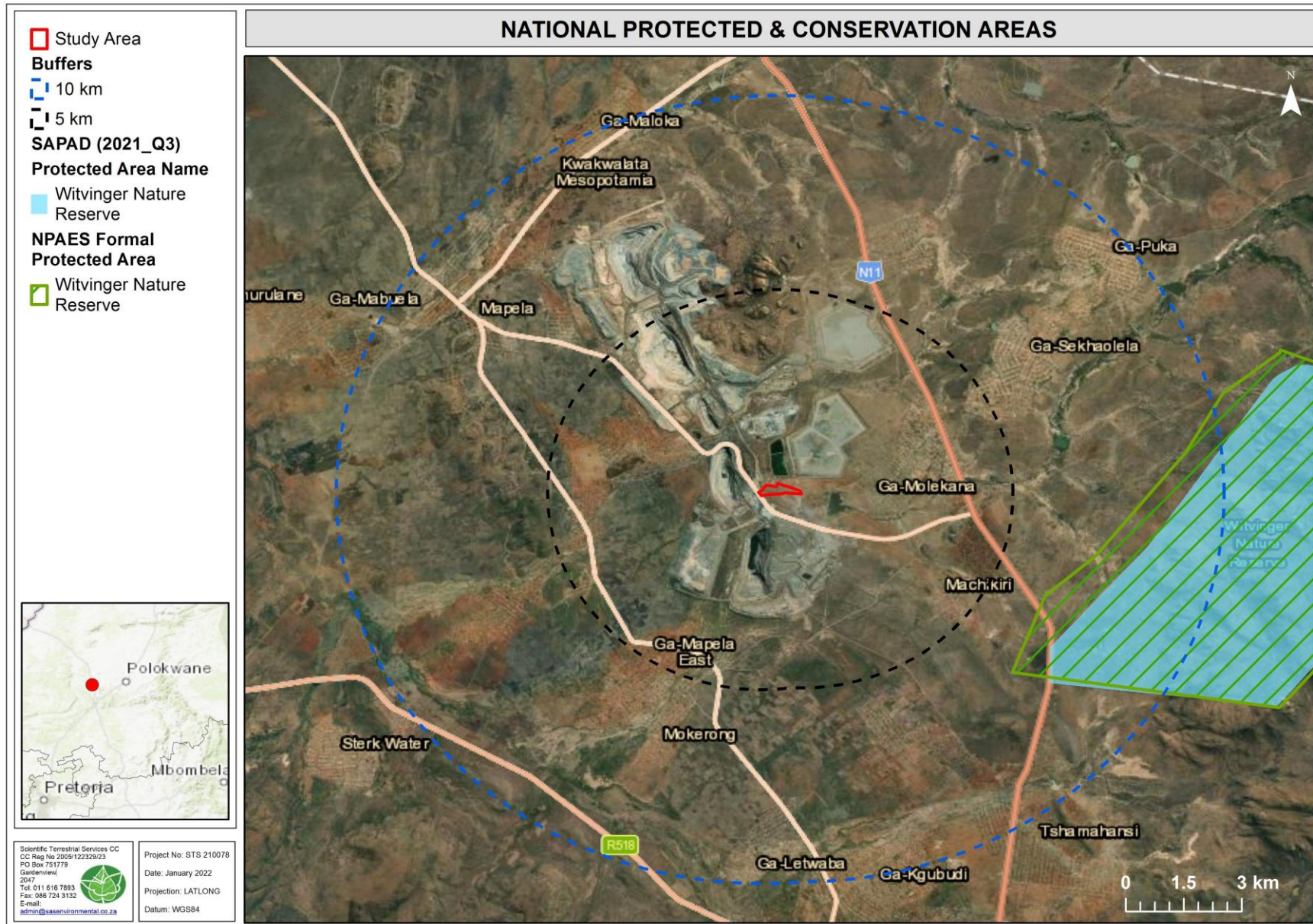


Figure 5: National protected & conservation areas within a 10 km radius of the study area as identified by the SAPAD (2021, Q3) and NPAES (2010).



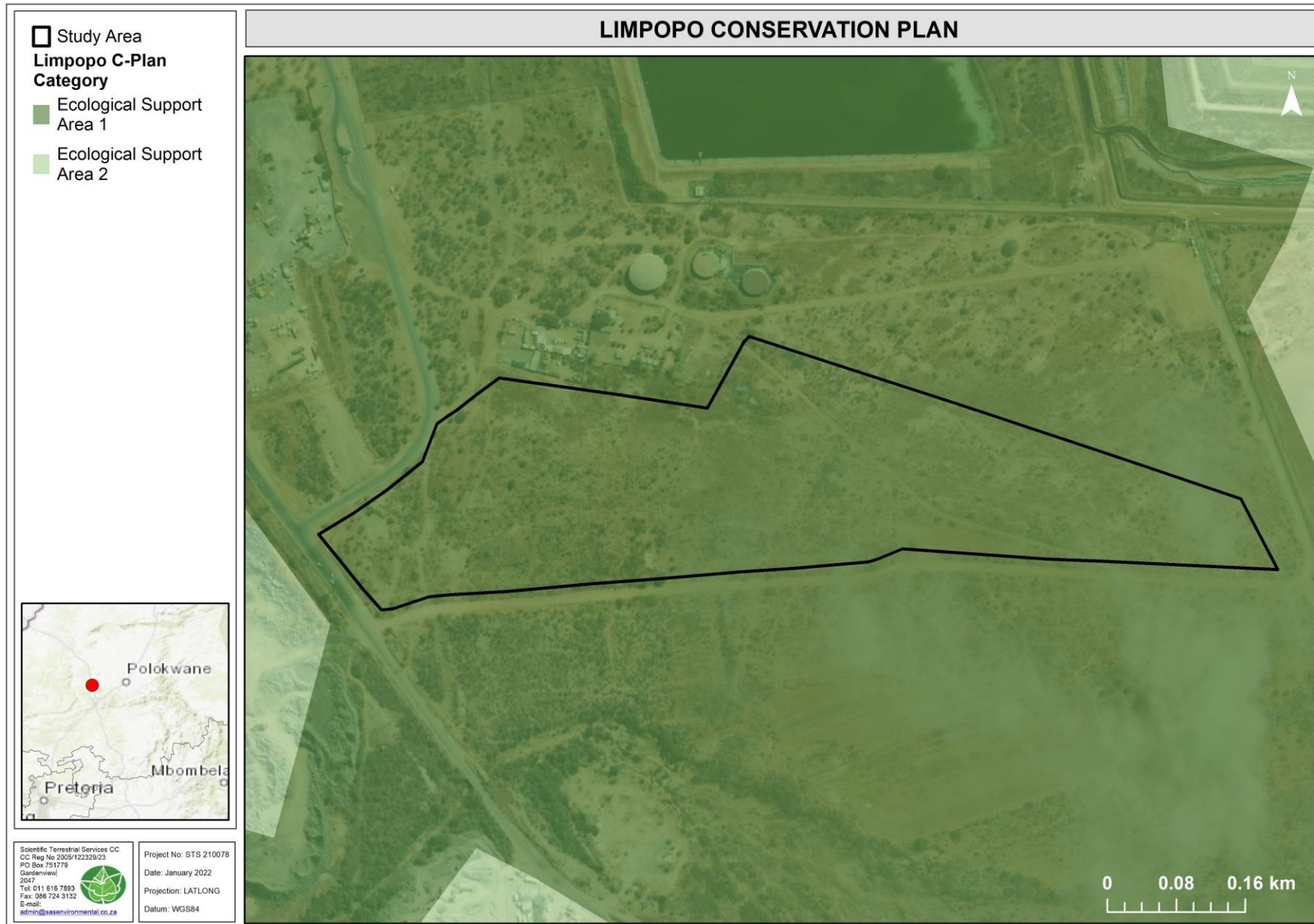


Figure 6: The study area in relation to the various CBA categories as indicated in the Limpopo Biodiversity Conservation Plan (2018).



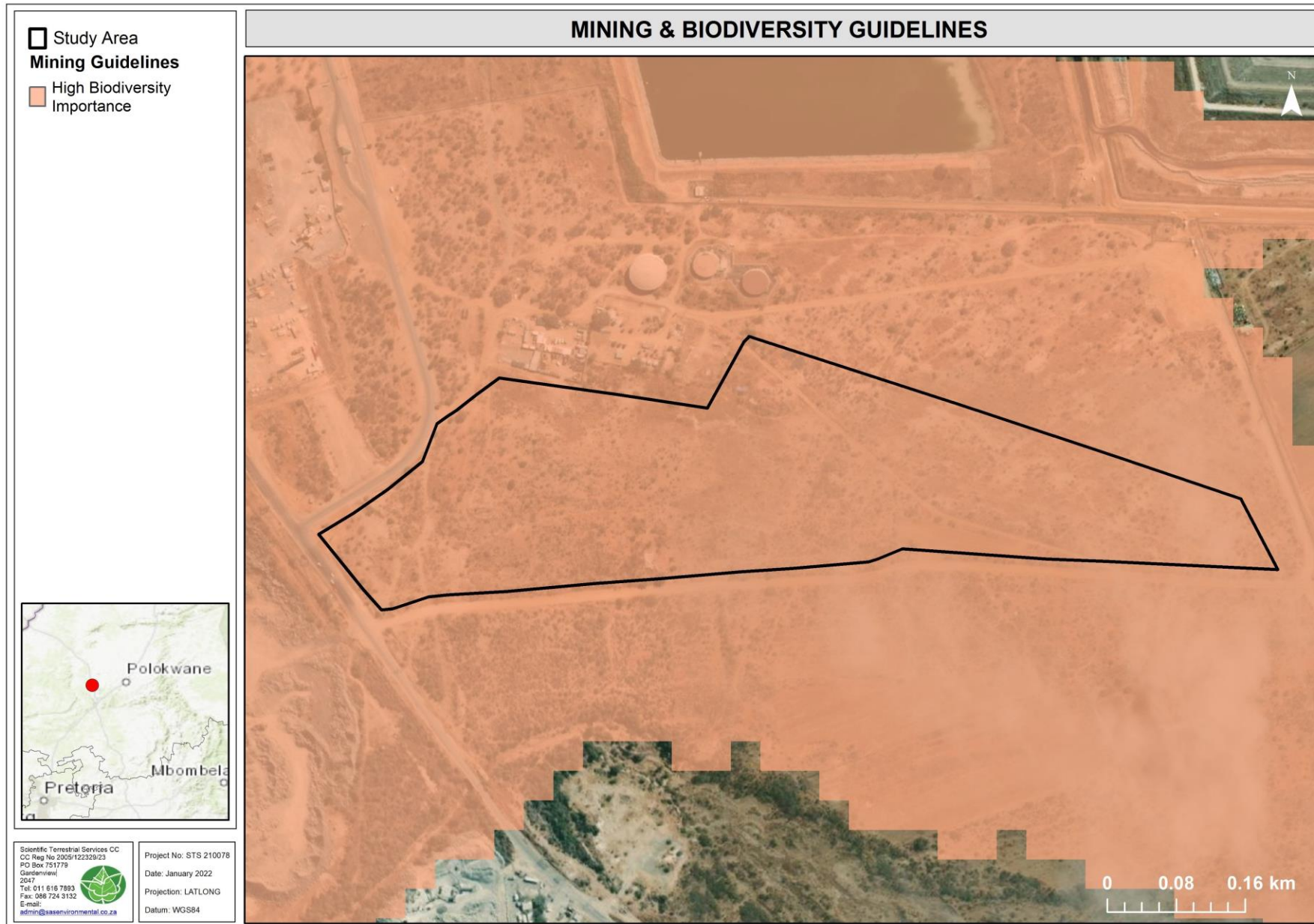


Figure 7: The importance of the study area in relation to Mining & Biodiversity Guidelines (2012).



4. BIODIVERSITY ASSESSMENT RESULTS

4.1 *Broad-scale vegetation characteristics*

The study area falls within the Makhado Sweet Thornveld vegetation type (listed as vulnerable in Mucina and Rutherford, 2006, but as Least Concern in the updated 2018 Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a)), i.e., the reference state. Mucina and Rutherford (2006) describe the Makhado Sweet Thornveld as having “slightly to moderately undulating plains generally sloping to the north, with some hills towards the south-west. This vegetation type is generally described as short and shrubby bushveld with a poorly developed grass layer”.

4.2 *Ground-truthed vegetation characteristics*

Overall, the habitat within the study area ranged from well-vegetated areas to transformed areas. Across the study area, the presence of indigenous vegetation was not recorded. The biodiversity of the study area can thus be defined under two broad habitat units as described below (Figure 8). These habitat units were distinguished based on species composition, vegetation structure, ecological function, physical nature of the environment and habitat condition.

The two broad habitat units include:

1. Secondary Thornveld; and
2. Heavily Degraded Habitat.

For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, refer to Section 4.3 and Section 5. Results pertaining to the presence (or absence) of indigenous vegetation is also presented in Section 4.3.



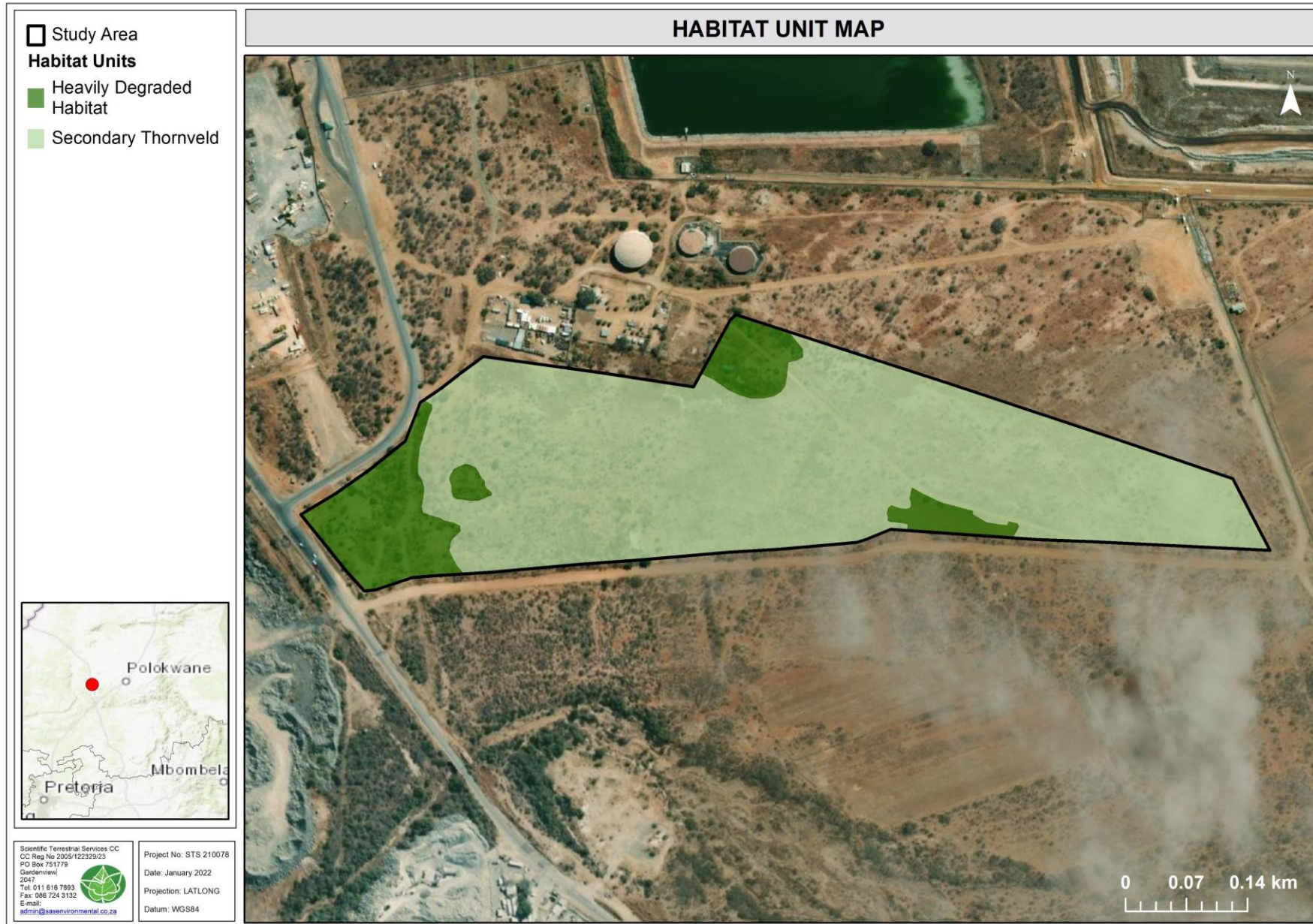


Figure 8: Map illustrating the Habitat units associated with the study area. No indigenous vegetation was recorded within either of the habitat units.



4.3 Floral Assessment Results

HABITAT OVERVIEW

Overall, the study area supported a moderately low species diversity. The two broad habitat units identified within the study area included i) Secondary Thornveld and ii) Heavily Degraded Habitat (discussed in more detail below). Refer to the photographs below for a visual representation of the habitat units and examples of species recorded within these habitats.

Secondary Thornveld Habitat – This habitat unit comprises the largest extent of the study area (approximately 15 ha). The Secondary Thornveld habitat is associated with a poor floristic diversity and is typically characterised by vegetation communities that are dominated by encroaching *Dichrostachys cinerea* and *Vachellia tortilis* subsp. *heteracantha*. Overall, the Secondary Thornveld habitat unit was characterised by an encroaching tree layer with a sparse grass layer – although scattered areas were characterised by bare soils because of overgrazing. The associated floral communities have historically been impacted by cultivation, subsistence farming, and bush clearing. Currently, the vegetation is impacted by heavy grazing from both cattle and goats. Vegetation clearing, trenching and subsequent dumping of cleared vegetation was apparent throughout the habitat unit. The informal farming and associated transformation of the habitat occurred less than 10 years ago, which means that the current vegetation within the Secondary Thornveld Habitat **does not meet the definition of indigenous vegetation** as per the NEMA Listing Notices (LNs). Although the habitat unit has recovered somewhat, the alteration in fire and herbivory regimes and the residual impacts from historic activities (e.g., subsistence farming etc), have resulted in a habitat that is no longer being considered representative of the reference vegetation type, i.e., the Makhado Sweet Bushveld.

Heavily Degraded Habitat – this habitat unit (approximately 2.8 ha) was largely associated with areas of little to no vegetation (e.g., in areas cleared for parking lots) or with areas of very poor floristic diversity. The habitat is typically characterised by transformed areas (e.g., areas cleared for parking in which indigenous trees have been planted for shade cover) as well as areas that were historically built-up which has subsequently become dilapidated and have not been the subject of any rehabilitation efforts. Overall, the floral community associated with this habitat are degraded in nature and are typically associated with i) Alien and invasive plants (AIPs), ii) encroaching woody species (including *Dichrostachys cinerea* and *Vachellia tortilis* subsp. *heteracantha*), and iii) a poorly developed grass and forb layer. Given the level of transformation and the associated impacts to the vegetation associated with this habitat unit, the current vegetation within the habitat unit **does not meet the definition of indigenous vegetation** as per NEMA LNs. Given the level of transformation and overall degradation of the floral communities associated with the Heavily Degraded Habitat unit, it is no longer considered representative of the reference vegetation type, i.e., the Makhado Sweet Bushveld.



Photographs illustrating the landscape associated with the Secondary Thornveld Habitat Unit: a) typical landscape (with encroaching woody species in the background) associated with the habitat unit, b) areas throughout the habitat are characterised by bare soils because of overgrazing, and c) vegetation clearing and dumping is evident within the habitat.



HABITAT OVERVIEW



Photographs illustrating the landscape associated with the Heavily Degraded Habitat: a-b) typical areas in which old structures and/or infrastructure has not been cleared or rehabilitated, c) areas cleared for parking lots.



Photographs of plant species recorded within the study area: a) *Sclerocarya birrea subsp. caffra* (a NFA woody species recorded within the Secondary Thornveld Habitat), b) *Gossypium herbaceum subsp. africanum* (an infrequently recorded woody species within the Secondary Thornveld Habitat), c) *Aloe marlothii* (a succulent species recorded within the study area), and d) *Delonix regia* (an AIP species recorded in the study area where historic houses used to be).

VEGETATION STRUCTURE

Secondary Thornveld Habitat	Heavily Degraded Habitat
<p>Semi-open to closed woodland (as per Figure B1 in Appendix B) characterised by poor grass layer (bare soils prominent throughout).</p> <p>Overall, the structure and species composition of this habitat is no longer considered representative of the reference vegetation type.</p>	<p>The vegetation structure can be defined as transformed habitat in which no specific vegetation structure was evident.</p> <p>Floral diversity was low throughout the habitat unit and the structure and species composition of this habitat unit is no longer considered representative of the reference vegetation type.</p>



SPECIES OF CONSERVATION CONCERN

In terms of Section 56 of the NEMBA, threatened species are Red Data Listed (RDL) species falling into the CR, EN, VU or Protected (P) categories of ecological status. During the November 2021 field assessment, no RDL species was recorded within the study area. The Plant Species Theme of the entire study area is of a **low sensitivity**. As no RDL species were identified within the study area, the low sensitivity denoted for the study area is supported.

The LEMA provides a list of Specially Protected Species (Schedule 11) and Protected Species (Schedule 12) for the Limpopo Province. These species were also considered as part of the SCC assessment for the study area because they are considered important provincially. Provincially protected species recorded and the Probability of Occurrence (POC) calculations for LEMA protected species are presented below for the habitat units:

- Secondary Thornveld Habitat:
 - *Huernia* sp. (POC = High); and
 - *Stapellia* sp. (POC = High).

Additionally, several protected tree species, as per the NFA, were included in the SCC assessment and several species were observed within the Habitat units. The POC calculations for these species are presented below:

- Secondary Thornveld Habitat:
 - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);**
 - ***Elaeodendron transvaalense* (POC = Confirmed; Status = NT);**
 - *Combretum imberbe* (POC = High; Status = LC); and
 - *Boscia albitrunca* (POC = Medium; Status = LC).
- Heavily Degraded Habitat:
 - ***Sclerocarya birrea* subsp. *caffra* (POC = Confirmed; Status = LC);**
 - *Elaeodendron transvaalense* (POC = Medium, Status = NT).

The Threatened or Protected Species (TOPS) List as per the 2007 Regulations provides a list of protected species for the Limpopo Province. Suitable habitat to support TOPS species was identified within the study area for the following:

- Secondary Thornveld Habitat:
 - *Harpagophytum zeyheri* subsp. *zeyheri* (POC = Medium, Status = LC).

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

Refer to **Appendix G** for the complete SCC assessment results.

PRESENCE OF UNIQUE LANDSCAPES

The Terrestrial Sensitivity for the entire study area is considered to have a **very high sensitivity**. The triggered sensitivity feature included the presence of an ESA1. Given the level of anthropogenic influences experienced across the study area (e.g., dumping and vegetation clearing) and edge effects (e.g., AIP proliferation), the presence of ESA1 habitat was not confirmed for either the Heavily Degraded Habitat unit or the Secondary Thornveld Habitat and as such the high sensitivity as denoted by the Screening Tool was not supported.



PRESENCE OF INDIGENOUS VEGETATION

The extent of the study area is larger than 1 ha, but smaller than 20 ha, and thus can potentially trigger Activity 27 of Listing Notice 1. Furthermore, the study area is larger than 300 m², and thus can potentially trigger Activity 12 of Listing Notice 3. However, based on the ground-truthed results of the field assessment together with digital satellite imagery from the past ten years, the field verification indicated that the study area does not contain indigenous vegetation.

CONCLUDING REMARKS

From a floral perspective, the Heavily Degraded habitat is deemed to be of low ecological importance and the Secondary Thornveld Habitat is deemed to be of a moderately low ecological importance within the greater landscape (refer also to section 5).

Key considerations:

- The reference vegetation type was identified as the **Makhado Sweet Bushveld**. Given the overall degraded and modified nature of the habitats within the study area, as well as the alteration of natural fire regimes and grazing pressure experienced within the habitat, none of the habitat units are considered representative of the reference vegetation type.
- Both the Secondary Thornveld Habitat and the Heavily Degraded Habitat provide suitable habitat to sustain viable populations of several floral SCC; nationally protected (i.e., NFA) species were recorded within these Habitats. Suitable habitat to support other SCC (e.g., provincially protected species (i.e., as per the LEMA), and TOPS species) is potentially available within the Secondary Thornveld Habitat. The propensity of the Heavily Degraded habitat unit to provide suitable habitat for such SCC is deemed to be low. If the construction of the proposed pre-assembly laydown area is authorised, a summer season walkdown of the footprint area is recommended in which all SCC are recorded and marked for permit application purposes (be it for rescue and relocation initiatives, or destruction of the specimens). All SCC species recorded during the recommended footprint walkdown should first be investigated for possible relocation to suitable habitat outside the direct footprint (as far as is feasible) – destruction of SCC should only be considered as a last resort. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Rescue and relocation should be done by a suitably qualified specialist. Any additional floral SCC encountered during the construction phase of the proposed project should also be relocated by a suitably qualified specialist and the necessary permits should be applied for. Permits required for the relocation or destruction/removal of SCC prior to vegetation clearing must be obtained by the relevant authorities, i.e., from the LEDET and/or the DFFE.
- In terms of the National Web-based Environmental Screening Tool outcome, the study area (and its associated habitat units) matches the low sensitivity assigned to the Plant Species Theme, especially as no suitable habitat to support a RDL species was recorded during the field assessment. The study area is located within important biodiversity features such as ESAs, however, given the largely transformed and/or modified nature of the Heavily Degraded Habitat and the Secondary Thornveld Habitats and an overall lack of intact dispersal corridors, the presence of ESA habitat within these habitats was not confirmed.
- Due to the entire study area already being exposed to continued disturbance (e.g., continued grazing) and edge effect impacts, both habitat units are susceptible to AIP proliferation and continued bush encroachment. Care must be taken to limit edge effects on the surrounding natural areas. Furthermore, it is recommended that an AIP species management plan and a bush encroachment control plan be developed to manage the proliferation of AIPs within the study area.
- All the natural areas outside of the authorised footprint must be demarcated as “no-go” areas to ensure no footprint creep takes place.



4.4 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 legislation¹⁰. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to “escape” from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that South Africa’s diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

4.4.1 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.

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



Duty of care related to listed invasive species are referred to in NEMBA Section 73¹¹. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US\$142 million) each year - this being the amount currently spent by the national government's DFFE - i.e., the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

4.4.2 Site Results

A total of 10 AIP species were recorded within the study area. The density of AIPs within the study area varied; overall the Heavily Degraded Habitat supported higher density of AIPs.

Of the 10 AIP species recorded within the study area, three species are listed under NEMBA category 1b, and one species is listed as NEMBA category 2. The remaining six species are not currently listed in the NEMBA Alien and Invasive Species List of 2020 and thus are not regarded as invasive species. However, several of these species are rather seen as problem plants, especially *Bidens pilosa*, *Tagetes minuta*, and *Schkuhria pinnata*. Although these species may not pose an immediate risk of displacing native flora, they can become problematic after disturbance events and due to their pioneering nature, will colonise disturbed habitat more readily than native flora.

It is recommended that the study area be targeted for AIP control, especially during construction activities (if authorised), to prevent the spread of AIP propagules into surrounding areas. Refer to table 2 for more details on the AIPs recorded within the study area.

¹¹ Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-

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



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

Scientific Name	Common Name	Origin	NEMBA Category	Secondary Thornveld	Heavily Degraded Areas
Woody Species					
<i>Delonix regia</i>	Flamboyant	Madagascar	NL	x	x
<i>Plumeria Rubra</i>	Frangipani	Central America	NL	x	x
<i>Tecoma stans</i>	Yellow bells	Mexico & Southern USA	1b		x
Herbaceous Species					
<i>Bidens pilosa</i>	Blackjack	South & Central America	NL	x	x
<i>Gomphrena celosioides</i>	Bachelor's Button	South America	NL		x
<i>Schkuhria pinnata</i>	Dwarf Mexican Marigold	Central America	NL	x	x
<i>Solanum elaeagnifolium</i>	Silver-leaf bitter apple	Southern USA	1b	x	x
<i>Tagetes minuta</i>	Kaki bos	South & Central America	NL	x	x
Succulent Species					
<i>Agave sisalana</i>	Sisal	Central America	2	x	x
Graminoid Species					
<i>Pennisetum setaceum</i>	Fountain grass	East Africa	1b		x

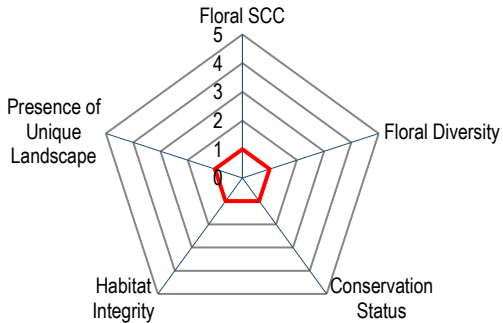
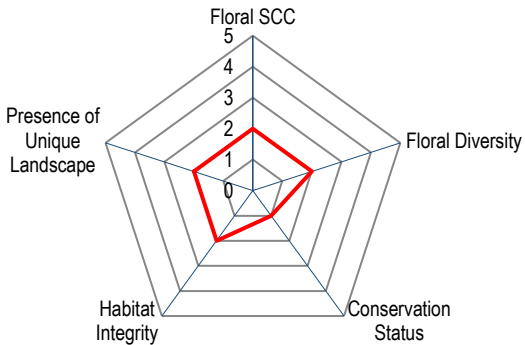
5. SENSITIVITY MAPPING

The Screening Tool identified the study area to be in a **low sensitivity** area for the Plant Species Theme and a **very high sensitivity** area for the Terrestrial Biodiversity Theme. Based on the *ground-truthed* results of the site visit, Table 3 below presents the sensitivity of each identified habitat unit for flora along with an associated conservation objective and implications for development.

Figure 9 conceptually illustrates areas of ecological floral sensitivity. The study area is depicted according to its sensitivity in terms of the presence or potential for SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity.



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

Habitat Sensitivity	Conservation objective	Habitat Unit	Key habitat characteristics
<p style="text-align: center;">Low</p> 	<p style="text-align: center;">Optimise development potential.</p>	<p style="text-align: center;">Heavily Degraded Habitat Unit</p>	<ul style="list-style-type: none"> - Indigenous vegetation as per NEMA absent. - Habitat has been degraded due to current and historic disturbances (e.g., vegetation clearing and unrehabilitated structures). - High association with anthropogenic activities. - Only one NFA tree was recorded within this habitat unit and in low densities. No other Floral SCC (e.g., RDL species, TOPS, or LEMA protected species) were recorded. - No significant biodiversity features present.
<p style="text-align: center;">Moderately low</p> 	<p style="text-align: center;">Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.</p>	<p style="text-align: center;">Secondary Thornveld Habitat</p>	<ul style="list-style-type: none"> - Does not meet the definition of Indigenous Vegetation as per the NEMA. - Habitat has been degraded due to current and historic disturbances (e.g., historic subsistence farming and current grazing pressures); floral communities have shifted away from the reference vegetation type. Floral species diversity is moderately low. - Two NFA protected tree species were recorded within the habitat unit. Habitat to support other SCC (i.e., as per the LEMA, TOPS) is deemed possible, albeit moderately low. - Given the largely transformed and/or modified nature of the Heavily Degraded Habitat and the Secondary Thornveld Habitats and an overall lack of intact dispersal corridors, the presence of ESA habitat within these habitats was not confirmed.



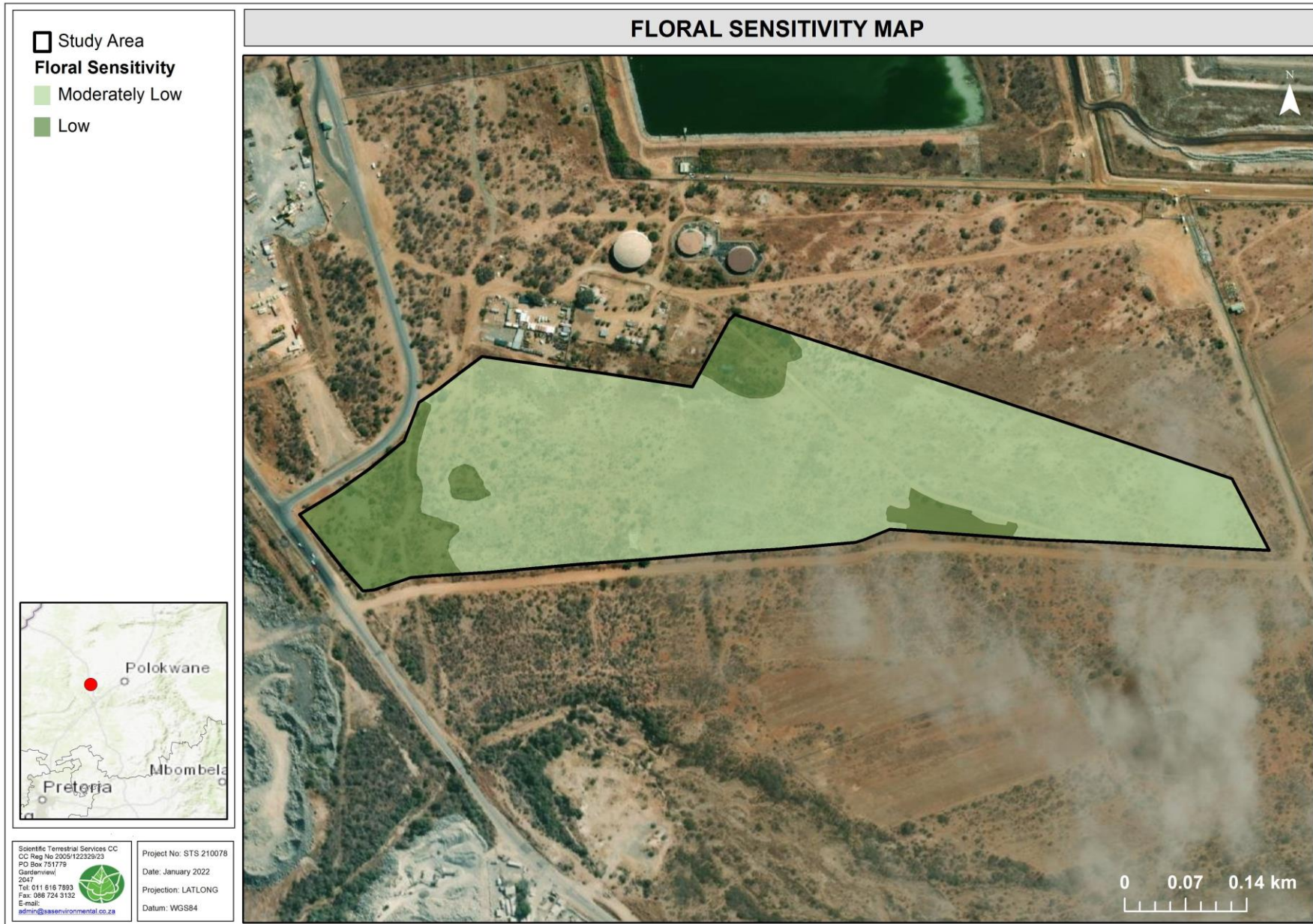


Figure 9: Map illustrating the floral sensitivity associated with the study area.



6. IMPACT ASSESSMENT

Table 4 below serves to summarise the significance of perceived impacts on the floral ecology of the study area, according to the method provided by the proponent (as is described in Appendix D).

An impact assessment (6.1) and discussion (6.2) of all i) Pre-construction & Planning, ii) Mining (i.e., Construction & Operational Phase), and iii) Decommissioning & Rehabilitation Phase impacts are provided in the sections below. All mitigatory measures required to minimise the perceived impacts are presented within the impact assessment tables (as presented in Section 6.1).

6.1 *Impact Assessment Tables*

The below section provides the findings of the impact assessment undertaken with reference to the perceived impacts on the associated floral ecology within the study area 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 (provided in impact tables below). Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The table below (Table 4) provides the results of the floral ecology impact assessment.



Table 4: Summary of the Impact Assessment of the i) Pre-Construction & Planning, ii) Construction & Mining, and iii) Decommissioning & Rehabilitation Phases of the proposed construction of a pre-assembly laydown area.

Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
ACTIVITY: Pre-assembly laydown Area Development																	
Pre-Construction & Planning Phase																	
Potential failure to conduct a walkdown of the authorised footprint area before construction activities commence where floral SCC, where present, are marked and relocated to suitable habitat outside the development footprint prior to the construction phase.	-	4	2	2	6	2	40	Moderate	* If SCC, that are not RDL species are encountered and will be affected by the construction activities, these species must, as far as is possible, be relocated to suitable habitat surrounding the disturbance footprint. If RDL species are encountered, avoidance is the best mitigation. * Permits will be required from LEDET for protected species that need to be removed, cut, or destroyed before any vegetation clearing may take place.	3	1	1	4	1	18	Low	55,0



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Potential failure to comply with national and regional legislative requirements regarding permit applications, including timeously liaising with national and provincial competent authorities, for the removal / destruction of species listed under:</p> <ul style="list-style-type: none"> - The list of Schedule 12 (Protected plants) under the Limpopo Environmental Management Act, 2003 (Act 7 of 2003) (LEMA); - The List of Protected Tree Species (GN 536 OF 2018) as it relates to the National Forest Act (Act 84 of 1998) (NFA); and - The NEMBA Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007 and again in GN 627 in Government Gazette 43386 of 2020). <p>This will result in unnecessary or unlawful destruction/removal of floral SCC leading to a decline in the numbers of NFA-Protected Tree species (particularly <i>Sclerocarya birrea</i> subsp. <i>caffra</i>, <i>Elaodendron transvaalse</i>) and/or potential TOPS-Protected floral species.</p>	-	4	2	2	6	2	40	Moderate	<p>* Before any construction activities can occur, a detailed walk down of the area must take place, during which all NFA-protected tree species should be marked and permits applied for to remove / cut / destroy these species.</p> <p>* Permits from the relevant authorities, i.e., Limpopo Department of Economic Development and Tourism (LEDET) and Department of Forestry, Fisheries, and the Environment (DFFE) should be obtained before removal, cutting or destruction of protected species or TOPS species before any proposed vegetation clearing activities may take place.</p>	3	1	1	4	1	18	Low	55,0
<p>Inconsiderate planning of infrastructure placement and design, leading to the loss of intact floral habitat, as well as unnecessary edge effect impacts (e.g., ongoing alien vegetation spread and bush encroachment) within areas outside of the proposed development footprint.</p>	-	4	3	2	6	2	44	Moderate	<p>* Planned footprint area must be optimised, ensuring that the layout is as small as possible and does not encroach upon any neighbouring floral communities..</p> <p>* Design of infrastructure should be environmentally sound, and all possible precautions taken to prevent potential spills and /or leaks. All spills and /or leaks from equipment must be immediately remedied and cleaned up to ensure that these chemicals do not enter the soils.</p>	3	2	1	4	1	21	Low	52,3



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
Potential failure to draft an updated Alien and Invasive Plant (AIP) Management/Control plan for the footprint area before the commencement of construction activities.	-	4	3	2	8	2	52	Moderate	* Prior to the commencement of construction activities on site, the existing alien and invasive plant control plan for the mine should be updated and implemented throughout all phases of the proposed pre-assembly project. i) Cleared vegetation and removed soil that will not be used again (e.g., in rehabilitation) should be disposed of at a registered waste facility where alien propagules will not spread further into natural habitat; and ii) It is highly recommended that the AIP Management/ Control Plan should be implemented by an experienced professional. * Only registered chemicals may be used during any carried out chemical control of AIPs.	3	2	1	6	1	27	Low	48,1
Potential failure to draw up and get approval for the required plans to mitigate impacts before and at the commencement of construction activities: - Failure to draw up and get approval for an Erosion Control Plan; - Failure to draw up and get approval for a Rehabilitation Plan to be implemented before the commencement of construction. This will result in: - Extensive and unnecessary loss of floral habitat, leading to a decline in floral diversity, including a decline in floral SCC numbers within the study area, including species such as <i>Sclerocarya birrea</i> subsp. <i>caffra</i> , <i>Elaodendron transvaalse</i> . - Inability of vegetation to recover due to a lack of, or untimely, implementation of a well-conceived rehabilitation plan.	-	4	3	2	8	2	52	Moderate	* Ensure that sound environmental management is in place during the planning phase. * Prior to the commencement of construction activities, the entire development footprint area, should be fenced off and clearly demarcated. * Prior to the commencement of construction activities on site, a rehabilitation plan should be developed for implementation throughout the pre-assembly laydown development phases (accommodating concurrent rehabilitation).	3	2	1	6	1	27	Low	48,1

Construction & Operational Phase



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Loss of floral diversity and habitat due to construction activities and vegetation clearing; i) Dumping of construction material within areas where no construction is planned; ii) Proliferation of alien invasive species within the footprint area due to pre-construction activities, spreading into the surrounding areas.</p> <p>This could lead to the potential loss of floral species within surrounding habitat areas.</p>	-	4	3	3	6	3	48	Moderate	<p>* The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management). * Removal of vegetation must be restricted to what is necessary and should remain within the approved development footprint. * If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil. * An AIP control plan must be implemented for areas cleared outside of the authorised footprint area.</p>	3	2	2	4	1	24	Low	50,0



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Loss of floral diversity and habitat due to potentially poorly managed edge effects such as</p> <p>i) Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to ongoing proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat;</p> <p>ii) Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation; and</p> <p>iii) Habitat fragmentation because of construction activities leading to loss of floral diversity.</p>	-	4	2	3	8	3	52	Moderate	<p>* Clearing of vegetation should take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential. Additionally, construction personnel and construction vehicles should be kept to the bare minimal per site to reduce the construction footprint and potential of soil compaction.</p> <p>* Vehicles should be restricted to travelling only on designated roadways to limit the footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal.</p> <p>* Care should be taken during the mining phase of the proposed development to limit edge effects to surrounding natural habitat. At minimum, this can be achieved by:</p> <p>i) Demarcating all footprint areas during construction and operational activities;</p> <p>ii) No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;</p> <p>iii) All soils compacted because of construction or mining activities should be ripped and profiled and reseeded;</p> <p>iv) Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Any areas that have been left bare because of the construction and mining activities should be rehabilitated using indigenous species.</p>	3	1	2	2	1	15	Low	71,2



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Loss of floral SCC from the study area for the following reasons:</p> <p>i) Potential failure to monitor relocation success of occurring and potential occurring floral SCC (relocation must have taken place before construction phase); and</p> <p>ii) Harvesting of floral SCC outside of the construction footprint by construction personnel.</p>	-	4	4	2	6	2	48	Moderate	<p>*No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC (if encountered).</p> <p>* Edge effect control needs to be implemented by fencing off or demarcating no-go areas to prevent further degradation and potential loss of floral SCC and their habitat outside of the proposed development footprint area.</p>	3	3	1	4	1	24	Low	50,0
<p>Loss of floral diversity and habitat due to construction and operational activities:</p> <p>i) Destruction of vegetation due to unplanned fires;</p> <p>ii) Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants, and potentially further decreasing optimal growing/re-establishing conditions.</p>	-	3	3	3	6	2	36	Moderate	<p>* No illicit fires must be allowed during the construction of the proposed development.</p> <p>* Where possible suppress dust to mitigate the impact of dust on flora within a close proximity of construction activities.</p>	2	2	2	4	1	16	Low	55,6
Decommissioning & Rehabilitation Phase																	



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Ineffective implementation of rehabilitation activities: Permanent loss of floral habitat, floral diversity, and floral SCC due to loss of favourable habitat to reinstate floral SCC. Higher likelihood of edge effect impacts on adjacent and nearby natural vegetation of increased sensitivity.</p>	-	3	3	2	6	2	33	Moderate	<p>*All infrastructure footprints that will be decommissioned should be concurrently rehabilitated in accordance with a rehabilitation plan compiled by a suitable specialist. * Regular dust suppression must be undertaken on bare soils during the closure and decommissioning phase. * Storm water management measures should be maintained until rehabilitation is complete. * All disturbed areas should be ripped to alleviate compaction. *All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated. *Rehabilitation efforts must be implemented for a period of at least five years after decommissioning or until it is evident that veg has taken and can maintain self-sustained populations. A mix of indigenous grass seeds can be used during rehabilitation activities to re-establish a protective cover, to minimise soil erosion and dust emissions. * Contractors will not be allowed to harvest any natural resources.</p>	2	2	1	4	1	14	Low	57,6



Nature of the impact	Significance of potential impact BEFORE mitigation						Mitigation Measures	Significance of potential impact AFTER mitigation						Degree of mitigation (%)			
	P	D	E	M	LoR	Significance		P	D	E	M	LoR	Significance				
<p>Potentially poorly implemented and monitored AIP Management programme, leading to the reintroduction and proliferation of AIP species within the area.</p> <p>Potential failure to monitor rehabilitation as per the BAP set out for the mine.</p>	-	4	3	2	8	3	52	Moderate	<p>*AIP control plans should be implemented to ensure continued control of AIP species within the study area and surrounding areas</p> <p>* Follow up with alien and invasive plant control measures for a period of 5 years post-closure</p> <p>*No dumping of litter must be allowed on-site. As such it is advised that vegetation cuttings be carefully collected and disposed of at a separate waste facility.</p> <p>* Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC or suitable habitat for such species outside of the proposed development footprint</p>	3	2	1	6	1	27	Low	48,1
<p>Potential poor monitoring of relocated SCC resulting in the loss of SCC from the study area and poorly reinstated and represented floral SCC within rehabilitated areas.</p>	-	4	3	2	6	2	44	Moderate	<p>* Monitoring of rescued and relocated floral SCC, particularly the NFA protected species recorded within the study area, should continue during the operational and maintenance phase until it is evident that the species have successfully established;</p> <p>*As far as possible, no collection of floral SCC or medicinal floral species within the study area or adjacent natural habitat must be allowed during the any of the proposed phases of the development established.</p>	3	2	1	4	1	21	Low	52,3



6.2 Impact Discussion

The direct impact of the proposed construction of the pre-assembly laydown area on the floral ecology of the study area is not anticipated to be detrimental. Due to the already modified nature of the habitat units, particularly the Heavily Degraded Habitat, the associated impacts are anticipated to remain localised – given that mitigation measures are adequately implemented.

The overall impact significance prior to the implementation of mitigation measures was medium. With the implementation of mitigation measures, the proposed impact significance for the study area and its associated habitat units was low.

6.2.1 Impact on Floral Ecology

Impact on Floral Habitat and Diversity

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed construction of a pre-assembly laydown area. The proposed construction activities will result in the clearance of vegetation which will lead to a loss of floral habitat and diversity within the study area. As no indigenous vegetation was verified on site, no direct impact on indigenous vegetation is anticipated, however, edge effects should be managed and mitigated so to reduce impacts to the surrounding habitat which consists of indigenous vegetation.

The construction of the proposed pre-assembly laydown area within the Secondary Thornveld Habitat unit (of moderately low sensitivity from a floral perspective) will result in the loss of largely modified and degraded habitat, which is not associated with indigenous vegetation as per the NEMA listing notice definition. As such a significant loss of the associated modified floral communities is not anticipated. The construction of the proposed pre-assembly laydown area is not likely to impact floral communities at a larger local and regional (provincial) level.

The construction of the proposed pre-assembly laydown area within the Heavily Degraded Habitat Unit (of low floral sensitivity) is not deemed likely to significantly impact on the floral habitat and diversity that is located within this habitat unit, nor is it likely to impact floral communities at a larger local and regional (provincial) level.

Provided that strict mitigation measures are implemented, it is anticipated that the impact on floral habitat and diversity will be localised in extent and will not impact on floral conservation targets for the region.



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

- Placement of infrastructure and/or construction material within natural habitat outside of the authorised footprint;
- Failure to implement rehabilitation efforts in disturbed areas surrounding the proposed footprint areas;
- Destruction of floral habitat during construction activities; and
- AIP proliferation in disturbed areas and subsequent spread into surrounding natural areas.

Impact on Floral Species of Conservation Concern

Two protected NFA tree species, namely *Sclerocarya birrea* subsp. *caffra* and *Elaeodendron transvaalense* (NT), were recorded within the study area. Both NFA tree species were recorded within the Secondary Thornveld Habitat. Only *S. caffra* subsp. *caffra* was recorded within the Heavily Degraded Habitat although it was present in low densities. No floral species as per TOPS, or provincially protected species as listed under the LEMA were recorded within the study area. However, suitable habitat for such species is available within the study area, particularly within the Secondary Thornveld Habitat.

If the construction of the proposed pre-assembly laydown area is authorised, a summer season walkdown of the footprint area is recommended in which all SCC are recorded and marked for permit application purposes (be it for rescue and relocation initiatives, or destruction of the specimens). All SCC species recorded during the recommended footprint walkdown should first be investigated for possible relocation to suitable habitat outside the direct footprint (as far as is feasible) – destruction of SCC should only be considered as a last resort. Good record-keeping will be necessary to record this process and to document all successes and failures associated with the relocation. Rescue and relocation should be done by a suitably qualified specialist. Any additional floral SCC encountered during the construction phase of the proposed project should also be relocated by a suitably qualified specialist and the necessary permits should be applied for. Permits required for the relocation or destruction/removal of SCC prior to vegetation clearing must be obtained by the relevant authorities, i.e., from the LEDET and/or the DFFE.

It is recommended that for species that cannot be relocated, seedlings and /or seeds of these species are harvested from the development footprint area before clearing activities commence and grown under nursery conditions with the purpose to use these species for rehabilitation at a later stage.



Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas

Due to their largely modified and degraded natures, none of the habitat units within the study area were considered representative of the reference vegetation type, namely the Makhado Sweet Bushveld.

The study area is not located within a protected area, a threatened vegetation type, or a threatened ecosystem. According to the Limpopo C-Plan, the study area is located entirely within an ESA1. Given the largely transformed and/or modified nature of the Heavily Degraded Habitat and the Secondary Thornveld Habitats, an overall lack of intact dispersal corridors, the presence of ESA habitat within these habitats was not confirmed.

Probable Residual Impacts

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

- Continued AIP proliferation and woody encroachment to adjacent natural vegetation communities.

Cumulative Impacts

The greatest threat to the floral ecology within the study area and the local region is the ongoing proliferation of poorly managed AIP species and woody encroachment (as a result of overgrazing practices) which can result in an overall cumulative loss of native floral communities within the area.

7. CONCLUSION

STS was appointed by SRK Consulting (South Africa) to conduct an indigenous vegetation assessment as part of the EA process to authorise the third concentrator (known as the M3C) pre-assembly area.

During the field assessment, two broad habitat units were identified within the study area, namely Secondary Thornveld Habitat and Heavily Degraded Habitat. Indigenous vegetation was not recorded within either of the habitat units. The sensitivities, from a floral perspective, of each of the habitat units was as follows: the Heavily Degraded Habitat was of a **low sensitivity** and the Secondary Habitat was of a **moderately low sensitivity**.



No TOPS species or species as listed under the LEMA were observed during the field assessment. However, two protected tree species as per the NFA, namely *Sclerocarya birrea* subsp. *caffra* and *Ealeodendron transvaalense* (NT), were identified within the study area. If the construction of the proposed pre-assembly laydown area is authorised, a summer season walkdown of the footprint area is recommended in which all SCC are recorded and marked for permit application purposes (be it for rescue and relocation initiatives, or destruction of the specimens).

The study area is not located within a protected area, a threatened vegetation type, or a threatened ecosystem. According to the Limpopo C-Plan, the study area is located entirely within an ESA1; however, given the largely transformed and/or modified nature of the Heavily Degraded Habitat and the Secondary Thornveld Habitats and an overall lack of intact dispersal corridors, the presence of ESA habitat within these habitats was not confirmed.

With no indigenous vegetation present within the study area, the proposed project will not impact on indigenous vegetation. The overall, combined significance of impacts on floral ecology prior to the implementation of mitigation measures was medium across the study area. With the implementation of mitigation measures, the proposed impact significance is anticipated to be low.

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



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APPENDIX A: Indemnity and Terms of Use of this Report

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

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This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.



APPENDIX B: Legislative Requirements

THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

- (a) A species that is not an indigenous species; or
- (b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

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

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

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

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

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

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

Section 12:

Declaration of trees as protected

- 1) The Minister may declare-
 - a. particular tree,
 - b. a particular group of trees,
 - c. a particular woodland; or
 - d. trees belonging to a particular species,
 to be a protected tree, group of trees, woodland or species.



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

Section 15(1):

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

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

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

The objectives of this Act are:

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

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



APPENDIX C: Floral Method of Assessment

Floral Species of Conservational Concern Assessment

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

The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “*low*”, “*medium*”, “*high*” and “*very high*” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below¹²:

- **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 km² 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

¹² 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>



Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).

- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (<http://redlist.sanbi.org/>).
- Typically, data is extracted for the Quarter Degree Square (QDS) in which the study area is situated but where it is deemed appropriate, a larger area can be included.

NEMBA TOPS Species

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

NFA Species

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

LEMA - Specially Protected and Protected Species

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

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

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

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

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

Floral Habitat Sensitivity

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance, and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Floral SCC**: The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Unique Landscapes**: The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
- **Conservation Status**: The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional and national databases. Whether the habitat is representative of a Critical Biodiversity Area or forms part of an Ecological Support Area is also taken into consideration;
- **Floral Diversity**: The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and



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

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

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

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

Vegetation Surveys

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

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

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

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



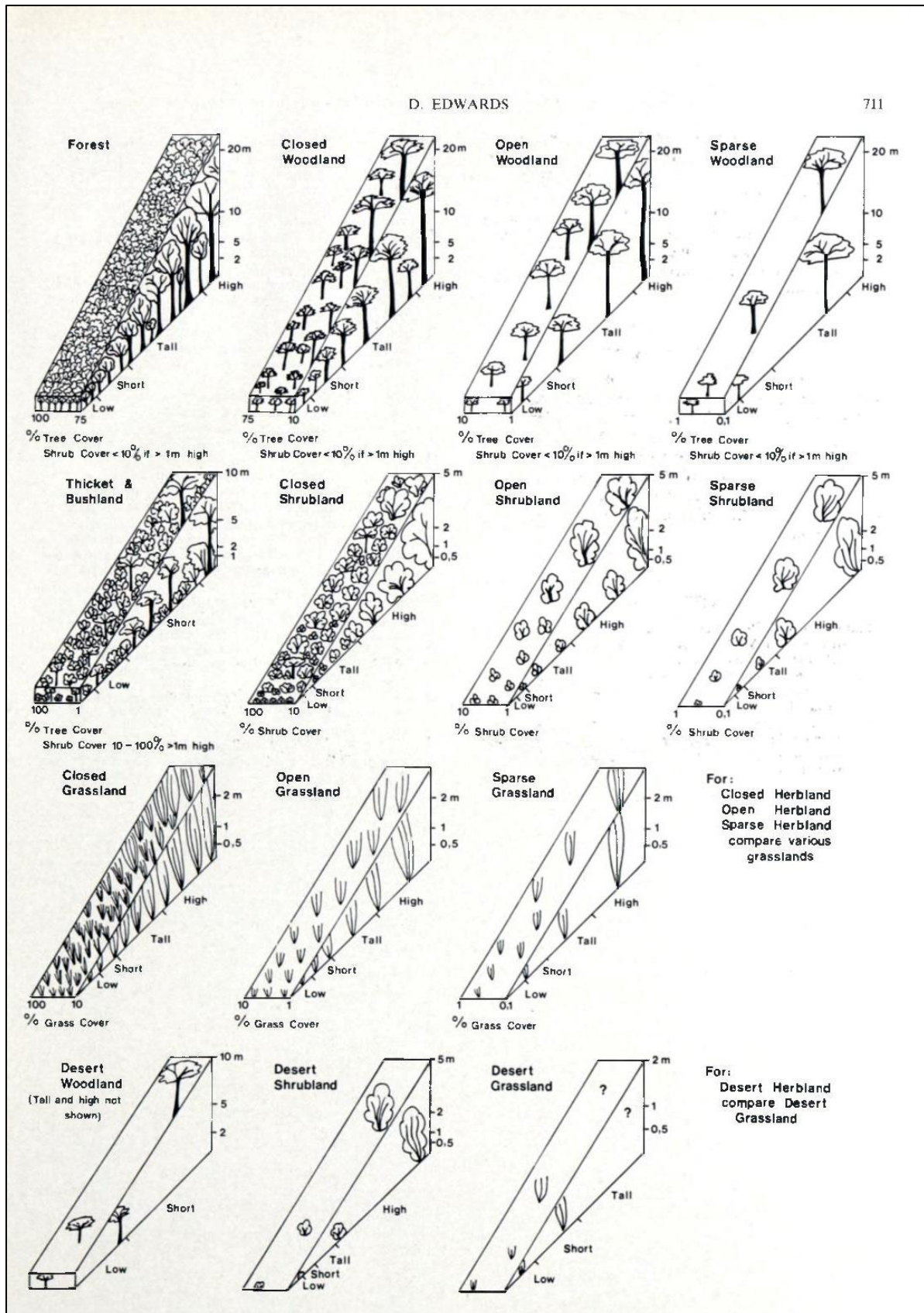


Figure C1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.



APPENDIX D: Impact Assessment Methodology (SRK)

For the EAP to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

Impact Assessment Methodology

The anticipated impacts associated with the proposed project have been assessed according to SRK’s standardised impact assessment methodology which is presented below. This methodology has been formalised to comply with Regulation 31(2) (l) of the National Environmental Management Act (Act 107 of 1998) (NEMA), which states the following:

“An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision, and must include;

- I. An assessment of each identified potentially significant impact, including:
 - a. Cumulative impacts;
 - b. The nature of the impact;
 - c. The extent and duration of the impact;
 - d. The probability of the impact occurring;
 - e. The degree to which the impact can be reversed;
 - f. The degree to which the impact may cause irreplaceable loss of resources; and
 - g. The degree to which the impact can be mitigated.”

Based on the above, the EIA Methodology will require that each potential impact identified is clearly described (providing the nature of the impact) and be assessed in terms of the following factors:

- **Extent** (spatial scale) - will the impact affect the national, regional or local environment, or only that of the site;
- **Duration** (temporal scale) - how long will the impact last;
- **Magnitude** (severity) - will the impact be of high, moderate or low severity; and
- **Probability** (likelihood of occurring) - how likely is it that the impact may occur.

To enable a scientific approach for the determination of the environmental significance (importance) of each identified potential impact, a numerical value has been linked to each factor.

The following ranking scales are applicable:

Occurrence	Duration:	Probability:
	5 – Permanent	5 – Definite/don't know
	4 – Long-term (ceases with the operational life)	4 – Highly probable
	3 – Medium-term (5-15 years)	3 – Medium probability
	2 – Short-term (0-5 years)	2 – Low probability
	1 – Immediate	1 – Improbable
	0 – None	
Severity	Extent/scale:	Magnitude:
	5 – International	10 – Very high/uncertain
	4 – National	8 – High
	3 – Regional	6 – Moderate
	2 – Local	4 – Low
	1 – Site only	2 – Minor
0 – None		

Once the above factors had been ranked for each identified potential impact, the environmental significance of each impact can be calculated using the following formula:



Significance = (duration + extent + magnitude) x probability

The maximum value that can be calculated for the environmental significance of any impact is 100.

The environmental significance of any identified potential impact is then rated as either: high, moderate or low on the following basis:

- More than 60 significance value indicates a high (H) environmental significance impact;
- Between 30 and 60 significance value indicates a moderate (M) environmental significance impact; and
- Less than 30 significance value indicates a low (L) environmental significance impact.

In order to assess the degree to which the potential impact can be reversed, and be mitigated, each identified potential impact will need to be assessed twice;

- Firstly, the potential impact will be assessed and rated prior to implementing any mitigation and management measures; and
- Secondly, the potential impact will be assessed and rated after the proposed mitigation and management measures have been implemented.

The purpose of this dual rating of the impact before and after mitigation is to indicate that the significance rating of the initial impact is and should be higher in relation to the significance of the impact after mitigation measures have been implemented.

To assess the degree to which the potential impact can cause irreplaceable loss of resources, the following classes (%) will be used and will need to be selected based on your informed decision and discretion:

- 5 100% - Permanent loss
- 4 75% - 99% - significant loss
- 3 50% - 74% - moderate loss
- 2 25% - 49% - minor loss
- 1 0% - 24% - limited loss

Please note that the Loss of Resources aspect will not affect the overall significance rating of the impact.

In terms of assessing the cumulative impacts, it must be addressed in a sentence/paragraph fashion as the spatial extent of the cumulative impacts will vary from project to project. Cumulative impact, in relation to an activity, means the impact of an activity that in itself may not be significant, but may become significant when added to the existing or potential impacts eventuating from similar or diverse activities or undertakings in the area.

Mitigation measure development

The following points presents the key concepts considered in the development of mitigation measures for the proposed construction:

- Mitigation and performance improvement measures and actions that address the risks and impacts¹³ are identified and described in as much detail as possible. Mitigating measures are investigated according to the impact minimisation hierarchy as follows:
 - Avoidance or prevention of impact;
 - Minimisation of impact; and
 - Rehabilitation.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation; and

¹³ Mitigation measures should address both positive and negative impacts



- Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, wherever possible.

Recommendations

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



APPENDIX E: Vegetation Type(s)

Makhado Sweet Bushveld

Remarks: This area is transitional between the higher-lying Polokwane Plateau and the lower-lying vegetation units of the Limpopo River Valley.

Table E1: Dominant & typical floristic species of the Makhado Sweet Bushveld (Mucina & Rutherford, 2012)

GROUP	SPECIES
Woody Species	
Small trees	<i>Senegalia erubescens</i> (d), <i>Vachellia gerrardii</i> (d), <i>S. mellifera</i> subsp. <i>detinens</i> (d), <i>V. rehmanniana</i> (d), <i>Boscia albitrunca</i> (d), <i>Combretum apiculatum</i> (d), <i>V. tortilis</i> subsp. <i>heteracantha</i> , <i>Terminalia sericea</i>
Tall shrubs	<i>Commiphora pyracanthoides</i> , <i>Dichrostachys cinerea</i> , <i>Grewia flava</i> , <i>Hibiscus calyphyllus</i> , <i>Lycium shawii</i> , <i>Rhigozum obovatum</i>
Low shrubs	<i>Barleria lancifolia</i> , <i>Hirpicium bechuanense</i> , <i>Indigofera polioties</i> , <i>Melhaniania rehmannii</i> , <i>Pechuel-Loeschea leubnitziae</i>
Succulents	
Succulent shrubs	<i>Euphorbia bergii</i> , <i>Kalanchoe rotundifolia</i> , <i>Lycium cinereum</i> .
Herbaceous species	
Herbs	<i>Chamaecrista absus</i> , <i>Corbichonia decumbens</i> , <i>Geigeria acaulis</i> , <i>Harpagophytum procumbens</i> subsp. <i>transvaalense</i> , <i>Heliotropium steudneri</i> , <i>Syncolostemon elliottii</i> , <i>Hermbstaedtia odorata</i> , <i>Leonotis sexdentata</i> , <i>Osteospermum muricatum</i> , <i>Tephrosia purpurea</i> subsp. <i>leptostachya</i>
Graminoids	
Grasses	<i>Antheophora pubescens</i> (d), <i>Aristida stipitata</i> subsp. <i>graciliflora</i> (d), <i>Cenchrus ciliaris</i> (d), <i>Enneapogon scoparius</i> (d), <i>Brachiaria nigropedata</i> , <i>Eragrostis trichophora</i> , <i>Panicum coloratum</i> , <i>P. maximum</i> , <i>Schmidtia pappophoroides</i> , <i>Urochloa mosambicensis</i>

*(d) – Dominant species for the vegetation type



APPENDIX F: Species List

Observed and Expected Floral Species

Table F1: Dominant floral species encountered in the study area. Alien species are indicated with an asterisk (*).

Species	Secondary Thornveld	Heavily Degraded Habitat
Woody Species		
* <i>Delonix regia</i>	x	x
* <i>Plumeria Rubra</i>	x	x
* <i>Tecoma stans</i>		x
<i>Asparagus suaveolens</i>	x	x
<i>Clerodendrum ternatum</i>	x	
<i>Combretum apiculatum</i>	x	
<i>Dichrostachys cinerea</i>	x	x
<i>Elaeodendron transvaalense</i>	x	
<i>Euclea crispa</i>	x	x
<i>Euclea undulata</i>	x	x
<i>Ficus burkei</i>	x	
<i>Gomphocarpus fruticosus</i>	x	x
<i>Gossypium herbaceum</i>	x	x
<i>Grewia flava</i>	x	
<i>Grewia vernicosa</i>	x	
<i>Gymnosporia buxifolia</i>	x	x
<i>Gymnosporia senegalensis</i>	x	
<i>Pappea capensis</i>	x	
<i>Peltophorum africanum</i>	x	
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	x	x
<i>Searsia lancea</i>	x	
<i>Searsia leptodictya</i>	x	x
<i>Searsia pyroides</i>	x	
<i>Senegalia burkei</i>	x	
<i>Senegalia fleckii</i>	x	
<i>Tapinanthus oleifolius</i>	x	x
<i>Terminalia sericea</i>	x	
<i>Vachellia karroo</i>	x	x
<i>Vachellia tortilis</i>	x	x
<i>Ziziphus mucronata</i>	x	x
Herbaceous Species		
* <i>Bidens pilosa</i>	x	x
* <i>Gomphrena celosioides</i>		x
* <i>Schkuhria pinnata</i>	x	x
* <i>Solanum elaeagnifolium</i>	x	x
* <i>Tagetes minuta</i>	x	x
<i>Abutilon</i> sp.	x	x
<i>Berkheya</i> sp.	x	



Species	Secondary Thornveld	Heavily Degraded Habitat
<i>Commelina benghalensis</i>	x	
<i>Dicerocaryum senecioides</i>	x	x
<i>Dipcadi cf. virida</i>	x	x
<i>Helichrysum sp.</i>	x	
<i>Hirpicium bechuanense</i>	x	
<i>Indigophera sp.</i>	x	
<i>Ipomoea sinensis</i>	x	
<i>Lagera decurrens</i>		x
<i>Leonotis sp.</i>	x	x
<i>Phyllanthus parvulus var. parvulus</i>	x	
<i>Polygala hotentotta</i>	x	x
<i>Rhynchosia cf. minima</i>	x	
<i>Rhynchosia totta var. totta</i>	x	
<i>Senna italica subsp. arachoides</i>		x
<i>Solanum campylacanthum</i>	x	x
<i>Tephrosa sp.</i>	x	x
<i>Xenostegia tridentata</i>	x	
Succulent Species		
* <i>Agave sisalana</i>	x	x
<i>Aloe marlothii</i>	x	
<i>Aloe transvaalensis</i>	x	x
<i>Cynanchum viminalis</i>	x	x
<i>Euphorbia inaequilatera</i>	x	
<i>Kalanchoe rotundifolia</i>	x	
<i>Kleinia longifolia</i>	x	
<i>Viscum rotundifolium</i>	x	x
Graminoid Species		
* <i>Pennisetum setaceum</i>		x
<i>Aristida congesta subsp. congesta</i>	x	x
<i>Cynodon dactylon</i>	x	x
<i>Heteropogon contortus</i>	x	x
<i>Hyparrhenia hirta</i>	x	x
<i>Melinis repens</i>	x	x
<i>Panicum maximum</i>	x	x
<i>Setaria pumila</i>	x	
<i>Urochloa mosambicensis</i>	x	x



APPENDIX G: Floral SCC

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. For the POC assessment, a list of Red Data Listed (RDL) species previously recorded within the 10 km of the study area was pulled from the Botanical Database of Southern Africa (BODATSA) (<http://posa.sanbi.org/>). This list was further cross-checked with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) TOPS flora) to identify provincially protected species previously recorded for the area.

Definitions of the national Red List categories

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

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- ^N**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- ^N**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
 - Restricted range: Extent of Occurrence <500 km², OR



- Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy, typically smaller than 20 km², OR
- Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
- Small global population: Less than 10 000 mature individuals.
- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.
- **Data Deficient - Insufficient Information (DDD)** A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
- **Data Deficient - Taxonomically Problematic (DDT)** A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
- **Not Evaluated (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in [Plants of southern Africa: an online checklist](#) are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

The below tables present the results of the POC assessment.

NEMBA TOPS List for South Africa¹⁴

Table G2: TOPS list for South Africa – plant species.

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Conservation Status
<i>Adenia wilmsii</i>	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
<i>Adenium swazicum</i>	Swaziland Impala Lily	Low	Range: Kruger National Park to Swaziland along the Lebombo Mountains and adjacent areas in south-western Mozambique.	VU
<i>Adenium swazicum</i>	Swaziland Impala Lily	Low	Provincial distribution: Mpumalanga	VU
<i>Aloe albida</i>	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
<i>Aloe pillansii</i> (now <i>Aloidendron pillansii</i>)	False Quiver Tree	Low	Provincial distribution: Northern Cape Range: Richtersveld and southern Namibia.	EN

¹⁴ 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
<i>Aloe simii</i>	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
<i>Clivia mirabilis</i>	“Oorlogskloof Bush Lily	Low	Provincial distribution: Northern Cape, Western Cape	VU; P
<i>Diaphanathe millarii</i>	Tree Orchid	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal Range: East London and Durban.	VU
<i>Disa macrostachya</i>	No common name	Low	Provincial distribution: Northern Cape	EN; P
<i>Disa nubigena</i>	No common name	Low	Provincial distribution: Western Cape	Rare; P
<i>Disa physodes</i>	No common name	Low	Provincial distribution: Western Cape	CR; P
<i>Disa procerata</i>	No common name	Low	Provincial distribution: Western Cape	EN; P
<i>Disa sabulosa</i>	No common name	Low	Provincial distribution: Western Cape	EN; P
<i>Encephalartos aemulans</i>	Ngotshe Cycad	Low	Provincial distribution: KwaZulu-Natal	CR
<i>Encephalartos altensteinii</i>	Bread Palm	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	VU; P
<i>Encephalartos arenarius</i>	Dune Cycad	Low	Provincial distribution: Eastern Cape	EN
<i>Encephalartos brevifoliolatus</i>	Escarpment Cycad	Low	Provincial distribution: Limpopo	EW
<i>Encephalartos caffer</i>	Breadfruit Tree	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	NT; P
<i>Encephalartos cerinus</i>	Waxen Cycad	Low	Provincial distribution: KwaZulu-Natal	CR
<i>Encephalartos cupidus</i>	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
<i>Encephalartos dolomiticus</i>	Wolkberg Cycad	Low	Provincial distribution: Limpopo	CR
<i>Encephalartos dyerianus</i>	Lowveld Cycad	Low	Provincial distribution: Limpopo	CR; P
<i>Encephalartos eugene-maraisii</i>	Waterberg Cycad	Low	Provincial distribution: Limpopo	EN
<i>Encephalartos friderici-guilielmi</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	NT; P
<i>Encephalartos ghellinckii</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	VU; P
<i>Encephalartos heenanii</i>	Woolly Cycad	Low	Provincial distribution: Mpumalanga Description: Open areas of montane grasslands amidst scarp forest in deep valleys and ravines.	CR
<i>Encephalartos hirsutus</i>	Venda Cycad	Low	Provincial distribution: Limpopo	CR
<i>Encephalartos horridus</i>	Eastern Cape Blue Cycad	Low	Provincial distribution: Eastern Cape	EN
<i>Encephalartos humilis</i>	No common name	Low	Provincial distribution: Mpumalanga Description: Montane and mistbelt grassland, rocky sandstone slopes.	VU; P
<i>Encephalartos inopinus</i>	Lydenburg Cycad	Low	Provincial distribution: Limpopo	CR



NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Conservation Status
<i>Encephalartos laevifolius</i>	Kaapsehoop Cycad	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga Description: Steep, rocky slopes in mistbelt grassland, 1300-1500 m.	CR
<i>Encephalartos lanatus</i>	No common name	Low	Provincial distribution: Gauteng and western Mpumalanga Description: Sheltered, wooded ravines in sandstone ridges, 1200-1500 m.	NT; P
<i>Encephalartos latifrons</i>	Albany Cycad	Low	Provincial distribution: Eastern Cape	CR
<i>Encephalartos lebomboensis</i>	Lebombo Cycad	Low	Provincial distribution: KwaZulu-Natal, Mpumalanga Description: Cliffs and rocky ravines in savanna and grassland.	EN
<i>Encephalartos lehmannii</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Encephalartos longifolius</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Encephalartos middelburgensis</i>	Middelburg Cycad	Low	Provincial distribution: Gauteng, Mpumalanga Description: Open grasslands and in sheltered valleys.	CR
<i>Encephalartos msinganus</i>	Msinga, Cycad	Low	Provincial distribution: KwaZulu-Natal	CR
<i>Encephalartos natalensis</i>	Natal Giant Cycad	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	NT; P
<i>Encephalartos ngoyanus</i>	Ngoye Dwarf Cycad	Low	Provincial distribution: KwaZulu-Natal	VU
<i>Encephalartos nubimontanus</i>	Blue Cycad	Low	Provincial distribution: Limpopo	EW
<i>Encephalartos paucidentatus</i>	No common name	Low	Provincial distribution: Mpumalanga Description: Forest, occurs on steep rocky slopes and alongside streams in deep gorges.	VU; P
<i>Encephalartos princeps</i>	No common name	Low	Provincial distribution: Eastern Cape	VU; P
<i>Encephalartos senticosus</i>	No common name	Low	Provincial distribution: KwaZulu-Natal	VU; P
<i>Encephalartos transvenosus</i>	Modjadje Cycad	Low	Provincial distribution: Limpopo	LC; P
<i>Encephalartos trispinosus</i>	No common name	Low	Provincial distribution: Eastern Cape	VU; P
<i>Encephalartos woodii</i>	Wood's Cycad	Low	Provincial distribution: KwaZulu-Natal	EW
<i>Euphorbia clivicola</i>	No common name	Low	Provincial distribution: Limpopo	CR; P
<i>Euphorbia meloformis</i>	No common name	Low	Provincial distribution: Eastern Cape	NT; P
<i>Euphorbia obesa</i>	No common name	Low	Provincial distribution: Eastern Cape	EN; P
<i>Harpagophytum procumbens</i>	Devil's Claw	Low	Provincial distribution: Free State, Limpopo, Northern Cape, North West	LC; P
<i>Harpagophytum zeyherii</i>	Devil's Claw	Medium	Provincial distribution: Gauteng, Limpopo, Mpumalanga, North West	LC; P
<i>Hoodia currorii</i>	Ghaap	Low	Provincial distribution: Limpopo	P
<i>Hoodia gordonii</i>	Ghaap	Low	Provincial distribution: Free State, Northern Cape, Western Cape	DDD; P
<i>Jubaeopsis caffra</i>	Pondoland Coconut	Low	Provincial distribution: Eastern Cape	EN
<i>Merwillia plumbea</i>	Blue Squill	Low	Provincial distribution: KwaZulu-Natal, Mpumalanga Major habitats: Grassland Description: Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m.	NT



NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Conservation Status
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	Lebombo Wattle	Low	Provincial distribution: KwaZulu-Natal	Now LC
<i>Protea odorata</i>	Swartland Sugarbush	Low	Provincial distribution: Western Cape	CR; P
<i>Siphonochilus aethiopicus</i>	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
<i>Stangeria eriopus</i>	No common name	Low	Provincial distribution: Eastern Cape, KwaZulu-Natal	VU; P
<i>Warburgia salutaris</i>	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
<i>Zantedeschia jucunda</i>	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.



Provincially Protected Flora

Table G3: Protected Plants (Schedule 12) for the Limpopo Province¹⁵.

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

¹⁵ <https://www.thetreeapp.co.za/team/>


Common name	Scientific name	POC
Aloe Krans	<i>Aloe arborescens</i>	not protected under LEMA
Aloe Mountain	<i>Aloe marlothii</i>	
Ammophilla	<i>Aloe ammophilla</i>	
Davyana	<i>Aloe davyana</i>	
Fosteri	<i>Aloe fosteri</i>	
Globuligemma	<i>Aloe globuligemma</i>	
Grandidentata	<i>Aloe grandidentata</i>	
Greatheadii	<i>Aloe greatheadii</i>	
Lutescens	<i>Aloe lutescens</i>	
Mutans	<i>Aloe mutans</i>	
Parvibracteata	<i>Aloe parvibracteata</i>	
Transvaalensis	<i>Aloe transvaalensis</i>	
Wickensii	<i>Aloe wickensii</i>	
All species of <i>Brachystelma</i>	<i>Brachystelma</i> spp	
All species of <i>Ceropegia</i>	<i>Ceropegia</i> spp	Low
All species of <i>Duvalia</i>	<i>Duvalia</i> spp	Low
The following species Euphorbias:	<i>Euphorbia barnardii</i>	Low
	<i>Euphorbia divicola</i>	Low
	<i>Euphorbia grandialata</i>	Low
	<i>Euphorbia groenewaldii</i>	Low
	<i>Euphorbia louwii</i>	Low
	<i>Euphorbia restricta</i>	Low
	<i>Euphorbia rowlandii</i>	Low
	<i>Euphorbia tortirama</i>	Low
	<i>Euphorbia waterbergensis</i>	Low
	Ghaap	<i>Hoodia lugardii</i>
All species of Ghaap	<i>Tavaresia</i> spp	Low
All species of <i>Huernia</i>	<i>Huernia</i> spp (i.e., <i>Huernia zebrina</i> subsp. <i>magniflora</i>)	High
All species of <i>Huerniopsis</i>	<i>Huerniopsis</i> spp	Low
The following Impala Lilies	<i>Adenium multiflorum</i>	Low
Multiflorum en Oleifolium	<i>Adenium oleifolium</i>	Low
Kudu Lily	<i>Pachypodium saundersii</i>	Low
All species of <i>Orbeanthus</i>	<i>Orbeanthus</i> spp	Low
All species of <i>Orbea</i>	<i>Orbea</i> spp	Low
All species of <i>Orbeopsis</i>	<i>Orbeopsis</i> spp	Low
All species of <i>Pachycymbiums</i>	<i>Pachycymbium</i> spp	Low
All species of <i>Riocreuxias</i>	<i>Riocreuxia</i> spp	Low
All species of <i>Stapeliads</i>	<i>Stapelia</i> spp	High
Stone Plant	<i>Lithops leslieii</i>	Low
Other Plants		
The following <i>Agapanthus</i> species	<i>Agapanthus coddii</i> , <i>A. dyeri</i>	Low
The following <i>Anacampseros</i> species	<i>Anacampseros bemenkampii</i> (now <i>A. rhodesica</i>)	Low
All species of <i>Anomatheca</i>	<i>Anomatheca</i> spp	Low
The following <i>Anthericum</i> species	<i>Anthericum cyperaceum</i>	Low
The following Arum Lilies:		Low
Jucunda, Pentlandii and Rehmännii	<i>Zantedeschia jucunda</i> , <i>Z. pentlandii</i> , <i>Z. rehmannii</i>	Low
The following <i>Babiana</i> Species	<i>Babiana hypogaea</i> var. <i>longituba</i>	Low
<i>Batesiana Gasteria</i>	<i>Gasteria batesiana</i>	Low
Blue Squill	<i>Scilla natalensis</i>	Low
Clivia	<i>Clivia caulescens</i>	Low



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



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

Table G5: NFA plant list for species with a known distribution range falling within the study area¹⁶.

SCIENTIFIC NAME	Habitat & Distribution ¹⁷ & ¹⁸	National Red List Status	POC
<i>Boscia albitrunca</i>	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	Medium
<i>Combretum imberbe</i>	The leadwood can be found in all the bushveld regions and in mixed forest in southern Africa. Preferred habitat includes open bushveld, mixed woodland, rivers or dry watercourses and often on alluvial soils. It is widespread in Lowveld areas and grows along streams and rivers. <i>Combretum imberbe</i> is widespread in northern Namibia. It is also found in Mpumalanga, Limpopo, North-West Province, Mozambique, and into tropical Africa.	LC P	High
<i>Catha edulis</i>	Khat is found in woodlands and on rocky outcrops. It is scattered in KwaZulu-Natal and Eastern Cape, mostly from the mistbelt, moving inland. It is also found in the Western Cape, Mpumalanga, Swaziland, Mozambique and through to tropical Africa and the Arab countries.	LC P	Low
<i>Elaeodendron transvaalense</i>	Savanna or bushveld, from open woodland to thickets, often on termite mounds.	NT P	Confirmed
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	The Marula is widespread in Africa from Ethiopia in the north to KwaZulu-Natal in the south. In South Africa it is more dominant in the Baphalaborwa area in Limpopo. It occurs naturally in various types of woodland, on sandy soil or occasionally sandy loam.	LC P	Confirmed
<i>Philenoptera violacea</i>	Alluvial flats in bushveld	LC P	Low
<i>Pittosporum viridiflorum</i>	<i>Pittosporum viridiflorum</i> 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. <i>Pittosporum viridiflorum</i> grows in tall forest and in scrub on the forest margin, kloofs and on-stream banks.	LC P	Low
<i>Prunus africana</i>	<i>Prunus africana</i> is confined to evergreen forests from near the coast to the mist belt and montane forests in KwaZulu-Natal, Eastern Cape, Swaziland, Mpumalanga, Zimbabwe, and tropical Africa. This 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	Low

¹⁶ <https://www.thetreeapp.co.za/team/>

¹⁷ <http://pza.sanbi.org/>

¹⁸ <http://redlist.sanbi.org/index.php>



SCIENTIFIC NAME	Habitat & Distribution ¹⁷ & ¹⁸	National Red List Status	POC
<i>Vachellia erioloba</i>	Found in dry woodland, bushveld, grassland, and watercourses in arid areas usually on stony or sandy soil. Widespread in the arid northern provinces of South Africa, also Namibia, Botswana, Zimbabwe, southern Angola, and south-western Zambia.	LC P	Low
<i>Erythrophysa transvaalensis</i>	This species has a limited distribution in South Africa occurring in Gauteng, Limpopo, and the North West Province. It grows in a few places in western Gauteng, on the slope of a hill near the Bospoort Dam in the Rustenburg District, near Thabazimbi, and in the western Waterberg. It was first thought to be endemic to syenite hills (koppies) in the Pilanesberg Nature Reserve, but it has been found since in a wider area (Balkwill 1994). I.C. Verdoorn (1942) described one of the original collections as coming from a norite koppie (near Bosport Dam). It also occurs in Limpopo in a few areas including near the Strydom tunnel on dolomite (Pieter Winter pers. comm.). It has also been collected in Zimbabwe.	LC P	Low
<i>Securidaca longepedunculata</i>	It occurs in the North-West and Limpopo provinces of South Africa, in Mozambique and is widely distributed in tropical Africa. The violet tree is found in woodland and arid savanna soils.	LC P	Low
<i>Podocarpus latifolius</i>	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 forest.	LC P	Low

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



APPENDIX H: Declaration and Specialists CV's

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

Samantha-Leigh Daniels
Christien Steyn

PhD Candidate Plant Science (University of Pretoria)
MSc Plant Science (University of Pretoria)

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

Company of Specialist:	Scientific Terrestrial Services	
Name / Contact person:	Christien Steyn	
Postal address:	PO. Box 751779, Gardenview	
Postal code:	2047	
Telephone:	011 616 7893	Fax: 086 724 3132
E-mail:	christien@sasenvgroup.co.za	
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria) BSc Environmental Science (University of Pretoria)	
Registration / Associations	Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc) Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the Grassland Society of South Africa (GSSA) Member of the Land Rehabilitation Society of Southern Africa (LARSSA)	

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

I, Samantha-Leigh Daniels, declare that -

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



Signature of the Specialist



I, Christien Steyn, declare that -

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



Signature of the Specialist





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Training

- Plant species identification
- Herbarium usage and protocols





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 127823/21)

Member of the Botanical Society of South Africa (BotSoc)

Member of the Grassland Society of South Africa (GSSA)

Member of the Land Rehabilitation Society of Southern Africa (LARSSA)

Member of the South African Association of Botanists (SAAB)

EDUCATION

Qualifications

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

Short courses and Training

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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

