



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE PROPOSED MOKOPANE
WATER TREATMENT WORKS AND
ASSOCIATED ACCESS ROAD
INFRASTRUCTURE, LIMPOPO PROVINCE.

Prepared for: Zutari (Pty) Ltd

Authors: C. Steyn
J. Potgieter

Reviewers: S. L. Daniels (PhD)
S. van Staden (Pr. Sci. Nat)

Reference: STS 23-2043

Date: September 2023



Part of the SAS Environmental Group of Companies

EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by Zutari (Pty) Ltd (Zutari) to conduct a Faunal and Floral Assessment for the proposed water treatment works (WTW), within the Limpopo Province. This report pertains solely to the assessed “**focus area**”, which encompasses two sites, namely 1) the Alternative WTW and associated access road, and 2) the Preferred WTW (where no access road will be required as there is existing access).

A Basic Assessment Report (BAR) will be compiled by the Environmental Assessment Practitioner (EAP) for the proposed WTW. The overall objective of the proposed development is to supply potable water for commercial and residential purposes. The technical features of the scheme proposed in the Mogalakwena Water Master Plan (MWMP) (as provided by the proponent) include the following:

- A raw water pipe from the farm Pruissen (where this pipe will connect to the bulk water pipeline from the Flag Boshielo Dam) to the new WTW (i.e., the focus of this report). The proposed WTW will supply potable water to the Mokopane Central Business District (CBD) and town areas.
- The raw water pipe will continue from the WTW at Mokopane, northwards to the rural town area of Sekuruwe where a second WTW will be constructed (not assessed in this report). This WTW will be able to provide potable water to mining clients and residents for various rural villages.
- Mining water users will also be able to draw water from the raw water line at various points towards Sekuruwe. This will be handled by means of offtake agreements.
- The site assessment took place over one day (29th of August 2023) by one botanical specialist and one faunal specialist to “ground-truth” the results of the desktop assessment.

Desktop research

The focus area is in the Central Bushveld Bioregion, which is situated within the Savanna Biome. The associated vegetation type is the Polokwane Plateau Bushveld (as per the 2018 Vegetation Map Project (VegMAP)). The 2022 Red List of Ecosystems (RLE) database replaces the 2018 National Biodiversity Assessment (NBA) database and, according to the 2022 RLE, the focus area is located within a Least Concern (LC) ecosystem.

According to the South African Protected Areas Database (SAPAD) (2023, Q1), the focus area is located directly within a protected area, namely the Fossil Hominid Sites of South Africa (SA), also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO).

The entire focus area is located within a Category 1 Critical Biodiversity Area (CBA), i.e., these are Irreplaceable Sites required to meet biodiversity pattern and / or ecological processes targets.

Floral and Faunal Ecology

Three broad habitats were delineated during the site assessment, namely the (1) Mountain Bushveld and associated Episodic Drainage Line (EDL), (2) the Plateau Bushveld, and (3) Transformed Habitat.

A total of 94 plant taxa were recorded across the focus area, 61% of which were represented by woody species, 12% by forbs (under-represented due to season of assessment), 7% by succulents, and 20% by graminoid species.

While conducting the site assessment, it was evident that the focus area is still effectively utilised by various faunal species, including two confirmed and 14 potential species of conservation concern (SCC). Smaller species like reptiles, small mammals, and invertebrates have limited ranges in which they move and are probably permanent residents of the focus area and habitats therein. On the other hand, larger mammals, and avifauna, which are more mobile, are likely to use the focus area in combination with the surrounding natural vegetation. These species are expected to have home and foraging ranges that extend beyond the focus area and are not entirely dependent on it for their survival.



Site Ecological Importance (SEI)

Based on the criteria provided in Appendix A of this report, all habitats within the focus area were allocated an importance category, i.e., a SEI category. SEI is a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]). BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

The below table breaks down the SEI obtained for the floral and faunal components.

Table A1: Floral and Faunal SEI for the focus area habitats.

HABITAT UNIT	FLORAL SEI	FAUNAL SEI
Mountain Bushveld and associated EDL	High	
	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.	
Plateau Bushveld	Medium	Low
	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Transformed Habitat	Very low	
	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required	

Impact Summary

The proposed activities will impact on the habitat units within the focus area to varying degrees, i.e., the proposed Alternative WTW will impact on approximately three (3) hectares (ha) of Mountain Bushveld and minimally on the EDL (0.003 ha), whereas the proposed Preferred WTW will impact on seven (7) ha of Plateau Bushveld. Within the entire focus area, very little of the Transformed Habitat is utilised as part of the project footprints (i.e., only ± 0.007 ha).

Floral Impact Summary:

The activities associated with the pre-construction phase can be mitigated; the implementation of sound planning can allow for very low impact significance scores for both the Alternative WTW and the Preferred WTW. During the construction phase, not much can be done to reduce impacts to floral habitat and diversity and, as such pre- and post-mitigated impact significance remains largely the same. However, the impact significance associated with the two options are variable, i.e., the impact significance is – and remains to be – high pre- and post-mitigation for the Alternative WTW and associated access road, whereas the impact significance is – and remains to be – moderate pre- and post-mitigation for the Preferred WTW. During the operational and maintenance phase, if the proposed mitigation measures are implemented, the significance of long-term impacts can be reduced to acceptable levels (for both the Alternative WTW and the Preferred WTW).

The focus area is not associated with any red data listed (RDL) floral species (i.e., vulnerable (VU), endangered (EN), or critically endangered (CR) species), but habitat associated with the Mountain



Bushveld is suitable for RDLs such as Sensitive species 1248¹ (VU) and Sensitive species 1252 (VU) (albeit of medium probability of occurrence (POC)). Species such as *Combretum petrophilum* (Rare) and the near-threatened (NT) *Elaeodendron transvaalense* (also protected under the National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA)), are further likely to establish in the Mountain Bushveld habitat unit. The Plateau Bushveld is not deemed suitable for the successful establishment of RDLs; however, the NT *Elaeodendron transvaalense* (also NFA-protected) was recorded in this habitat unit. The impact that the proposed Alternative WTW and associated access road will have on RDL floral species, and their habitat, is of higher significance than the impact that the proposed Preferred WTW will have on RDL floral species and their habitat. The impacts will be realised within the pre-construction phase seeing that rescue and relocation must take place prior to the commencement of construction activities. It should be noted, however, that if an RDL is located on site, avoidance should be the mitigation measure, and relocation only seen as a compensation initiative.

The focus area is associated with a CBA 1. Loss of the CBA 1 within the Preferred WTW footprint is deemed acceptable from a botanical perspective, whereas loss of the CBA 1 within the Mountain Bushveld is considered significant from a botanical perspective (especially considering that the proposed development can be considered as an incompatible land-use). Consultation with regional authorities regarding the suitability of the proposed development within affected CBAs will be required.

Faunal Impact Summary:

Construction of the proposed development within the Alternative WTW area will largely affect the Mountain Bushveld Habitat which will result in **high** impact significance (pre mitigation), during the pre-construction and construction phase, which can be reduced to moderate significance levels (post mitigation). During the operational and maintenance phase, **moderate** impact significance can be expected pre-mitigation, which can be reduced to **low** significance if mitigation measures are implemented. Impacts to the Preferred WTW site, which is largely situated within the Plateau Bushveld Habitat, is expected to be lower as this habitat is less sensitive from a faunal perspective. During the pre-construction and construction phase, impacts of **moderate** significance can be expected pre and post mitigation on faunal habitat and diversity, while impacts of **low** significance on faunal SCC is anticipated before implementation of mitigation measures, which can be reduced to **very low** significance levels after mitigation measures are implemented. During the operational and maintenance phase, impacts of **low** significance can be expected on habitat diversity and faunal SCC prior to the implementation of mitigation measures, which can be reduced to **very low** post mitigation.

Sagittarius serpentarius (Marabou Stork, NT) and *Hadogenes newlandsi* (Newlands Rock Scorpion, protected under the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) regulations) were the only two confirmed SCC during the site visit. The Marabou Storks were seen foraging in the Transformed Habitat which consisted mostly of a waste disposal facility while the Newlands Rock Scorpion was found in the rocky parts of the Mountain Bushveld Habitat. The focus area has medium POC for an additional six mammal SCCs, four avifaunal SCCs, two reptile SCCs and one invertebrate SCC and a high POC of one avifaunal SCC. The habitat in the Preferred WTW site is not expected to be suitable for faunal SCC and therefore low and very low impacts can be expected from development in this area from a faunal SCC perspective.

Reasoned Opinion

It is the recommendation of the specialists that the proposed Preferred WTW be pursued and that the proposed Alternative WTW and associated access road be avoided. 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 focus area will be made in support of the principle of sustainable development.

¹ The identity of sensitive species identified by the Screening Tool must remain confidential and may under no circumstances be made known to the public (as per the best practice guideline as stipulated by the South African National Biodiversity Institute (SANBI) that accompanies the protocol and screening tool).



TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
TABLE OF CONTENTS	iv
LIST OF TABLES	v
LIST OF FIGURES	vi
DOCUMENT GUIDES.....	vii
GLOSSARY OF TERMS	xiv
LIST OF ACRONYMS	xviii
1 INTRODUCTION.....	1
1.1 Reporting Protocol.....	5
1.2 Scope of Work.....	5
1.3 Assumptions and Limitations	6
1.4 Legislative Requirements	7
2 METHODOLOGY	8
2.1 Desktop Study	8
2.2 General Field Assessment Approach	9
2.3 Sensitivity Mapping.....	10
3 RESULTS OF THE DESKTOP ANALYSIS.....	10
3.1 Conservation Characteristics of the focus area based on National and Provincial Datasets.....	11
3.2 Screening Tool Outcome.....	17
4 RESULTS OF THE FIELD ASSESSMENT	22
4.1 Sampling Effort.....	22
4.2 Local Context and Fieldwork Results.....	22
4.2.1 Existing Impacts	22
4.2.2 Vegetation types, fine scale habitats, and ecological overview.....	23
4.2.3 Faunal Field-Verified Results.....	32
5 BIODIVERSITY PRIORITY AREAS / CONSERVATION SIGNIFICANCE	40
6 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN	41
7 ALIEN AND INVASIVE PLANT (AIP) SPECIES	47
7.1 AIPs identified within the focus area.....	48
8 IMPACT ASSESSMENT	49
8.1 Activities and Aspect Register	49
8.2 Floral Impact Assessment Tables.....	51
8.3 Floral Impact Discussion	58
8.3.1 Impact on Floral Habitat and Diversity	58
8.3.2 Impacts on Floral SCC	59
8.3.3 Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas.....	60
8.3.4 Probable Residual Impacts.....	60
8.3.5 Possible Cumulative Impacts.....	61
8.4 Faunal Impact Assessment Tables.....	62
8.5 Faunal Impact Discussion.....	69
8.5.1 Loss of Faunal Habitat and Diversity	69
8.5.2 Impact on Important Faunal SCC	70
8.5.3 Probable Residual Impacts.....	71
8.5.4 Possible Cumulative Impacts.....	71
9 CONCLUSION	72
10 REFERENCES.....	73
APPENDIX A: Indemnity and Terms of Use of This Report.....	75
APPENDIX B: Legislative Requirements	76
APPENDIX C: Method of Assessment (Floral and Fauna).....	79
APPENDIX D: Site Ecological Importance (SEI).....	85
APPENDIX E: Impact Assessment Methodology (as provided by the proponent)	90



APPENDIX F: Vegetation Type(s).....	97
APPENDIX G: Species List.....	99
APPENDIX H: Floral SCC.....	105
APPENDIX I: Faunal SCC.....	116
APPENDIX J: Details, Expertise and Curriculum Vitae of Specialists.....	121

LIST OF TABLES

Table 1:	Summary of the terrestrial conservation characteristics for the focus area (Quarter Degree Square (QDS) 2429AA).....	11
Table 2:	Summary of the screening tool results obtained for the focus area.	18
Table 3:	Vegetation classification of the habitat units and associated floral communities within the focus area.	24
Table 4:	Mountain Bushveld and associated EDL.....	27
Table 5:	Plateau Bushveld.....	29
Table 6:	Transformed habitat.....	31
Table 7:	Field assessment results pertaining to mammal species within the focus area.	32
Table 8:	Field assessment results pertaining to avifaunal species within the focus area.	34
Table 9:	Field assessment results pertaining to reptile and amphibian species within the focus area.	36
Table 10:	Field assessment results pertaining to invertebrate species within the focus area.	38
Table 11:	Biodiversity Priority Areas / Conservation Significance.	40
Table 12:	SEI importance for the different habitat units associated with the focus area (floral perspective).	42
Table 13:	SEI importance for the different habitat units associated with the focus area (faunal perspective).	44
Table 14:	List of AIPs observed within the focus area.....	48
Table 15:	Activities and Aspects likely to impact on the floral and faunal resources within the focus area.	49
Table 16:	Pre-construction Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.	52
Table 17:	Construction Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.	54
Table 18:	Operational and Maintenance Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.....	57
Table 19:	Summary of impact significance on floral habitat and diversity.....	58
Table 20:	Pre-construction Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented within each table section.	63
Table 21:	Construction Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented within each table section.	65
Table 22:	Maintenance and Operational Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented at the bottom of each table section.....	67
Table 23:	Summary of impact significance on faunal habitat and diversity.....	69
Table 24:	Summary of impact significance on faunal SCC.....	70



LIST OF FIGURES

Figure 1:	Locality map illustrating the focus area in relation to surrounding areas.....	2
Figure 2:	Topographic map illustrating the focus area in relation to surrounding areas.	3
Figure 3:	Proposed layout of the Preferred WTW as provided by the proponent.	4
Figure 4:	The focus area in relation to the remaining extent of the LC Polokwane Plateau Bushveld ecosystem (2022 RLE dataset).....	14
Figure 5:	National protected areas in relation to the focus area (SAPAD, 2023-Q1).	15
Figure 6:	The focus area in relation to a Category 1 CBA (2018 Limpopo C-Plan).....	16
Figure 7:	Screening Tool outcome for the Animal Species Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.	19
Figure 8:	Screening Tool outcome for the Plant Species Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.	20
Figure 9:	Screening Tool outcome for the Terrestrial Biodiversity Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.	21
Figure 10:	Historic harvesting or clearing of indigenous trees within the Preferred WTW has taken place in 2019. Prior to this, no notable impacts to the Preferred WTW have taken place. The yellow outline indicates the proposed Preferred WTW.	23
Figure 11:	Habitat units associated with the focus area.	26
Figure 12:	Floral SEI map of the focus area.....	43
Figure 13:	Faunal SEI map of the focus area.....	46



DOCUMENT GUIDES

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 March 2020, and 2) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Plant 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 Professions with expertise in the field of terrestrial biodiversity.	Cover Page and Appendix J
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	Section 4 (field-verified results)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Section 4 (field-verified results)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 3 (background research); and Section 4 (field-verified results)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas or Freshwater Ecosystem Priority Area sub catchments;	Section 3 (background research); and Section 4 (field-verified results)
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and d) species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	Section 3 (background research); and Section 4 (field-verified results)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Section 6 (site ecological importance); and Section 8 (impact assessment and mitigation recommendations)
2.3.7	The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	
2.3.7.1	Terrestrial Critical Biodiversity Areas, including: a) <i>the reasons why an area has been identified as a Critical Biodiversity Areas;</i> b) <i>an indication of whether or not the proposed development is consistent with maintaining the Critical Biodiversity Areas in a natural or near natural state or in achieving the goal of rehabilitation;</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 Critical Biodiversity Areas;</i>	Section 3 (background research); Section 4 (field-verified results); Section 6 (site ecological importance); and Section 8 (impact assessment and mitigation recommendations)
2.3.7.2	Terrestrial Ecological Support Areas, including: 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 Ecological Support Areas; 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, 2004 including-	Section 3 (background research)



	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>	
2.3.7.4	Priority areas for protected area expansion, including- a) <i>the way in which the proposed development will compromise or contribute to the expansion of the protected area network;</i>	Section 3 (background research)
2.3.7.5	SWSAs including: 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>	Addressed in the Freshwater Report (refer to SAS 23-1135, 2023).
2.3.7.6	Freshwater Ecosystem Priority Area sub catchments, including- a) <i>the impacts of the proposed development on habitat condition and species in the Freshwater Ecosystem Priority Area sub catchment;</i>	Addressed in the Freshwater Report (refer to SAS 23-1135, 2023).
2.3.7.7	Indigenous forests, including: 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 based on the current remaining vegetation types associated with the focus area.
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.	
	Section 4.2.1 & 4.2.2 & 5: Results of the Floral Assessment as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. Section 4.2.1 & 4.2.3: Results of the Faunal Assessment as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	Terrestrial Biodiversity Specialist Assessment Report	
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix J
3.1.2	A signed statement of independence by the specialist;	Appendix J
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.3
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; and Appendix C - 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 6 (site ecological importance)
	Impact Assessment Requirements 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme;	Section 8 (impact assessment and mitigation recommendations)
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	Section 6 (site ecological importance)
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Executive summary; and Section 9
3.1.15	Any conditions to which this statement is subjected.	Section 8 (impact assessment and mitigation recommendations)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the Environmental Management Programme where relevant.	This report is submitted to the Environmental Assessment Practitioner and applicant and will be appended to the Environmental Impact Assessment / Environmental Management Plan by the Environmental Assessment Practitioner in due course as part of the application process
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	



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

Theme-Specific Requirements as per Government Notice No. 1150 Plant Theme – Very High and High Sensitivity Protocol followed (refer to Section 1.1)		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
1.	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “medium sensitivity” for plant species, must submit either a Plant Species Specialist Assessment Report or a Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4	Section 3.2; and Section 4.2.1 & 4.2.2
1.2	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “low” sensitivity for plant species, must submit a Plant Species Compliance Statement.	Not applicable to this report. A Plant Species Specialist Assessment Report was compiled.
1.3	Where the nature of the activity is expected to have an impact on species of conservation concern beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the area of assessment must include the project areas of influence, as determined.	Section 1
2	Plant Species Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions within a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	Cover Page and Appendix J
2.2	The assessment must be undertaken within the area of assessment.	Section 1
2.3	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline² and must:	
2.3.1	Identify the Species of Conservation Concern which were found, observed or are likely to occur within the area of assessment;	Section 4.2 and Appendix H
2.3.2	Provide evidence (photographs) of each Species of Conservation Concern found or observed within the area of assessment, which must be disseminated by the specialist to a recognised online database facility ³ immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	Not applicable to this report. SCCs were not recorded on site (although suitable habitat for such species is present)
2.3.3	Identify the distribution, location, viability ⁴ and detailed description of population size of the Species of Conservation Concern identified within the area of assessment;	Not applicable to this report. SCCs were not recorded on site (although suitable habitat for such species is present)
2.3.4	Identify the nature and the extent of the potential impact of the proposed development to the population of the Species of Conservation Concern located within the area of assessment;	Section 8.2 and 8.3
2.3.5	Determine the importance of the conservation of the population of the Species of Conservation Concern identified within the area of assessment, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	Appendix H
2.3.6	Determine the potential impact of the proposed development on the habitat of the Species of Conservation Concern located within the area of assessment;	Section 8.2 and 8.3
2.3.7	Include a review of relevant literature on the population size of the Species of Conservation Concern, the conservation interventions as well as any national or provincial species management plans for the Species of Conservation Concern. This review must provide information on the need to conserve the Species of Conservation Concern and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;	Not applicable to this report. SCCs were not recorded on site (although suitable habitat for such species is present)
2.3.8	Identify any dynamic ecological processes occurring within the broader landscape, which might be disrupted by the development and result in negative impact on the identified Species of Conservation Concern, for example, fires in fire-prone systems;	Section 4.2 & Section 8.2-8.3
2.3.9	Identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified Species of Conservation Concern and its long-term viability;	Section 4.2 & Section 8.2-8.3

² Available at <https://bgis.sanbi.org/>

³ The preferred platform is iNaturalist.org but any other national or international virtual museum

⁴ the ability to survive and reproduce in the long term



2.3.10	Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each Species of Conservation Concern	Not applicable to this report. SCCs were not recorded on site (although suitable habitat for such species is present)
2.3.11	Discuss the presence or likelihood of additional Species of Conservation Concern including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species ⁵	Section 4.2 & Appendix H
2.3.12	Identify any alternative development footprints within the preferred development site which would be of “low” sensitivity or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification	Section 6
3.	The findings of the assessment must be written up in a Plant Species Specialist Assessment Report, this report must include:	
3.1.2	A signed statement of independence by the specialist;	Appendix J
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.3 & Section 4.1
3.1.4	A description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	Section 2 & Appendices C - E
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data	Section 1.3
3.1.6	Details of all Species of Conservation Concern found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 4.2 and Appendix H
3.1.7	The online database name, hyperlink and record accession numbers for disseminated evidence of Species of Conservation Concern found within the area of assessment;	Not applicable to this report. SCCs were not recorded on site (although suitable habitat for such species is present)
3.1.8	The location of areas not suitable for development and to be avoided during construction where relevant;	Section 6
3.1.9	A discussion on the cumulative impacts;	Section 8.3
3.1.10	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr)	Section 8.2 & 8.3
3.1.11	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant	Executive summary & Section 9
3.1.12	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” plant species sensitivity and were not considered appropriate	Section 6

⁵ Undescribed species are to be assessed as “High Sensitivity”



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

Theme-Specific Requirements as per Government Notice No. 1150		
Animal Theme – Very High and High Sensitivity Protocol followed (refer to Section 1.1)		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
1.	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for animal species must submit an Animal Species Specialist Assessment Report.	Section 3.2; and Section 4.2.3
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for animal species must submit either an Animal Species Specialist Assessment Report or an Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	Section 3.2; and Section 4.2.3
1.3	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “low” sensitivity for animal species, must submit a Terrestrial Compliance Statement.	Not applicable
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for animal species sensitivity and it is found to be of a “low” sensitivity, then an Animal Species Compliance Statement must be submitted.	Not applicable
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” animal species sensitivity and it is found to be of a “very high” or “high” animal species sensitivity, an Animal Species Specialist Assessment must be conducted.	Not applicable
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	Not applicable
1.7	The Animal Species Specialist Assessment and the Animal Species Compliance Statement must be undertaken within the focus area.	Section 1
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the focus area means the proposed development footprint within the preferred site.	Section 1
1.9	Where the nature of the activity is expected to have an impact on species of conservation concern beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the focus area must include the project areas of influence, as determined.	Section 1
2	Plant Species Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP) within a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	Cover Page Appendix J
2.2	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline⁶ and must:	
2.2.1	Identify the Species of Conservation Concern which were found, observed or are likely to occur within the focus area;	Section 4.2.3 Appendix I
2.2.2	Provide evidence (photographs or sound recordings) of each SCC found or observed within the focus area, which must be disseminated by the specialist to a recognised online database facility, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	Section 4.2.3
2.2.3	Identify the distribution, location, viability ⁷ and detailed description of population size of the Species of Conservation Concern identified within the focus area;	Section 4.2.3
2.2.4	Identify the nature and the extent of the potential impact of the proposed development to the population of the Species of Conservation Concern located within the focus area;	Section 8.4 & 8.5
2.2.5	Determine the importance of the conservation of the population of the Species of Conservation Concern identified within the focus area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	Section 4.2.3 Appendix I

⁶ Available at <https://bgis.sanbi.org/>

⁷ the ability to survive and reproduce in the long term



2.2.6	Determine the potential impact of the proposed development on the habitat of the Species of Conservation Concern located within the focus area;	Section 8.4 & 8.5
2.2.7	Include a review of relevant literature on the population size of the Species of Conservation Concern, the conservation interventions as well as any national or provincial species management plans for the Species of Conservation Concern. This review must provide information on the need to conserve the Species of Conservation Concern and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;	Section 4.2.3 Appendix I
2.2.8	Identify any dynamic ecological processes occurring within the broader landscape, which might be disrupted by the development and result in negative impact on the identified Species of Conservation Concern, for example, fires in fire-prone systems;	Section 4.2.2
2.2.9	Identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified Species of Conservation Concern and its long-term viability;	Section 4.2.3
2.2.10	Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each Species of Conservation Concern	Not Applicable to this report
2.2.11	Discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity.	Section 4.2.3 Section 8.5 Appendix I
2.2.12	Identify any alternative development footprints within the preferred development site which would be of "low" sensitivity or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification	Section 4
2.3	The findings of the assessment must be written up in an Animal Species Specialist Assessment Report.	This Report
3.	Animal Species Specialist Assessment Report. This report must include as a minimum the following information:	
3.1.1	Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	Cover page Appendix J
3.1.2	A signed statement of independence by the specialist;	Appendix J
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1
3.1.4	A description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	Section 2 Appendix C
3.1.5	A description of the mean density of observations/number of sample sites per unit area and the site inspection observations;	Not applicable to this report.
3.1.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data	Section 1.3
3.1.7	Details of all Species of Conservation Concern found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 4.2.3 Appendix I
3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of Species of Conservation Concern found within the focus area	Not Applicable to this report, needs to be included in an Animal Specialist Report.
3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	Section 6
3.1.10	A discussion on the cumulative impacts;	Section 8.5.4
3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr)	Section 6
3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant.	Executive summary Section 9
3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" animal species sensitivity and were not considered appropriate.	Section 6
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	This report
4	Medium Sensitivity Species of Conservation Concern Confirmation	
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	Section 4.2.3
4.2	The presence or likely presence of the Species of Conservation Concern identified by the screening tool, must be confirmed through a site inspection by a specialist registered with the South African Council for Natural Scientific Professions in a field of practice relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	Cover Page Appendix J
4.3	The assessment must be undertaken within the focus area.	Section 1



4.4	The site inspection to determine the presence or likely presence of Species of Conservation Concern must be undertaken in accordance with the Species Environmental Assessment Guideline.	Section 4.2.3 Appendix I
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a Species of Conservation Concern within the site identified as “medium” sensitivity by the screening tool.	Section 4.2.3 Appendix I
4.6	Where Species of Conservation Concern are found on site or have been confirmed to be likely present, an Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	Section 4.2.3 Appendix I Animal Species Specialist Assessment Recommended



GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson et al. (2011), Hui and Richardson (2017), Wilson et al. (2017), Skowno et al. (2019), and SANBI (2016), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

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 the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems.
Biodiversity priority areas	Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: Protected Areas, Critically Endangered (CR) and Endangered (EN) ecosystems, Critical Biodiversity Area (CBAs) and Ecological Support Area (ESAs), Freshwater Ecosystem Priority Areas, High Water Yield Areas, Flagship Free-Flowing Rivers, Priority Estuaries, Priority Areas for land-based Protected Area Expansion, and Focus Areas for Offshore Protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future. The different categories <i>are not mutually exclusive</i> and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be <i>complementary</i>, with overlaps <i>reinforcing the importance</i> of an area.
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.
Community Characterisation	Comparisons can be made among communities using attributes such as species richness, species diversity, and evenness. ➤ <u>Species richness</u> is simply the number of species in a community. ➤ <u>Species diversity</u> is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species. ➤ <u>Species evenness</u> is a description of the distribution of abundance across the species in a community. Species evenness is highest when all species in a sample have the same abundance. Evenness approaches zero as relative abundances vary. Source: https://tinyurl.com/2p9yr3j8
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
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.
CR (IUCN⁸ Red List category)	Applied to both species/taxa and ecosystems: A species is CR when the best available evidence indicates that it meets at least one of the five

⁸ International Union for Conservation of Nature (IUCN)



	International Union for Conservation of Nature (IUCN) criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.
Development footprint (as per the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) definition)	"in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity"
Degradation	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Driver (ecological)	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.
Ecological Condition	"Ecological condition" means the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of "natural". Various terminology can be used for precision of language: ➤ <u>Fair ecological condition</u>: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem. ➤ <u>Good ecological condition</u>: Areas that are natural or near natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem. ➤ <u>Poor ecological condition</u>: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.
Ecological processes	The functions and processes that operate to maintain and generate biodiversity. To include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped.
ESA	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
EN (IUCN Red List category)	Applied to both species/taxa and ecosystems : A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Fatal flaw (Integrated Environmental Management Information Series (IEM))	Any problem, issue, or conflict (real or perceived) that could result in proposals being rejected or stopped.
Faunal Class	In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates.



Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Habitat loss	Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and functional characteristics of the ecosystem concerned.
Impact (IEM Series, draft Offset policy, and NEMA)	The positive or negative effects on human well-being and/or on the environment. Impact-related terminology: ➤ <u>Cumulative impact</u>: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. ➤ <u>Impact Significant/significance</u>: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social, and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts. ➤ <u>Residual negative impacts</u>: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years (<i>It is acknowledged that the time it takes for full restoration differs from ecosystem type to ecosystem type, as well as the local conditions. Given that there is no readily accessible information on the recovery times of the different ecosystem types in South Africa, a general timeframe had to be used. The 30-year general timeframe in the definition of "residual impact" reflects that the difficulty in restoring South African ecosystems once they have been disturbed. It is based on the risk-averse and cautious approach.</i>). ➤ <u>Significant impact</u>: An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds, or targets.
Important Bird and Biodiversity Area (IBA)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (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 invasive species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
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).
Near Threatened (according to IUCN)	Close to being at high risk of extinction in the near future.
Niche (ecological)	The role and position a species have in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces. A species' niche includes all of its interactions with the biotic and abiotic factors of its environment.
Protected	Species of high conservation value or national importance that require protection, according to Threatened or Protected Species (TOPS) 2007 and NEMBA.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the IUCN, organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Resource (ecological)	A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.
Threatened ecosystem	An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The NEMBA allows the Minister of Environmental Affairs or a provincial MEC for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
VU (Red List category)	Applied to both species/taxa and ecosystems: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.



LIST OF ACRONYMS

ADU	Animal Demography Unit
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
BI	Biodiversity Importance
CARA	Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983]
CBA	Critical Biodiversity Area
CBD	Central Business District
CI	Conservation Importance
CR	Critically Endangered
DD	Data Deficient
DDD	Data Deficient - Insufficient Information
DDT	Data Deficient - Taxonomically Problematic
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries, and the Environment
EA	Environmental authorisation
EAP	Environmental Assessment Practitioner
EDL	Episodic Drainage Line
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
EOO	Extent of occurrence
ESA	Ecological Support Area
FI	Functional Integrity
FMP	Fire Management Plan
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectares
IBA	Important Bird and Biodiversity Area
IEM	Integrated Environmental Management Information Series
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
km	Kilometres
km ²	Square kilometres
LC	Least concern
LEDET	Limpopo Economic Development, Environmental and Tourism
LEMA	Limpopo Environmental Management Act, 2003 [Act No. 7 of 2003]
MAP	Mean annual precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MEA	Millennium Ecosystem Assessment
MFD	Mean Frost Days
MWMP	Mogalakwena Water Master Plan
NBA	National Biodiversity Assessment
NE	Not Evaluated
NEMA	National Environmental Management Act, 1998 [Act No. 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]
NEMPAA	National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]
NFA	National Forest Act, 1998 [Act No. 84 of 1998]
NPAES	National Protected Area Expansion Strategy



NT	Near-threatened
NYBA	Not yet been assessed
P	Peripheral [Limpopo SoER 2004 Status]
PAOI	Project Area of Influence
PES	Present Ecological State
POC	Probability of occurrence
QDS	Quarter Degree Squares
RLE	Red List of Ecosystems
RR	Receptor Resilience
SA	South Africa
SABAP 2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
STS	Scientific Terrestrial Services [Pty] Ltd
SWSA	Strategic Water Source Areas
T	Listed as threatened but with no specific status for the Limpopo Province
TOPS	Threatened or Protected Species
TSP	Threatened Species Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
VEGMAP	Vegetation Map Project
VU	Vulnerable
WSA	Water Source Area
WTW	Water treatment works



1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed by Zutari (Pty) Ltd (Zutari) to conduct a Faunal and Floral Assessment for the proposed water treatment works (WTW), within the Limpopo Province. This report pertains solely to the assessed “**focus area**”, which encompasses two sites, namely 1) the Alternative WTW and associated access road, and 2) the Preferred WTW (where no access road will be required as there is existing access). For a visual representation of the location of the focus area, please refer to Figures 1 and 2. For a detailed description of the proposed layout for the Preferred WTW, refer to Figure 3.

The focus area is situated approx. 4 kilometres (km) southeast of Mokopane. The access road will connect to an existing (unnamed) road that links to the R518; the focus area is situated to the west of the R518. A Basic Assessment Report (BAR) will be compiled by the Environmental Assessment Practitioner (EAP) for the proposed WTW. The overall objective of the proposed development is to supply potable water for commercial and residential purposes. The technical features of the scheme proposed in the Mogalakwena Water Master Plan (MWMP) (as provided by the proponent) include the following:

- A raw water pipe from the farm Pruissen (where this pipe will connect to the bulk water pipeline from the Flag Boshielo Dam) to the new WTW (i.e., the focus of this report). The proposed WTW will supply potable water to the Mokopane Central Business District (CBD) and town areas.
- The raw water pipe will continue from the WTW at Mokopane, northwards to the rural town area of Sekuruwe where a second WTW will be constructed (not assessed in this report). This WTW will be able to provide potable water to mining clients and residents for various rural villages.
- Mining water users will also be able to draw water from the raw water line at various points towards Sekuruwe. This will be handled by means of offtake agreements.

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



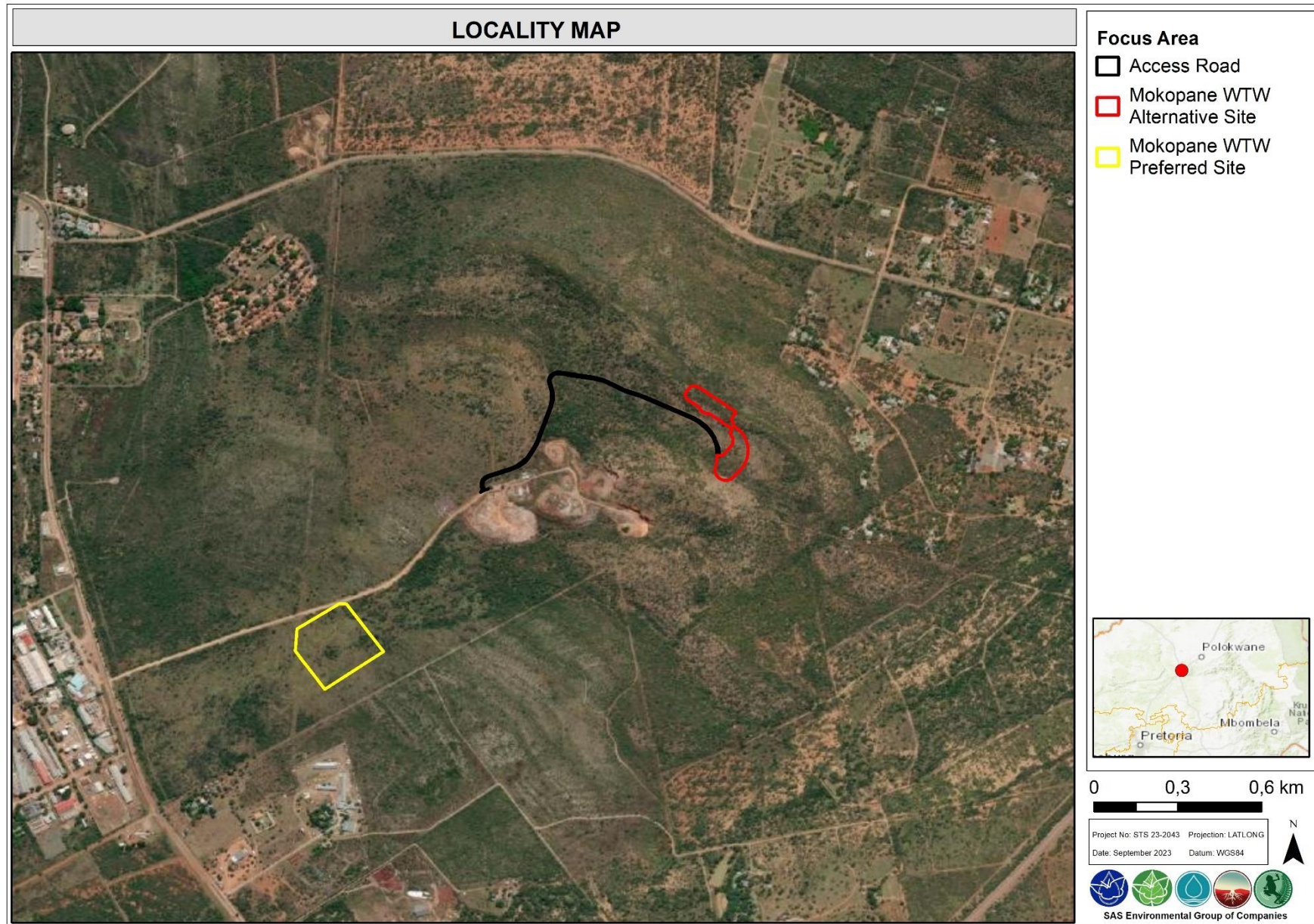


Figure 1: Locality map illustrating the focus area in relation to surrounding areas.



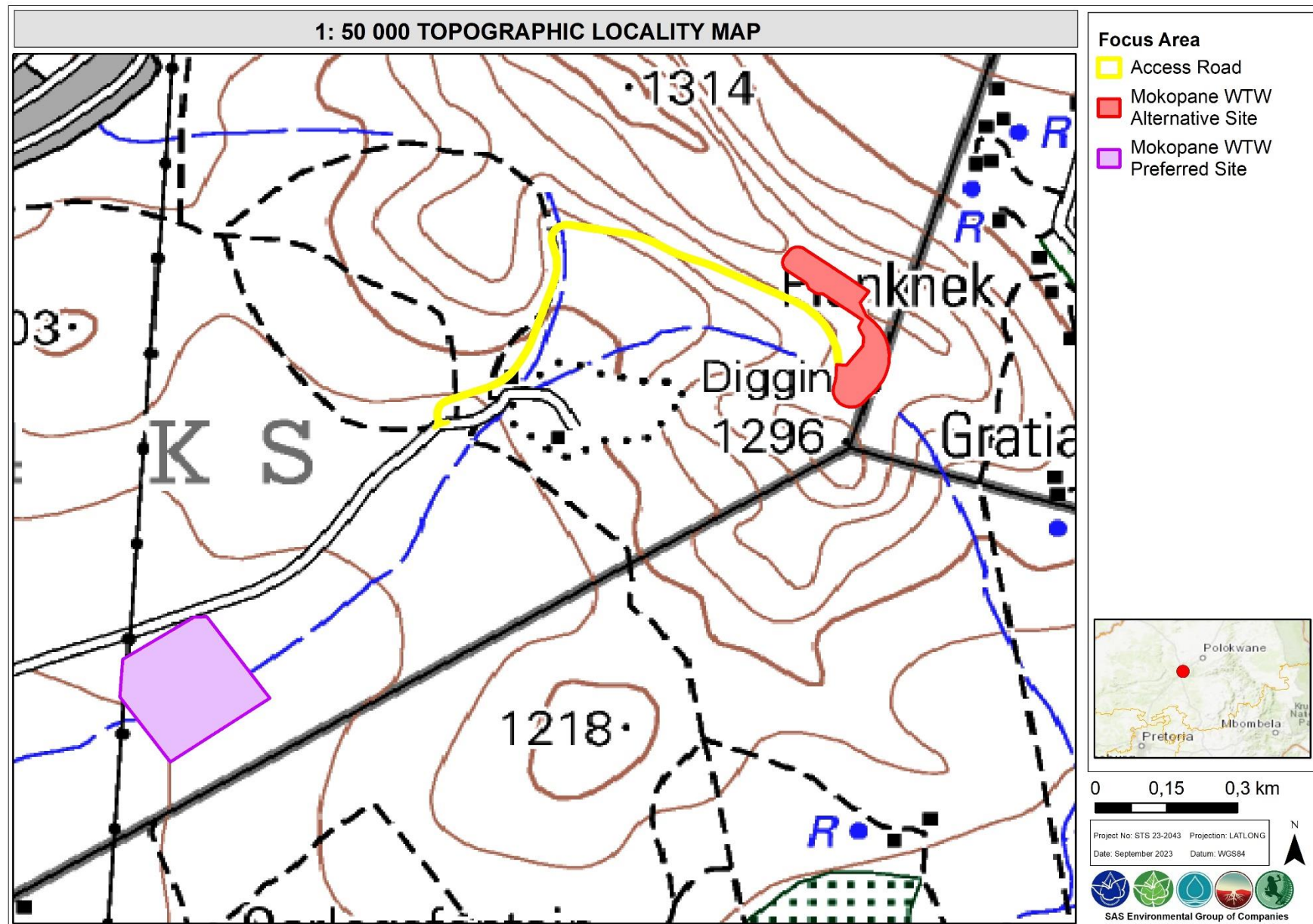


Figure 2: Topographic map illustrating the focus area in relation to surrounding areas.



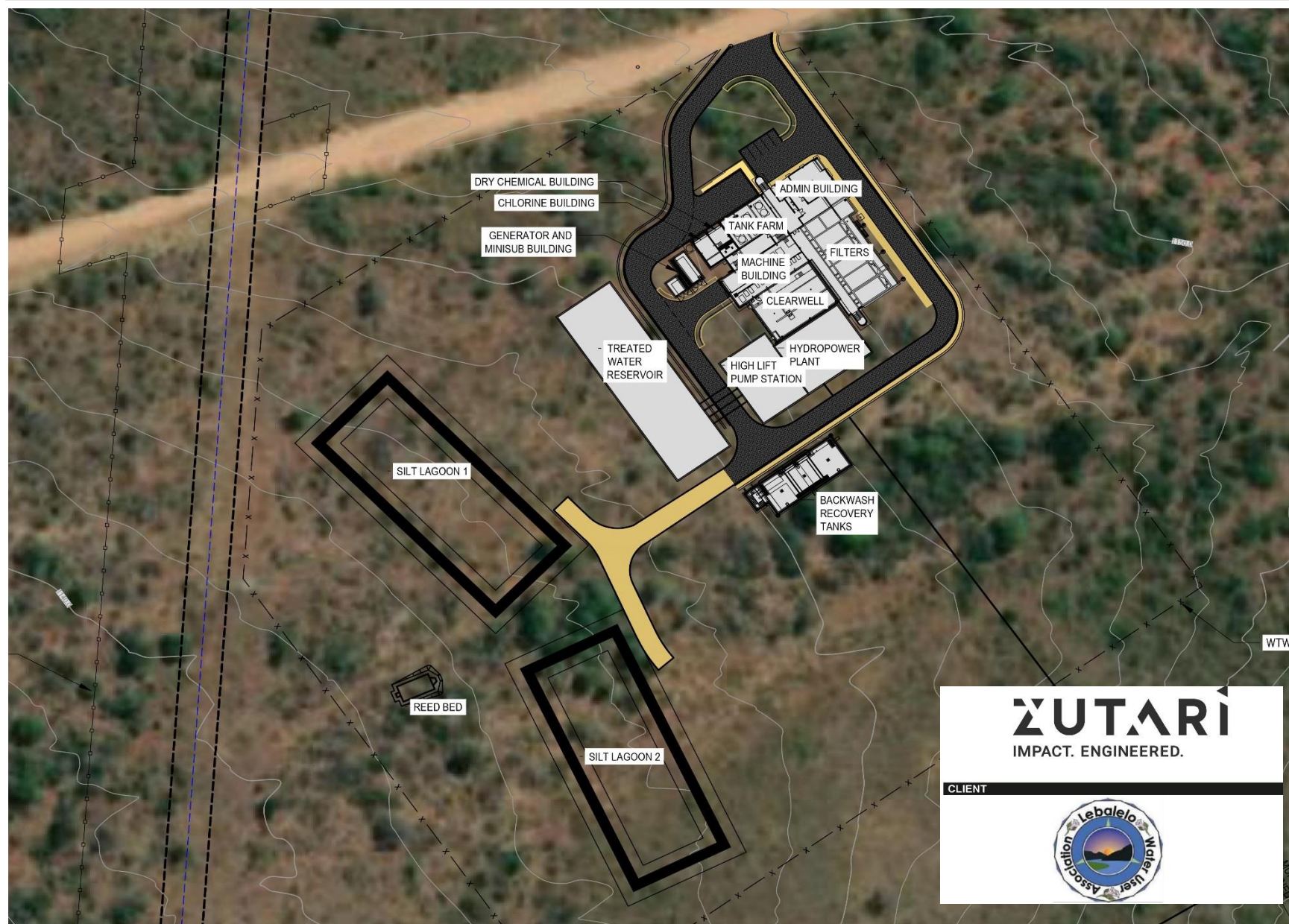


Figure 3: Proposed layout of the Preferred WTW as provided by the proponent.



1.1 Reporting Protocol

The site verification and field assessments verified the medium **plant and animal species theme** sensitivities (as identified by the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool")) for the focus area and this report therefore follows the requirements specified for the "high" sensitivity protocol – i.e., "4.6 Where SCC are... likely present [i.e., triggering a medium sensitivity], a Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol". The very high sensitivity for the **terrestrial biodiversity theme** was verified for the focus area and triggering features of this sensitivity are discussed in this report (following the requirements specified for the "very high" sensitivity protocol).

1.2 Scope of Work

Specific outcomes in terms of this report are outlined below:

- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix J);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report);
- Compile a desktop assessment with all relevant information as presented by South African National Biodiversity Institute (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 and faunal ecology associated with the focus area;
- To define the Present Ecological State (PES) of the biodiversity of the focus area;
- To determine and describe habitats, communities, and the ecological state of the focus area;
- To conduct a faunal and floral Species of Conservation Concern (SCC)⁹ assessment, including the potential of suitable habitat to occur within the focus area for SCC;

⁹ The term **SCC** in the context of this report refers to all Red Data Listed (RDL) and International Union for the Conservation of Nature (IUCN) listed threatened species, as well as **nationally protected** - i.e., *National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) Threatened or Protected Species (TOPS)* and the *List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA)* – and **provincially protected species** – i.e., *Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA)* - of relevance to the project.



- 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 WTW will have on the biodiversity associated with the focus area, and to provide recommendations as to which option (proposed vs alternative) is more feasible from a biodiversity perspective; and
- To develop mitigation and management measures for all phases of the proposed activities.

1.3 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The biodiversity desktop assessment is confined to the focus 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 and taxa associated with the focus area may have been missed during the assessment. The field assessment was undertaken on the 29th of August 2023, which falls outside of the optimal flowering season for the area; however, it is expected that floral and faunal communities have been adequately considered given the specialist's experience in the area. Relevant online sources and background information were further assessed to improve on the overall understanding of the focus area's ecology. The precautionary approach was, however, taken into account while conducting the Site Ecological Importance (SEI) assessment, the SCC assessment, as well as the impact assessment due to the assessment taking place outside of the optimal flowering time;
- Due to most faunal taxa's nature and habits, it is unlikely that all species would have been observed during a field assessment of limited duration. Due to the locality of the focus area and the cyclical nature of many species' life stages, as well as the season of the assessment, not all faunal species were observed. As such, background data (desktop) and literature studies (previous work undertaken in the area) were used to further infer faunal species composition and sensitivities in relation to the available habitat; and
- Some floral SCC identities will not be made known in this report, although their potential to occur on-site will still be assessed. As per the best practise guideline that



accompanies the SANBI protocol and the screening tool, the name of the certain sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered (CR) sensitive plant.

1.4 Legislative Requirements

To align with national and provincial legislative regulations, the following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996¹⁰;
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
 - Government Notice (GN) number 2747 (Gazette Number 47526): The revised National list of Ecosystems that are Threatened and in need of Protection, dated 18 November 2022, as it relates to the NEMBA;
 - GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated September 2020 as it relates to the NEMBA;
 - GN number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the NEMBA;
- GN number 30568: Threatened or Protected Species (TOPS) list dated 14 December 2007, as it relates to the NEMBA; and
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA);
- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
 - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA;
- Government Gazette 45421 dated 10 May 2019 as it relates to the DFFE's screening report required with an application for environmental authorisation (EA) as identified in regulation 16(1)(v) of EIA Regulations (the themes are used to provide an indication of important and/or sensitive features that have been identified within the Focus area):

¹⁰ 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.



- For the Terrestrial Biodiversity Theme: GN 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
- For Animal and Plant Species Themes: GN 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 (as amended in GN 3717 of 2023); and
- The Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA).

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

2 METHODOLOGY

The below sections outline, broadly, the approach taken for the biodiversity assessment. Refer to **Appendix C and D** for a more detailed method of assessment.

2.1 Desktop Study

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the focus 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 focus area includes¹¹:

- National Protected Areas Expansion Strategy (NPAES) – 2018 database;
- The South African Conservation Areas Database, Quarter 1 (SACAD, 2023);
- The South African Protected Areas Database, Quarter 1 (SAPAD, 2023);
- The 2018 Limpopo Province Map of CBAs and ESAs (LEDET, 2018);
- The 2016 Waterberg District Bioregional Plan (LEDET, 2016);
- 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, 2018);

¹¹ 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
- Department of Environmental Affairs' (now DFFE) Environmental Geographical Information Systems (E-GIS) website. URL: <https://egis.environment.gov.za/>



- The 2022 Red List of Ecosystems (RLE) for the terrestrial realm for South Africa (SANBI 2022a and 2022b). This database replaces the 2018 National Biodiversity Assessment (NBA; Skowno et al., 2019; SANBI, 2019) Terrestrial Assessment project, which is one of the databases that the RLE was generated upon;
- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al., 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species Database;
- The screening tool (accessed 2023); and
- From the 2017 Strategic Water Source Areas (SWSA) project:
 - 2017 SWSA **Surface water** (Water Research Commission, 2017).

The field assessment took place during August 2023 to “ground-truth” the results of the desktop assessment. Results of the field assessment are presented in Section 4.

2.2 General Field Assessment Approach

An on-site visual assessment of the focus area (as per Figures 1 and 2) was conducted to confirm the assumptions made during the consultation of the background maps (refer to Section 3)) and to determine whether the ecological status of the habitat associated with the focus area reflects the data presented in the desktop databases.

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

For the faunal field surveys, a reconnaissance ‘walkabout’ was undertaken to confirm habitat types and to consider whether the areas are representative of these habitats, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot to identify and define the faunal assemblage within the footprint area. A detailed explanation of the method of assessment is provided in **Appendix C** of this report. The faunal categories covered in this assessment include mammals, avifauna, herpetofauna and general invertebrates.

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



- To guide the selection of appropriate sample sites, background data and digital satellite images were consulted before going to 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 within the focus area);
- Databases used for background information include the SANBI Threatened Species Programme (TSP), the 2022 RLE database, the SAPAD (Quarter 1, 2023) and the SACAD (Quarter 1, 2023), the NPAES (2018) and the IUCN;
- The subjective sampling method requires that field assessment take place on foot. Based on the broad habitat units delineated before going to site, and points of interest recorded, which is updated based on on-site observations, the selected sample areas were surveyed on foot, following subjective transects, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed; and
- Photographs were taken of each vegetation community that are representative of typical vegetation structure of that community, as well as photos of all detected SCC (photographs of species identified as sensitive by the screening tool may be excluded from this report).

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

2.3 Sensitivity Mapping

All the ecological features associated with the focus 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. Refer to **Appendix D** for the breakdown of the methodology used to determine SEI and sensitivity.

3 RESULTS OF THE DESKTOP ANALYSIS

The below section outlines the results of the desktop assessment.



3.1 Conservation Characteristics of the focus area based on National and Provincial Datasets

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.

Table 1: Summary of the terrestrial conservation characteristics for the focus area (Quarter Degree Square (QDS) 2429AA).

DETAILS OF THE ASSESSMENT AREA IN TERMS OF MUCINA & RUTHERFORD (2006) AND THE NATIONAL VEGETATION MAP PROJECT (SANBI, 2018) - ORIGINAL EXTENT OF MAPPED VEGETATION TYPE					
Biome(s) and Bioregion(s)	The focus area is in the Central Bushveld Bioregion , which is situated within the Savanna Biome .				
Vegetation Types	The focus area is situated within one vegetation type, namely the Polokwane Plateau Bushveld (SVcb 23).				
	Polokwane Plateau Bushveld				
Distribution	Limpopo Province: The higher-lying plains around Polokwane, north of the Strydpoort Mountains and south of the SVcb 20 Makhado Sweet Bushveld.				
Climate	Summer rainfall with very dry winters.				
	MAP (mm)	MAT (°C)	MFD (days)	MAPE (mm)	MASMS (%)
	500	16.9	11	2122	80
Altitude (m)	1100 - 1500				
Conservation	Least threatened according to remote sensing sources, but with over one third of the remaining vegetation regarded as degraded, would probably be regarded as susceptible. Target 19%. Less than 2% statutorily conserved mainly in the Percy Fyfe and Kuschke Nature Reserves. In addition, 0.7% conserved in other reserves, for example the Polokwane Game Reserve. Some 17% transformed, including about 10% cultivated and 6% urban and built-up. Dense concentration of rural human settlements is found particularly in the eastern and north-western parts of the unit. In some regions, scattered populations of alien <i>Agave</i> , <i>Jacaranda mimosifolia</i> , <i>Melia azedarach</i> , <i>Opuntia ficus-indica</i> and <i>Ricinus communis</i> are of concern. Erosion is high to moderate.				
Geology & Soils	Migmatites and gneisses of the Hout River Gneiss and the Turfloop Granite are dominant. Some ultramafic and mafic metavolcanics, quartzite, and chlorite schist of the Pietersburg Group are also found. Soils variable, with freely drained soils with high base status, some dystrophic/mesotrophic, eutrophic plinthic catenas. Glenrosa and Mispah soil forms.				
Vegetation & landscape features (Dominant Floral Taxa in Appendix F)	Moderately undulating plains with short open tree layer with a well-developed grass layer to grass plains with occasional trees at higher altitudes (for example the Mashashane area in the southwest and the south-eastern watershed of the Sand River catchment, such as around Eersteling). Hills and low mountains of SVcb 24 Mamabolo Mountain Bushveld are embedded within this unit.				
	Remark: Woody plants have increased in parts of the unit in the past few decades.				



CONSERVATION DETAILS PERTAINING TO THE ASSESSMENT AREA (VARIOUS DATABASES)	
2022 Red List of Ecosystems (Figure 4)	
The RLE database replaces the NBA (2018) and, according to the 2022 RLE, the focus area is located within a Least concern (LC) ecosystem, namely the Polokwane Plateau Bushveld ecosystem. The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the Red List of Ecosystems 2022) is based on assessments that followed the IUCN RLE Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 CR, 51 Endangered (EN) and 14 Vulnerable (VU) types). Following a series of consultations with conservation authorities and the public in 2020/21 the Revised list of terrestrial ecosystems that are threatened and in need of protection was the approved by the Minister for implementation in August 2022. The revised list was published in the Government Gazette (Gazette Number 47526, GN 2747) and came into effect on 18 November 2022.	
National Protected & Conservation Areas (Figure 5)	
SAPAD (2023, Q1); SACAD (2023, Q1); NPAES (2018)	According to the SAPAD (2023, Q1) database¹², the focus area is located directly within a protected area, namely the Fossil Hominid Sites of SA. Additionally, the focus area is located within 10 km of an additional protected area, namely the Glenesk Private Nature Reserve (~ 6 km northeast of the focus area). It is important to note that the Fossil Hominid Sites of SA are also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO) site (https://whc.unesco.org/en/list/915/). Development activities within these sites will be limited to the considerations and stipulations as stated in the NEMPAA. According to the SACAD (2023, Q1) database¹³, the focus area is not located directly within any conservation areas nor within a 10 km radius of any conservation areas. According to the NPAES (2018) database, the focus area is not located within any Protected or Priority Focus Areas.
IBA (2015)	The focus area is not located within a 10 km radius of any IBAs.

¹² **SAPAD (2023)**: 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).

¹³ **SACAD (2023)**: 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.



2018 Limpopo Province Map of CBAs and ESAs (Figure 6)	
The focus area is associated with one C-Plan categories according to the updated 2018 Limpopo Province Map of CBAs and ESAs.	
CBA 1	The entire focus area is located within a Category 1 CBA. These are Irreplaceable Sites required to meet biodiversity pattern and / or ecological processes targets. Land Management Recommendations: Obtain formal conservation protection where possible. Implement appropriate zoning to avoid net loss of intact habitat or intensification of land use. Incompatible Land-Use: Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines).
Waterberg District Bioregional Plan	
The Waterberg District Bioregional Plan is based on the Limpopo C-Plan, although it has been refined (in places) by incorporating input from various stakeholders as well as available spatial planning tools (e.g., Waterberg Environmental Management Framework). As with the Limpopo C-Plan, the Bioregions indicated that the assessment area is associated with four conservation categories. In this instance, the Bioregional Plan categories are the same as those indicated by the Limpopo C-Plan.	
CBA 1	The entire focus area is located within a Category 1 CBA. These are Irreplaceable Sites required to meet biodiversity pattern and / or ecological processes targets. Land Management Objective: Maintain in a natural or near-natural state that maximizes the retention of biodiversity pattern and ecological process.
2017 Strategic Water Source Areas (SWSA)	
SWSA (2017)	The focus area is not within 10 kms of a SWSA for surface water. Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.

NBA = National Biodiversity Assessment; SAPAD = South African Protected Areas Database; SACAD = South African Conservation Areas Database; NPAES = National Protected Areas Expansion Strategy; IBA = Important Bird Area; 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.



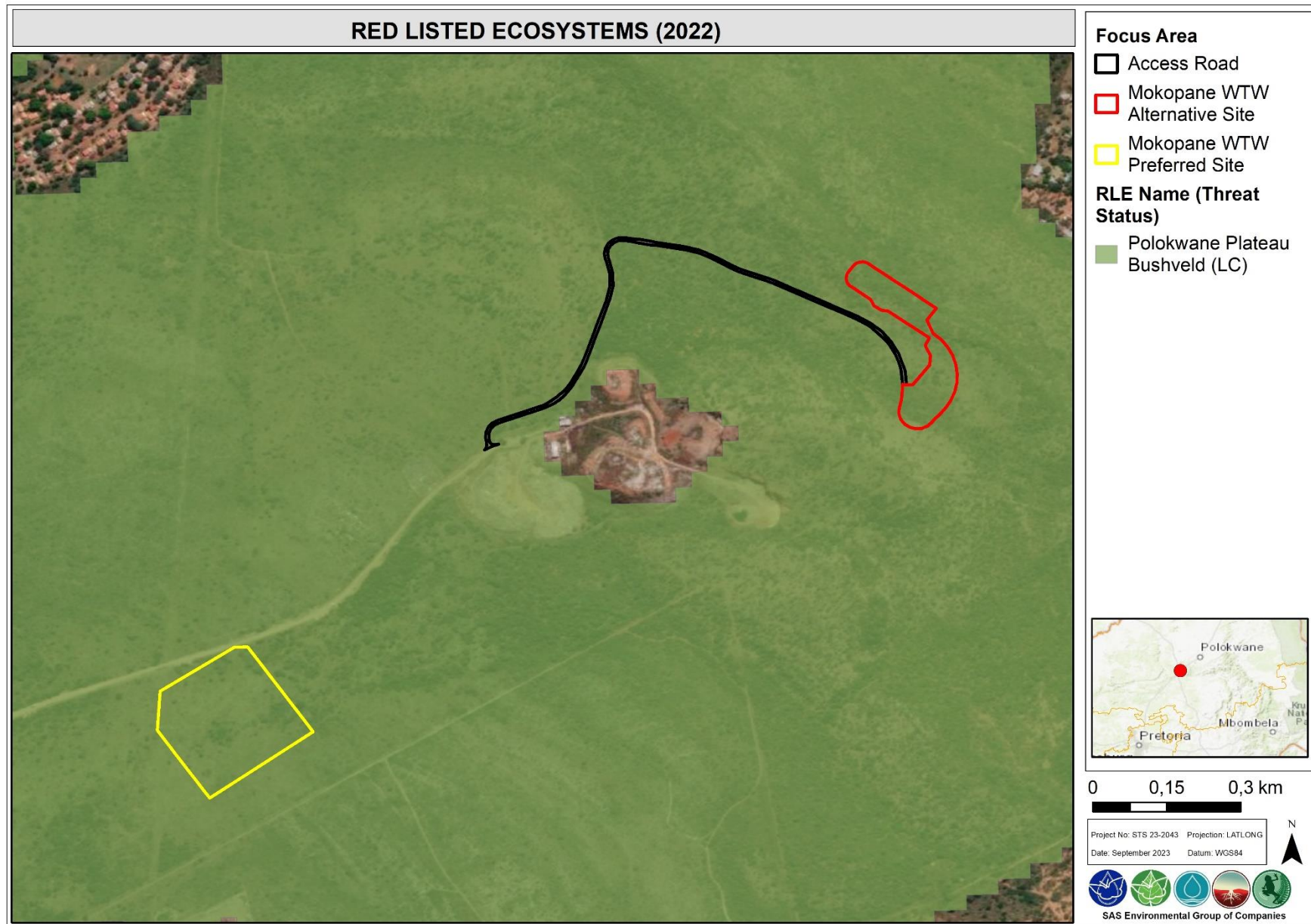


Figure 4: The focus area in relation to the remaining extent of the LC Polokwane Plateau Bushveld ecosystem (2022 RLE dataset).



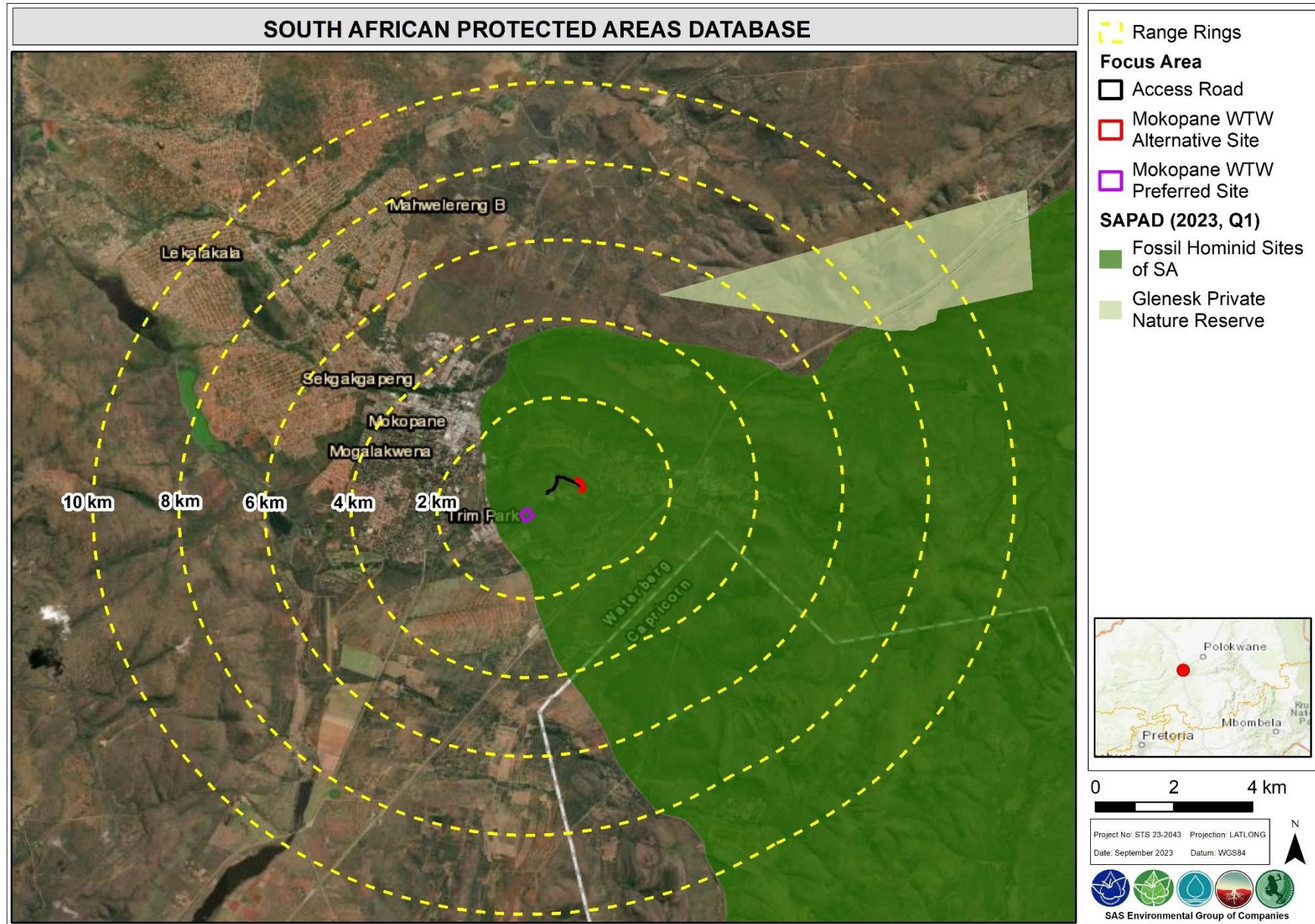


Figure 5: National protected areas in relation to the focus area (SAPAD, 2023-Q1).



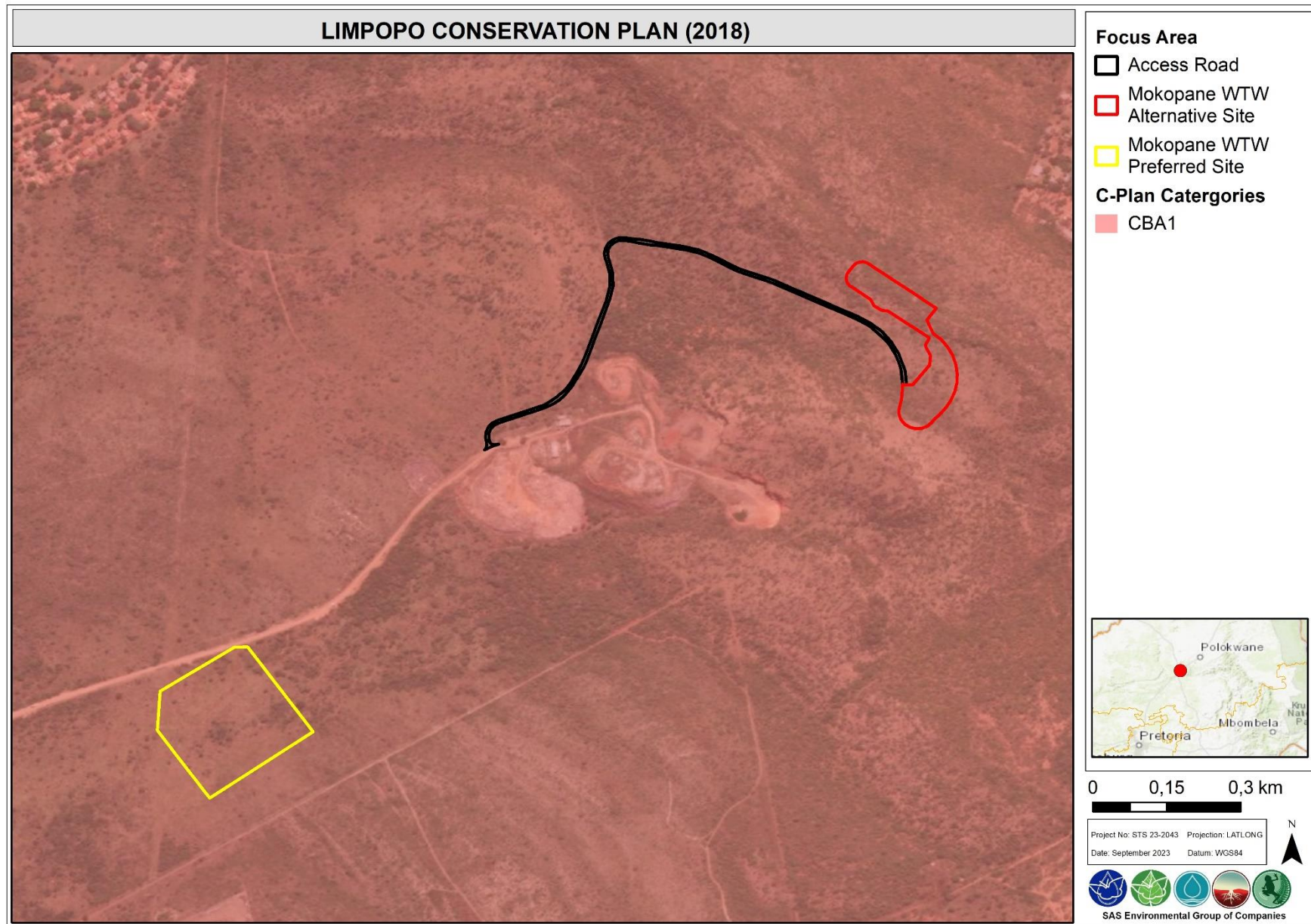


Figure 6: The focus area in relation to a Category 1 CBA (2018 Limpopo C-Plan).



3.2 Screening Tool Outcome

According to the “Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes (“the Protocols”) published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the EAP must verify the current use of the site in question and its environmental sensitivity as identified by the screening tool to determine the need for specialist inputs in relation to the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the NEMA. The Protocols must be complied with for every new application for EA that is submitted after 9 May 2020.

The screening tool identifies species and ecosystem spatial triggers likely to indicate environmental sensitivity associated with a particular proposed development site, which in turn **determines the necessity and requirements for particular specialist studies**. The screening tool evaluates ‘environmental sensitivity’ at a **larger scale** than that of a proposed development site and frequently includes modelled data that require **field verification/ground-truthing**. As such, the initial site sensitivity verification is required to verify the screening tool outcomes and such verified sensitivities are used to inform the minimum reporting requirements for the Plant Species, Animal Species, and Terrestrial Biodiversity Specialist Assessment Reports. The outcome of the screening tool is presented in Table 2.



Table 2: Summary of the screening tool results obtained for the focus area.

NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL		
The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings pertaining to the Plant and Animal Protocols are described below: ➤ <u>Very High</u>: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 square kilometres (km²) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under CR, EN, or VU D criteria of the IUCN or species listed as 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. ➤ <u>High</u>: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. ➤ <u>Medium</u>: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. ➤ <u>Low</u>: Areas where no threatened species are known or expected to occur.		
Animal Species Theme (Figure 7)	The focus area is located within areas identified as medium sensitivity. Triggering species for the assigned medium sensitivity include: » Mammalia - <i>Crociodura maquassiensis</i> (Makwassie Musk Shrew, VU), <i>Dasymys robertsii</i> (Robert's Shaggy Rat, Near-threatened (DD)); and » Reptiles – <i>Kinixys lobatsiana</i> (Lobatse hinge-back tortoise, VU).	
Plant Species Theme (Figure 8)	The focus area is located entirely within an area identified as medium sensitivity. Triggering species for the areas assigned a medium sensitivity include Sensitive species 1252 (VU)¹⁴. Within 10 km of the focus area, the following species were also identified by the screening tool and considered in this assessment: Sensitive species 550 (CR) and Sensitive species 1248 (VU).	
Terrestrial Theme (Figure 9)	Biodiversity	The focus area is located entirely within an area identified as very high sensitivity. The triggering features include CBA 1 and Fossil Hominid Sites of SA (as per the SAPAD (2023, Q1)).

¹⁴ The identity of sensitive species identified by the Screening Tool must remain confidential and may under no circumstances be made known to the public (as per the best practise guideline as stipulated by the South African National Biodiversity Institute (SANBI) that accompanies the protocol and screening tool).



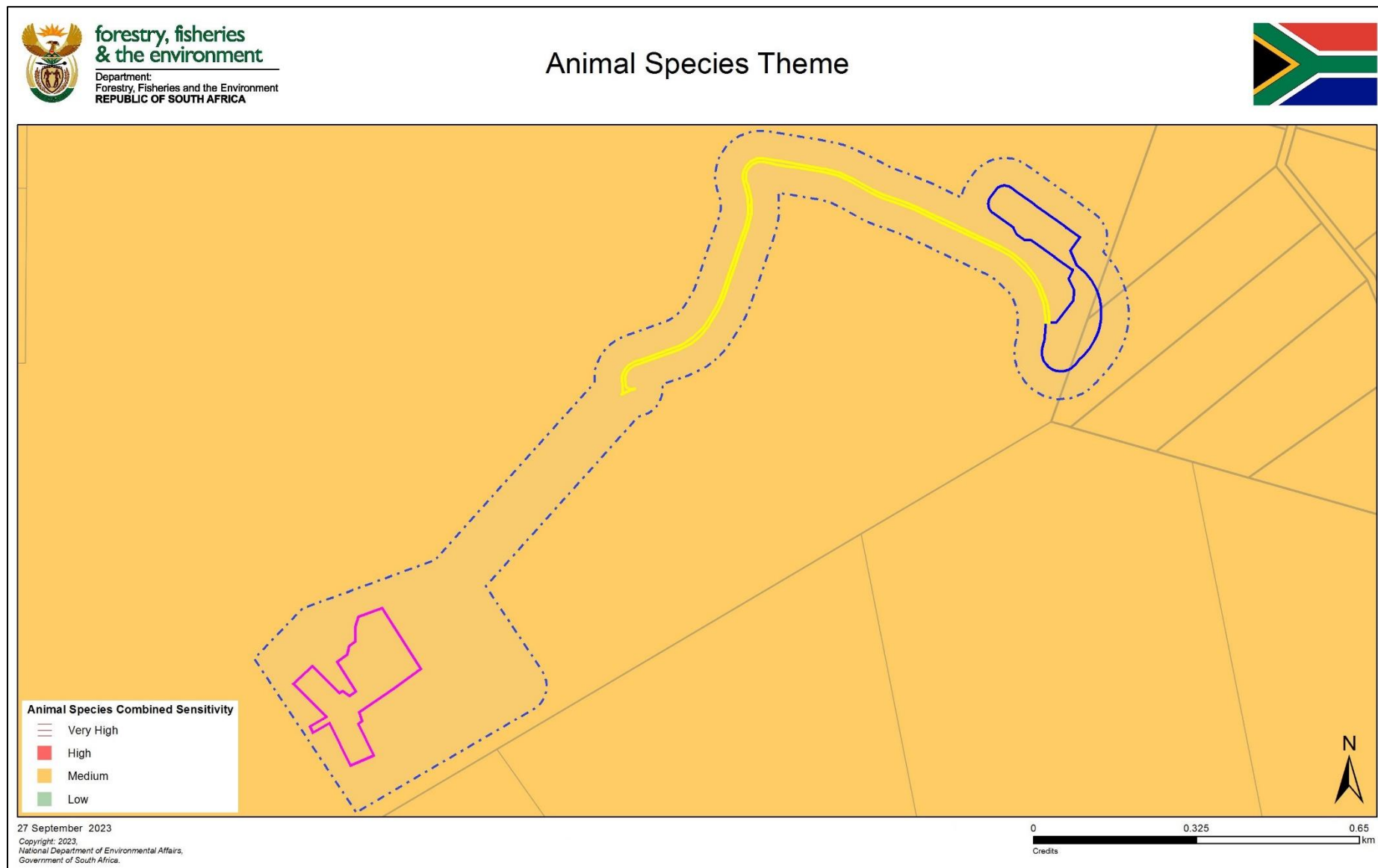


Figure 7: Screening Tool outcome for the Animal Species Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.



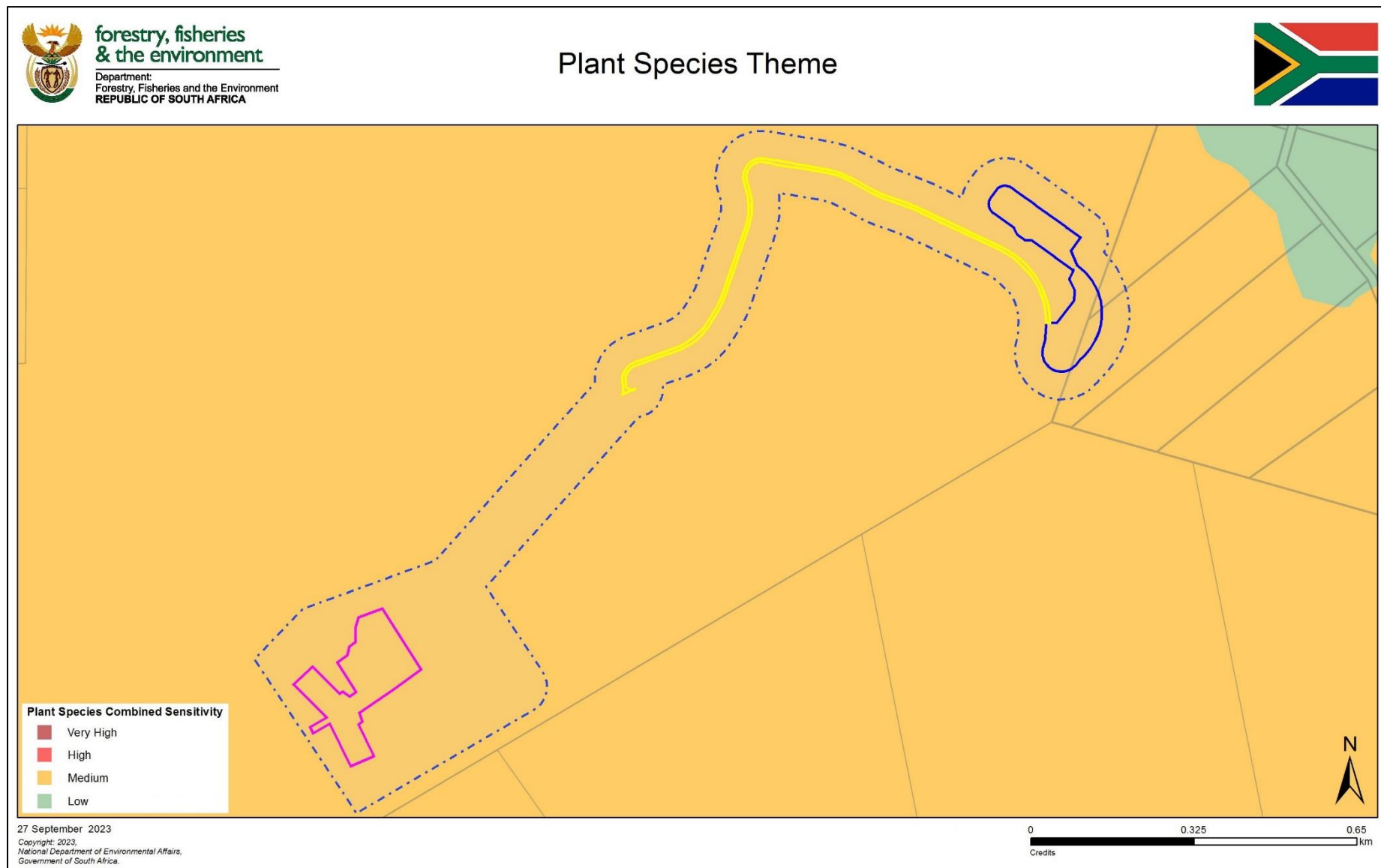


Figure 8: Screening Tool outcome for the Plant Species Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.



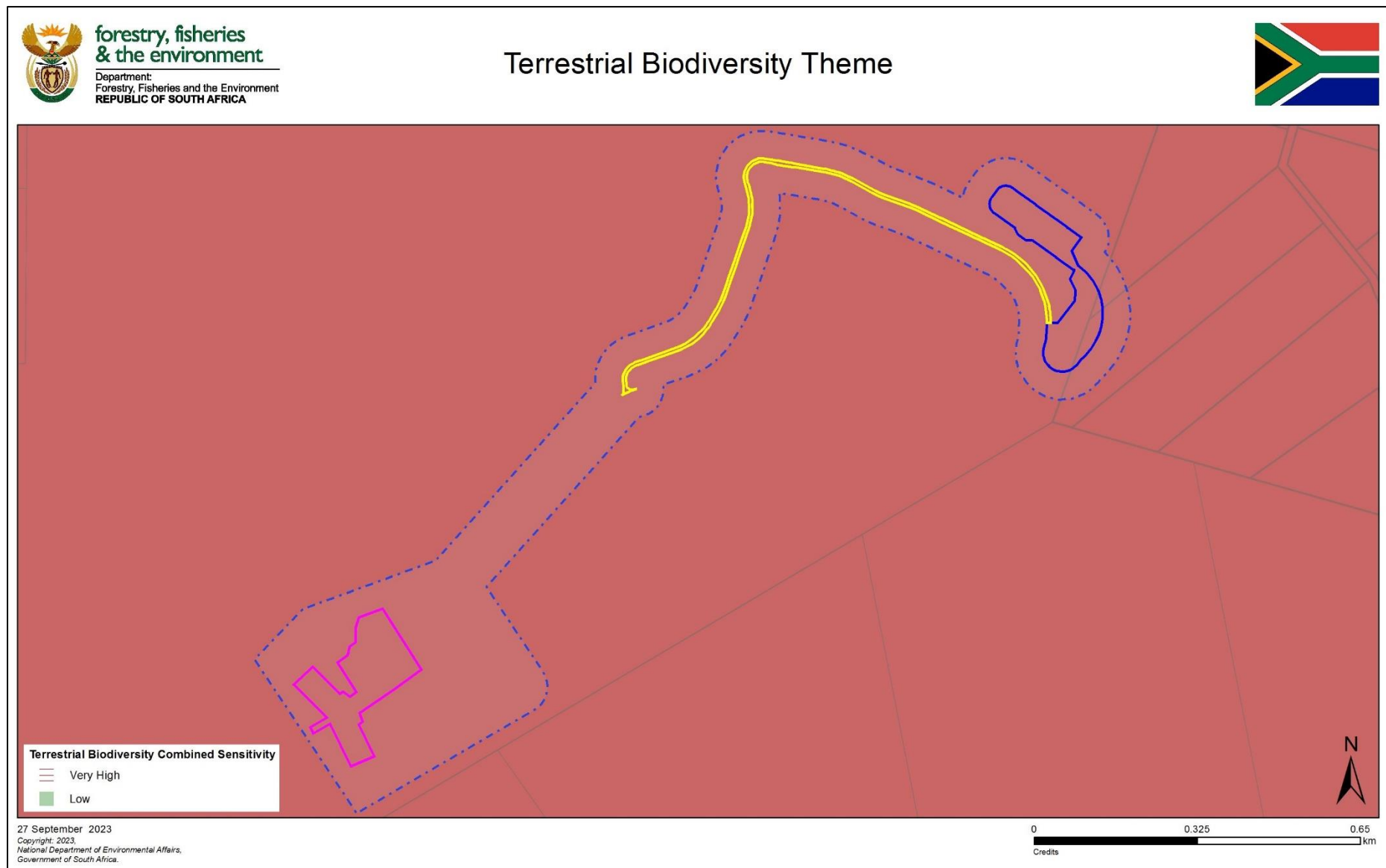


Figure 9: Screening Tool outcome for the Terrestrial Biodiversity Theme. The screening tool was run with a buffer of 50 m (blue dotted line) around the proposed focus area (purple solid line for the Preferred WTW, yellow solid line for the access road, and blue solid line for the Alternative WTW) purely for use in running the screening tool.



4 RESULTS OF THE FIELD ASSESSMENT

The below sections provide the baseline data gathered for the focus area.

4.1 Sampling Effort

The site assessment took place over one day (29th of August 2023) by one botanical specialist and one faunal specialist. The assessment took place in late autumn and thus outside of the optimal flowering season. Numerous meanders were, however, walked during the assessment where species were surveyed and habitat conditions noted; meanders were positioned within (1) the proposed footprint areas, and (2) the various habitat types on site (i.e., lower slope vs mountainous habitat vs rockier habitats, etc.) to ensure an adequate representation of each broad floral community was surveyed. Potential faunal habitat was inspected while actively searching for fauna from different classes through lifting rocks and logs, looking for tracks, burrows and other signs of species' occurrence/activity. Given the small extent of the focus area, together with specialist experience within the area, the data collected is deemed adequate for decision making purposes.

4.2 Local Context and Fieldwork Results

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

4.2.1 Existing Impacts

The Preferred WTW was exposed to recent (2019) tree clearing (Figure 10), whereas the Alternative WTW and associated access road have been without any notable, historical impacts. It was evident that large herbivores were moving through the Preferred WTW, but no sign of grazing pressures. This could be due to the dominance of unfavourable (less palatable) grasses such as *Heteropogon contortus*.



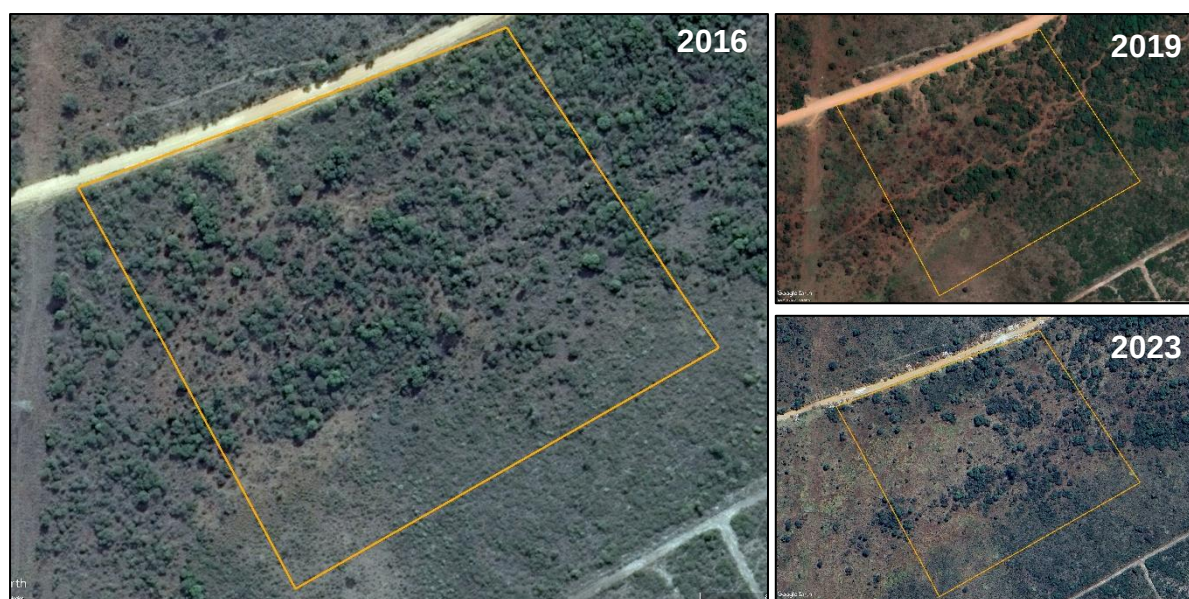


Figure 10: Historic harvesting or clearing of indigenous trees within the Preferred WTW has taken place in 2019. Prior to this, no notable impacts to the Preferred WTW have taken place. The yellow outline indicates the proposed Preferred WTW.

4.2.2 Vegetation types, fine scale habitats, and ecological overview

The floral communities are described in this report under three broad habitat units¹⁵ (Figure 11) and are presented in more detail in the dashboards within Section 4.2.2 (Tables 4 – 6). A brief overview of various ecological characteristics associated with the four habitat units is presented in Table 3. The faunal overview is provided in section 4.2.3 (Tables 7 - 10).

Three broad habitats were delineated during the site assessment, namely the Mountain Bushveld and associated Episodic Drainage Line (EDL: i.e., classified as a watercourse¹⁶ by the freshwater specialist (SAS 23-1135, 2023)), the Plateau Bushveld, and the Transformed Habitat. A total of 94 plant taxa were recorded across the focus area, 61% of which were represented by woody species, 12% by forbs (under-represented due to season of assessment), 7% by succulents, and 20% by graminoid species.

¹⁵ Mucina & Rutherford (2006) provide a synthesis of all the vegetation types found within South Africa. Within each vegetation synthesis, the general characteristics of the vegetation types is described together with an indication of dominant and/or important plant taxa within the vegetation type. These vegetation types form the basis on which the habitat units, and associated discussions, for the focus area are based.

¹⁶ In terms of the definition contained within the National Water Act, 1998 (Act No. 36 of 1998), a watercourse means:

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

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



The Mountain Bushveld and associated EDL has received minimal direct impacts apart from a small stretch of gravel road historically intersecting the habitat. Moreover, this habitat unit is not significantly fragmented on a local scale; however, the Mountain Bushveld (and EDL) is fragmented at a larger scale from more intact mountain ranges within the area by human settlements (north and west of the habitat), by national roads (east and south of the habitat), and agricultural practices (south of the site). Overall, the habitat is in a **good ecological condition** (i.e., areas that are natural or near natural where species composition, structure and function are still intact or largely intact).

The Plateau Bushveld has been subjected to recent tree clearing (as mentioned above; Figure 10) without rehabilitation and this has resulted in poor recovery of the veld, e.g., no return of trees noted and *Heteropogon contortus* dominates the graminoid component (forming dense stands). This species easily forms dense stands in disturbed areas where soil quality has been impacted. Although not entirely fragmented, there are more man-made barriers associated with the Plateau Bushveld than with the Mountain Bushveld, e.g., roads on either side of the Preferred WTW as well as closer proximity to human settlements and developments. The Plateau Bushveld is considered to have a **fair ecological condition** (areas that are moderately modified, semi-natural, and where ecological function is maintained even though composition and structure of the habitat have been compromised).

The habitat integrity of the Transformed Habitat is entirely diminished and is in a **poor ecological condition** (areas that are severely or irreversibly modified, and where ecological function has been compromised in addition to structure and composition of the habitat).

Additional details regarding the vegetation's classification are presented in Table 3.

Table 3: Vegetation classification of the habitat units and associated floral communities within the focus area.

	Mountain Bushveld and associated Episodic Drainage Line (EDL)	Plateau Bushveld	Transformed Habitat
Ecological Condition (refer to glossary of terms)	Good ecological condition	Fair ecological condition	Poor ecological condition
Indigenous vegetation¹⁷	✓	✓	✗
Presence of watercourse	✓	✗	✗

¹⁷ **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.



	Mountain Bushveld and associated Episodic Drainage Line (EDL)	Plateau Bushveld	Transformed Habitat
Ecological corridors¹⁸	Landscape corridor	Not applicable	Not applicable
Representative of reference vegetation type(s)¹⁹	Partially	Partially	No

The focus area itself is not significantly fragmented, and limited anthropogenic activities are located adjacent to these sites; as such, the landscape still retains connective corridors and supports ecological processes. Ecological corridors within the focus area include “landscape corridors” associated with the Mountain Bushveld (associated with the proposed Alternative WTW and access road). This landscape corridor is a moderately fragmented corridor due to increased human settlements and residential developments in the surrounding area, and this is also a much smaller corridor than the surrounding mountain ranges and ridges to the north and east of the site. There is moderate connectivity between the focus areas and larger, more intact landscape corridors (mountains to the north and east) and linear corridors (perennial system to the south-east) within the area, thus preventing complete disruption of ecological processes.

There are two EDLs within close proximity to the Alternative WTW (one of which is intersected by the proposed access road) and both these EDLs have been significantly altered / transformed by the Mokopane Landfill (south of the Alternative WTW and access road). The EDLs terminate at the northern edge of the landfill, and due to the presence of the landfill, these EDLs have been isolated from any downstream drainage network. The EDLs therefore no longer function as linear corridors.

Drivers of healthy central bushveld savanna systems such as fire regimes and natural herbivory (SANBI, 2021) have been altered within the focus area, and especially within the Preferred WTW, where harvesting of trees (i.e., overutilisation of the veld) has resulted in degradation of the habitat. However, the lack of bush encroachment, alien and invasive plant (AIP) proliferation, overgrazing, and fragmentation within and surrounding the focus area, is evidence that the savanna drivers are still largely intact.

¹⁸ In morphological terms, Ćurčić and Đurđić (2013) refer to three types of ecological corridors:

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

¹⁹ In terms of species composition and vegetation structure.



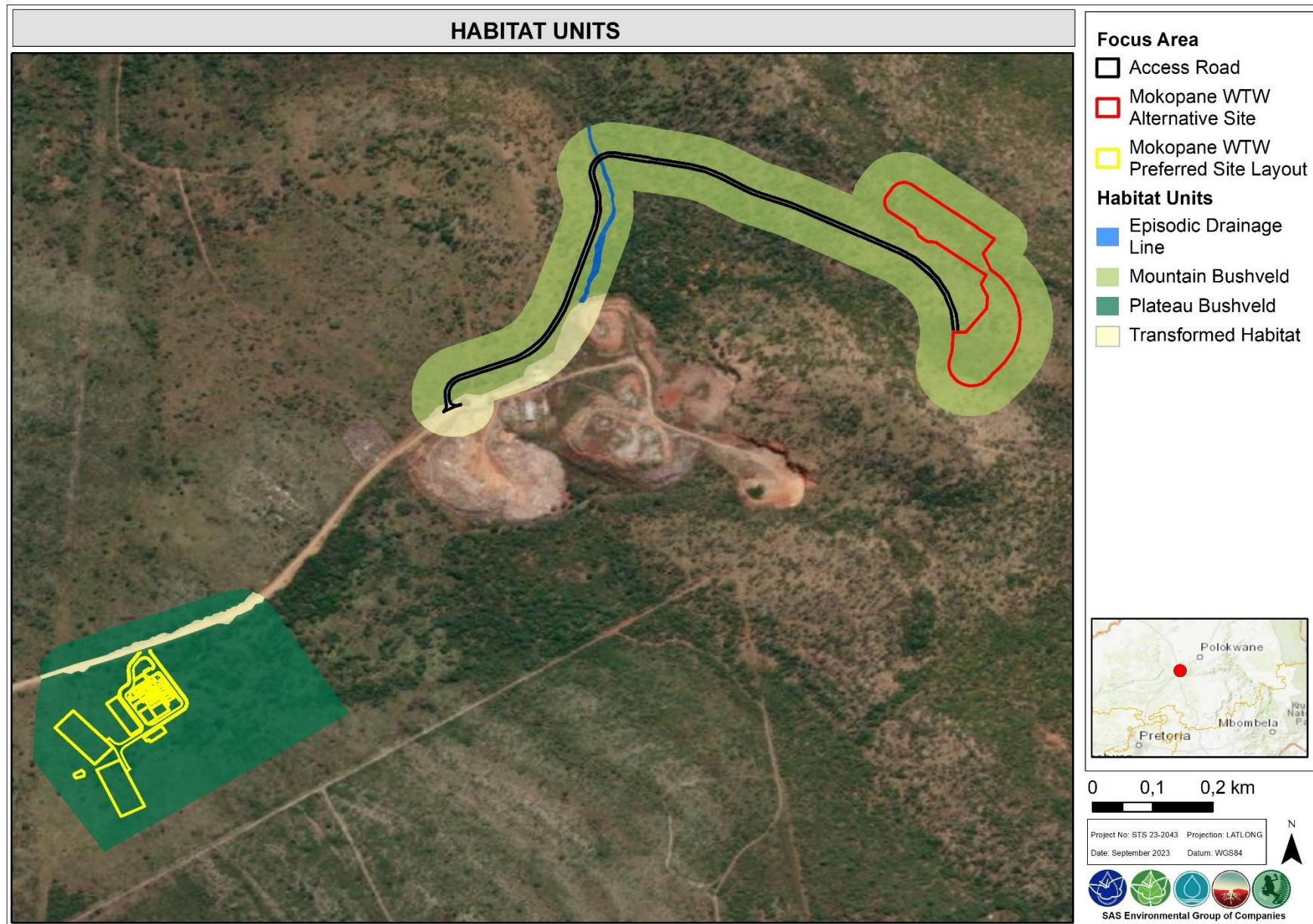


Figure 11: Habitat units associated with the focus area.



Table 4: Mountain Bushveld and associated EDL.**REPRESENTATIVE HABITAT AND SPECIES PHOTOGRAPHS**

Overview of the Mountain Bushveld habitat: although the soils were generally shallow and rocky, prominent outcropping was only present at the higher elevations/ crest of the ridge (compare the left and middle photographs). Very little difference between the Mountain Bushveld and EDL in terms of vegetation could be noted (refer to the photograph on the right), i.e., apart from there physically being a channel (without water), the vegetation remained the same in terms of both species' composition and vegetation structure. This lack of variation in species composition and structure can be attributed to the lack of seasonal water in the EDL. The vegetation structure (as per Appendix C, Diagram C1) can be described as a **short-to-tall, semi-closed bushveld** dominated by broadleaf tree species.



Some of the more commonly observed floral species within this habitat unit included (from left to right): *Croton gratissimus* (restricted to the more prominent rock outcropping at the higher elevations of the Mountain Bushveld), *Sansevieria aethiopica* (generally recorded at higher elevation but not typically restricted to such habitats), *Viscum combreticola* (common across the habitat unit), and *Viscum rotundifolium* (common across the habitat unit).



Some of the more commonly observed floral species within this habitat unit included (from left to right): *Faurea saligna* (more prominent along the higher, south-facing mountain slopes), *Ficus glumosa* (more abundant where outcropping was more prominent), *Ormocarpum trichocarpum* (common across the habitat unit), and *Strychnos pungens* (common across the habitat unit).



Species Composition	The vegetation communities can be described as follows: ➤ AIP species: A low diversity and abundance of AIPs were recorded within the Mountain Bushveld and EDL. Only one isolated clump of <i>Lantana camara</i> was noted, with <i>Tagetes minuta</i> and <i>Zinnia peruviana</i> sparsely occurring within this habitat unit. Refer also to section 6; ➤ Forb component: The forb component was under-represented at the time of the survey, although this is anticipated due to the season of assessment. Species such as <i>Blepharis cf. subvulvulibis</i>, <i>Dicliptera</i> sp., <i>Haplocarpha scapose</i>, <i>Helichrysum nudifolium</i>, and <i>Lasiosiphon capitatus</i> were noted; ➤ Graminoid component: The graminoid component was dominated by grass species with no sedges noted during the assessment (although sedges are likely to be present). Species commonly recorded included <i>Aristida spectabilis</i>, <i>Chloris Gayana</i>, <i>Cymbopogon cf. prolixus</i>, <i>Eragrostis rigidior</i>, <i>Hyperthelia dissolute</i>, <i>Melinis repens</i>, <i>Themeda triandra</i>, <i>Triraphis andropogonoides</i>; ➤ Succulent component: Fewer succulent species were noted than anticipated for the areas that are this rocky. Species noted within the footprint areas included <i>Aloe marlothii</i>, <i>Sansevieria aethiopica</i>, <i>Viscum combreticola</i>, <i>Viscum rotundifolium</i>; and ➤ Woody component: The woody component was well-represented in this habitat unit and included mostly broadleaf species and only a few fine-leaved species. Trees were best represented, and shrubs scattered amongst the trees. Commonly observed species included <i>Brachylaena rotundata</i>, <i>Combretum apiculatum</i>, <i>Combretum mole</i>, <i>Commiphora mollis</i>, <i>Croton gratissimus</i>, <i>Cryptolepis oblongifolia</i>, <i>Euclea natalensis</i>, <i>Faurea saligna</i>, <i>Ficus glumosa</i>, <i>Mundulea sericea</i> subsp. <i>sericea</i>, <i>Ozoroa sphaerocarpa</i>, <i>Sclerocarya birrea</i> subsp. <i>caffra</i> (NFA-protected species), <i>Senegalia caffra</i>, <i>Strychnos pungens</i>, <i>Vachellia permixta</i>, and <i>Volkameria glabra</i>. The Mountain Bushveld and EDL are regarded to be somewhat representative of the reference Polokwane Plateau Bushveld vegetation type in terms of species composition, and less so in terms of vegetation structure. However, the savanna biome is interspersed with "Mountain Bushveld" ecosystems that are "regarded as a unique vegetation type occurring across the biome" (SANBI, 2021) and thus not uncommon. Given the association with a rocky hill / low mountain, the species composition is expected for this area. Refer to Appendix E for a more comprehensive species list.
SPECIES OF CONSERVATION CONCERN (REFER ALSO TO APPENDIX H)	
Threatened Species	Protected Species
No threatened (red data listed (RDL)) plant species were recorded within the Mountain Bushveld, and no high probability of occurrence (POC) scores were obtained for RDLs known from the larger area. The following species, however, obtained medium POC scores for this habitat unit: ➤ Sensitive species 1248 (VU); ➤ Sensitive species 1252 (VU); and ➤ <i>Combretum petrophilum</i> (Rare). One NT species, namely <i>Elaeodendron transvaalense</i> (NFA-protected), was recorded in the lower slopes of the adjacent Plateau Bushveld habitat and is likely to also be present in the Mountain Bushveld habitat (POC = Medium).	Species protected under the LEMA were not recorded during the site assessment, but several species obtained medium and high POC scores due to suitable habitat within this unit, namely: ➤ <i>Combretum petrophilum</i> (Rare; POC = Medium); ➤ <i>Brachystelma</i> spp., e.g., <i>Brachystelma circinatum</i> (LC; POC = High); ➤ <i>Ceropegia</i> spp., e.g., <i>Ceropegia carnosae</i> and <i>Ceropegia stapeliiformis</i> (both LC; POC = Medium); ➤ <i>Huernia</i> spp. e.g., <i>Huernia zebrina</i> subsp. <i>magniflora</i> (LC; POC = High); ➤ <i>Orbea</i> spp., e.g., <i>Orbea lutea</i> (LC; POC = Medium); ➤ Orchidaceae Family (several <i>Eulophia</i> spp. likely to occur) (LC; POC = Medium-High); and ➤ <i>Scadoxys puniceus</i> (LC; OPC = Medium). No NEMBA TOPS species are anticipated to be present within the Mountain Bushveld habitat (all obtained low POC scores). Several NFA-protected tree species were, however, either recorded within this habitat unit or obtained a medium POC due to suitable habitat: ➤ <i>Boscia albitrunca</i> (LC; POC = Confirmed); ➤ <i>Elaeodendron transvaalense</i> (NT; POC = Medium); ➤ <i>Phyllogeiton zeyheri</i> (LC; POC = High); ➤ <i>Sclerocarya birrea</i> subsp. <i>caffra</i> (LC; POC = Confirmed); and ➤ <i>Securidaca longepedunculata</i> (LC; POC = Medium).



Table 5: Plateau Bushveld.**REPRESENTATIVE HABITAT AND SPECIES PHOTOGRAPHS**

The overall vegetation structure of the Plateau Bushveld can be described as a **short-tall, open bushveld as per** Appendix C, Diagram C1 (left photograph); however, within the few sections where tree harvesting has not taken place, the vegetation takes on a more closed structure (middle photograph). The disturbance from tree clearing and lack of fire have resulted in a degraded gaminoid layer where a dense dominance of *Heteropogon contortus* was noted (right photograph).



Some of the more commonly observed floral species within this habitat unit included (from left to right): *Aloe marlothii* (scattered across the habitat unit), *Heteropogon contortus* (dominant grass species typically indicative of degraded veld), *Opuntia ficus-indica* (alien species), and *Viscum rotundifolium* (common within the habitat unit).



Some of the more commonly observed floral species within this habitat unit included (from left to right): *Boscia albitrunca* (nationally protected tree species, scattered within this habitat unit), *Carissa bispinosa* (occurring underneath remaining bush clumps), *Petalidium oblongifolium* (abundant within the habitat unit), and *Vachellia exuvialis* (scattered within the habitat unit).



Species Composition	The vegetation communities can be described as follows: ➤ AIP species: A low diversity and abundance of AIPs were recorded within the Plateau Bushveld. Weedy species such as <i>Tegetes minuta</i> and <i>Zinnia peruviana</i> were scattered throughout the site, whereas succulent aliens like <i>Cereus jamacaru</i> and <i>Opuntia ficus-indica</i> were more sparsely occurring. Refer also to section 6; ➤ Forb component: The forb component was under-represented at the time of the survey, and this is anticipated due to the season of assessment as well as the semi-degraded nature of the site. Species such as <i>Leonotis nepetifolia</i> and <i>Pentarrhinum insipidum</i> were noted; ➤ Graminoid component: The graminoid component was species-poor due to the dominance of <i>Heteropogon contortus</i>. Other grasses such as <i>Cenchrus ciliaris</i>, <i>Cymbopogon</i> sp., <i>Hyperthelia dissolute</i>, <i>Panicum maximum</i>, and <i>Themeda triandra</i> were also recorded but not abundant; ➤ Succulent component: Poorly represented, apart from clumps of <i>Aloe marlothii</i> within the habitat unit. Additional species noted within the footprint areas included <i>Viscum rotundifolium</i>; and ➤ Woody component: The woody component was present wither scattered or in clumps. Commonly observed species included <i>Asparagus buchananii</i>, <i>Boscia albitrunca</i> (NFA-protected species), <i>Combretum apiculatum</i>, <i>Elaeodendron transvaalense</i> (NFA-protected species), <i>Euclea undulata</i>, <i>Grewia vernicosa</i>, <i>Petalidium oblongifolium</i>, <i>Phyllogeiton zeyheri</i> (NFA-protected species), <i>Searsia leptodictya</i>, and <i>Ziziphus mucronata</i>. The species composition and current vegetation structure is moderately representative of the reference Polokwane Plateau Bushveld vegetation type. The historical vegetation structure more resembled that of mountain bushveld types, as the woody component was not an open savanna but a closed savanna. This habitat unit therefore likely encompassed transitional vegetation between the Polokwane Plateau Bushveld and surrounding mountain bushveld. Refer to Appendix E for a more comprehensive species list.
SPECIES OF CONSERVATION CONCERN (REFER ALSO TO APPENDIX H)	
Threatened Species	Protected Species
No RDL plant species were recorded within the Plateau Bushveld, and no high or medium POC scores were obtained for RDLs for this habitat unit. One NT species, namely <i>Elaeodendron transvaalense</i> (NFA-protected), was recorded within the Plateau Bushveld.	Species protected under the LEMA were not recorded during the site assessment, but several species obtained medium and/or high POC scores due to suitable habitat within this unit, namely: ➤ <i>Orbea</i> spp., e.g., <i>Orbea melanantha</i> (LC; POC = Medium); and ➤ Orchidaceae Family (several <i>Eulophia</i> spp. likely to occur) (LC; POC = Medium-High). No NEMBA TOPS species are anticipated to be present within the Mountain Bushveld habitat (all obtained low POC scores). Several NFA-protected tree species were, however, either recorded within this habitat unit or obtained a medium POC due to suitable habitat: ➤ <i>Boscia albitrunca</i> (LC; POC = Confirmed); ➤ <i>Elaeodendron transvaalense</i> (NT; POC = Confirmed); ➤ <i>Phyllogeiton zeyheri</i> (LC; POC = Confirmed); and ➤ <i>Sclerocarya birrea</i> subsp. <i>caffra</i> (LC; POC = High).



Table 6: Transformed habitat.

REPRESENTATIVE HABITAT AND SPECIES PHOTOGRAPHS	
 Overview of the areas where habitat has entirely been transformed. No vegetation structure as per Appendix C, Diagram C1, is ascribed to this habitat unit due to the significant deviation from the reference (or expected) vegetation type.	
Species Composition	The vegetation communities can be described as follows: ➤ <u>AIP species</u>: Moderate association with AIPs. More serious invaders within this habitat included <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i> and <i>Flaveria bidentis</i>. Refer also to section 6; ➤ <u>Forb component</u>: None noted that was not an AIP; ➤ <u>Graminoid component</u>: Species like <i>Heteropogon contortus</i>, <i>Hyparrhenia hirta</i>, <i>Hyperthelia dissolute</i>, and <i>Pogonarthria squarrosa</i> were noted; ➤ <u>Succulent component</u>: None noted that was not an AIP; and ➤ <u>Woody component</u>: Absent. The Transformed Habitat is not representative of the reference state or of any vegetation community expected for the area. Refer to Appendix E for a more comprehensive species list.
SPECIES OF CONSERVATION CONCERN (REFER ALSO TO APPENDIX H)	
Threatened Species	Protected Species
None associated with this habitat unit, nor are any anticipated to be able to establish successful populations.	None recorded during the site assessment. Although it is possible for protected species to establish within transformed or highly degraded/disturbed sites, they are unlikely to establish large or thriving populations.



4.2.3 Faunal Field-Verified Results

Tables 7 -10 provides details on the baseline results of the faunal assessment pertaining to the focus area. Faunal results have been broken down into four classes: mammals, avifaunal, herpetofauna and invertebrates and discussed below in the applicable dashboards.

Table 7: Field assessment results pertaining to mammal species within the focus area.

SPECIES RECORDED IN THE FOCUS AREA							
 a.) <i>Papio ursinus</i> (Chacma Baboon, LC); b.) <i>Mungos mungo</i> (Banded Mongoose, LC); c.) <i>Sylvicapra grimmia</i> (Common Duiker, LC) droppings and d.) <i>Potamochoerus larvatus</i> (Bushpig, LC).							
MAMMAL SCC							
Species	Habitat and Resources	RSA Status	POC	Species	Habitat and Resources	RSA Status	POC
<i>Crociodura maquassiensis</i> (Makwassie Musk Shrew)	This is a rare species endemic to South Africa, Swaziland and Zimbabwe, existing in moist grassland habitats in the savannah and grassland biomes. They have also been found in rocky grassland habitat. Given that this species distribution range encompasses the focus area, and that the rocky areas in the focus area may be considered suitable for this species, it's considered possible (medium POC) that this species could be found in the focus area.	VU	Medium	<i>Leptailurus serval</i> (Serval)	The Serval is a medium-sized wild cat native to Africa found in a wide range of habitats, including grasslands, savannas, forests, and wetlands. Servals are adaptable and opportunistic hunters as they prey on a wide variety of small to medium-sized animals, depending on their availability in the local ecosystem. Records of this species are found within the QDS of the focus area and may move through the focus area but is unlikely to reside permanently within.	NT	Medium
<i>Dasymys robertsii</i>	Prefers swamps and wet areas along rivers and streams, which will become available during summer in the Freshwater Habitat in the focus	DD	Low	<i>Parahyaena brunnea</i>	It favours rocky, mountainous areas with vegetative cover in the bushveld areas of South Africa (Skinner 1976). It scavenges on a wide range of vertebrate	VU	Medium



(Robert's Shaggy Rat)	area. They are omnivorous feeding on stems and fruiting heads of semi aquatic grasses as well as insects.			(Brown Hyaena)	remains, which is supplemented by wild fruit and other plant material, insects, birds' eggs, and small mammals and may occasionally move through the focus area.		
<i>Rhinolophus blasii</i> (Blasius's Horseshoe Bat)	This is an uncommon bat species in South Africa and is rarely captured due to it having many small subpopulations. They are found within savanna and woodland habitats which have daytime roosting sites available such as caves, boulder piles or mine adits. Their diet consists mainly of moths which are caught in mid-air at night. This species may potentially roost in or close to the focus area in the rocky areas within the Mountain Bushveld Habitat, whilst they will forage in the greater area.	NT	Medium	<i>Rhinolophus smithersi</i> (Smithers' Horseshoe Bat)	This is an insectivorous bat species found within the Limpopo province of South Africa. They prefer miombo savanna habitats which provides natural caves such as sandstone cliffs or hollows in baobab trees or manmade structures like old mine adits. This species has been previously recorded within the QDS of the focus area and may potentially roost in or close to the focus area in the rocky areas within the Mountain Bushveld Habitat, whilst they will forage in the greater area.	NT	Medium

MAMMAL DISCUSSION

Mammal abundances and signs thereof, which were observed during the site visit, were limited to small bodied common mammal species. The proposed access road and Alternative WTW are largely situated within the Mountain Bushveld Habitat which provided habitat for various mammal species including potential SCC. The Preferred WTW area was mainly located within the lower lying Plateau Bushveld Habitat, which was previously impacted upon, only supporting a reduced diversity of common mammal species.

Mammal species or signs thereof (i.e., spoor, scat, marking etc.) observed during the site visit, included common species such as *Lepus saxatilis* (Scrub Hare), *Mungos mungo* (Banded Mongoose, LC), *Hystrix africaeaustralis* (Cape porcupine), *Sylvicapra grimmia* (Common Duiker, LC), *Papio ursinus* (Chacma Baboon, LC), *Potamochoerus larvatus* (Bushpig) and some small unidentified rodent species within the rocky bushveld habitat. Most of these species are scavenging for food in and around the waste disposal facility adjacent to the focus area, as observed during the site visit. Larger bodied species such as *Tragelaphus strepsiceros* (Greater Kudu) may move through the study area occasionally and meso-carnivores such as *Lupulella mesomelas* (Black-backed jackal) may be attracted by the small mammals gathering around the waste disposal facility.

Dasymys robertsii (Robert's Shaggy Rat, DD) and *Crocidura maquassiensis* (Makwassie Musk Shrew, VU) were triggered by the screening tool as their distribution ranges overlaps with the focus area. The Makwassie Musk Shrew has a medium POC for the focus area as suitable habitat within the Mountain Bushveld Habitat is available for this species, while the Robert's Shaggy Rat has a low POC, as no suitable habitat in the form of wetlands and swamp areas along rivers are present within and around the focus area. Four other mammal SCC as mentioned above may utilise or move through the focus area occasionally.

Food and habitat availability for mammal species were increased within the Mountain Bushveld Habitat as feeding signs were regularly observed in this habitat such as rocks flipped over by baboons searching for invertebrates, plant roots dug up by porcupines and small burrows dug by rodents and mongooses. The Mountain Bushveld Habitat is also connected to larger areas of semi-intact habitat to the north and east of the focus area increasing the importance for potential mammal SCC. The lower lying Plateau Bushveld found within the Preferred WTW area were mostly overgrown by unpalatable grasses and has been impacted though dumping limiting foraging opportunity for mammals. Although habitat was available, and signs of common mammals were observed in this area, it was to a far lesser extent than within the access road and Alternative WTW footprint. Mammal SCCs are not expected to occur within the Preferred WTW area, as suitable habitat and resources are limited within this area.

Overall, the focus area provided habitat and food resources for several smaller common mammal species as well as the potential to support potential mammal SCC within the Mountain Bushveld Habitat. The Preferred WTW area consisted of less sensitive habitat and had reduced mammal habitat and food availability and therefore will be the preferred option for development from a mammal perspective resulting in lower impacts.



Table 8: Field assessment results pertaining to avifaunal species within the focus area.

SPECIES RECORDED IN THE FOCUS AREA

The image contains four separate photographs of birds, each labeled with a letter in the bottom-left corner.
 a. A small bird with a black head, white throat, and a prominent red patch on its chest, perched on a thin, leafless branch.
 b. A small bird with a bright yellow body and a green head, perched on a thin branch.
 c. A small bird with a green head and back and a white underbelly, perched on a thick, light-colored branch.
 d. A large bird with a long, straight, dark beak, a white body, and dark wings, standing on a mound of reddish-brown soil.

a.) *Batis molitor* (Chinspot Batis, LC); b.) *Merops pusillus* (Little Bee-eater, LC); c.) *Pytilia melba* (Green-Winged Pytilia, LC) and d.) *Sagittarius serpentarius* (Marabou Stork, NT).

AVIFAUNAL SCC

Species	Habitat and Resources	Status	POC	Species	Habitat and Resources	Status	POC
<i>Ciconia nigra</i> (Black Stork)	The Black Stork is associated with mountainous areas. It relies on shallow waterbodies, such as pools in dry riverbeds, shallow rivers and wetlands in which it forages. They mainly feed on fish but can also feed on amphibians, reptiles, invertebrates and small mammals. This species may be found within the Mountain Bushveld Habitat.	VU	Medium	<i>Falco biarmicus</i> (Lanner Falcon)	Lanner Falcons prefers open grassland or cleared woodland habitat where they will hunt birds, small mammals, reptiles and insects. They mainly breed on cliffs but are also known to make nests in trees and on buildings and pylons. This species has records within the pentad of the focus area and will likely be found within the Mountain Bushveld Habitat of the focus area.	VU	High
<i>Gyps coprotheres</i> (Cape Vulture)	The Cape Vulture usually breeds and roosts on cliff faces in or near mountains. It is known to forage on carcasses within relatively open Bushveld Habitat. This species may potentially nest high in the cliffs of the mountain ranges in the surrounding areas and may utilise the focus area as foraging grounds scavenging for food.	EN	Medium	<i>Aquila rapax</i> (Tawny Eagle)	Tawny Eagles are found in lightly wooded savannah and thornveld as well as semi-desert habitats. Scavenging and piracy are two of the most important foraging strategies for Tawny Eagles. The focus area may provide suitable foraging habitat for the Tawny Eagle as they have been recorded in surrounding areas.	EN	Medium



<i>Buphagus erythrorhynchus</i> (Red-Billed Oxpecker)	This species breeds in tree holes in open country and may therefore associate with the Mountain Bushveld habitat unit when breeding. Its food is supplied by insects on large herbivores which are found within and around the focus area in the form of cattle, donkeys and other livestock.	T ²⁰	Medium	<i>Leptoptilos crumenifer</i> (Marabou Stork)	This species occurs throughout sub-Saharan Africa with only a few known breeding locations within South Africa. They are scavengers that feed on a wide variety of food resources, including carrion from large mammal carcasses, aquatic vertebrates and human waste found on waste disposal facilities. This species was observed within and around the existing waste disposal facility where they were scavenging for food.	NT	Confirmed
--	---	-----------------	--------	--	---	----	-----------

AVIFAUNAL DISCUSSION

Observed avifaunal diversity within the focus areas was lower than expected but can be attributed to limited time spent on site and the timing (season) of the assessment. The Mountain Bushveld Habitat had the highest diversity and abundance of avifauna within the focus area due to structural variation and presence of unique habitat like rocky areas within this habitat. Although the observed diversity was limited, 222 avifaunal species has previously been recorded within the pentad of the focus area and have potential to be found within the focus area.

Common avifaunal species observed included *Dicrurus adsimilis* (Fork-tailed Drongo), *Bubulcus ibis* (Cattle Egret), *Merops bullockoides* (White-fronted Bee-eater), *Batis molitor* (Chinspot Batis), *Prinia subflava* (Tawny-flanked Prinia), *Merops pusillus* (Little Bee-eater), *Pytilia melba* (Green-Winged Pytilia) etc. The structural complexity of the Mountain Bushveld Habitat increases the importance of this habitat for avifauna, as this is a characteristic which is considered a primary determinant of avian assemblage diversity. The presence of woody vegetation within this habitat provides excellent nesting opportunity for several avifaunal species. Food resources were also plentiful within the Mountain Bushveld Habitat which will support, insectivorous, frugivorous and some granivorous species. The waste disposal facility adjacent to the focus area also provides food resources to many avifaunal species that scavenges for food leftovers and nest building material within the wasted dump.

The NT *Leptoptilos crumenifer* (Marabou Stork) was observed flying over the focus area and multiple individuals were seen foraging within the waste disposal site adjacent to the focus area. This species is known to be attracted to human waste disposal facilities where they scavenge for food resources. There are four other SCC with a medium potential of occurrence (POC) within the focus area and one with a high POC, as records of such species have been recorded within the pentad of the focus area. The Mountain Bushveld Habitat will be the most important habitat for such species within the focus area as it is connected to surrounding mountain ranges through open areas and farmlands especially to the northern and eastern parts. Avifaunal movement is less restricted due to flight giving them the ability to overcome manmade barriers and therefore they can easily utilise open areas surrounded by anthropogenic activities.

The Preferred WTW area which is situated within the Plateau Bushveld Habitat had the lowest observed avifaunal diversity and abundance with only a few common species observed. The limited structural variation and diversity in vegetation and reduced habitat integrity, limits avifaunal assemblages. Historic vegetation clearing activities (especially removal of larger woody species) within this area, reduces the importance of the Preferred WTW area for avifauna.

The Mountain Bushveld Habitat within the focus area is considered important for avifaunal assemblages in the region and may support potential and confirmed SCC. The Plateau Bushveld Habitat is of less importance to avifauna and no SCC is expected to occur within the Preferred WTW area and will therefore be the recommended site for the construction of the WTW from an avifaunal perspective.

²⁰ Threatened according to the Limpopo SoER (2004) report.



Table 9: Field assessment results pertaining to reptile and amphibian species within the focus area.

HERPETOFAUNAL SPECIES RECORDED IN THE FOCUS AREA							
 a.) <i>Pachydactylus punctatus</i> (Pointed Thick-toed Gecko, LC); b.) <i>Trachylepis margaritifera</i> (Rainbow Skink, LC); c.) <i>Trachylepis varia</i> (Variable Skink, LC) and d.) Rocky areas in the Mountain Bushveld Habitat which providing shelter and basking opportunities for reptiles.							
HERPETOFAUNAL SCC							
Species	Habitat and Resources	Status	POC	Species	Habitat and Resources	Status	POC
<i>Kinixys lobatsiana</i> (Lobatse Hinged Tortoise)	The species prefers rocky hillsides. As such, rocky slopes close to the focus area are deemed important for the species. It is a species of open or closed mixed savanna, feeding on plants and invertebrates (snails, millipedes, and beetles). It aestivates in abandoned animal burrows or rock crevices, making these important localities for the species in the dry winter season. The Mountain Bushveld Habitat may potentially support his species.	VU	Medium	<i>Homoroselaps dorsalis</i> (Striped Harlequin Snake)	Partially fossorial and known to inhabit old termitaria in grassland habitat. Most of its range is at moderately high altitudes. It is likely to inhabit termitaria within the focus area as the focus area falls into the know distribution range of this species.	NT	Medium



HERPETOFAUNAL DISCUSSION

It is likely that the focus area will present a higher reptile diversity than that which was observed as reptiles are inherently secretive and shy, making their detection and identification in the field challenging, especially site visits of limited time. The QDS data presented through the Animal Demography Unit (ADU) indicated that 70 reptile species have been recorded within the QDS of the focus area and therefore a rich diversity of reptiles can potentially occur in the focus area notably within the Mountain Bushveld Habitat.

Common reptile species observed within the Mountain Bushveld Habitat, included *Pachydactylus punctatus* (Pointed Thick-toed Gecko, LC), *Trachylepis margaritifera* (Rainbow Skink, LC) and *Trachylepis varia* (Variable Skink, LC). The rocky areas and presence of loose rocks, within this habitat, offered excellent shelter and basking opportunity for reptiles, while the presence of insects, other invertebrates and small mammals provided sufficient food resources to sustain various reptile species. From a reptile perspective, habitat connectivity is limited especially for the small bodied species observed as anthropogenic activities and developments could prevent these species from moving. No reptile SCC was observed during the site visit with only two species may potentially occur within the focus area. *Kinixys lobatsiana* (Lobatse Hinged Tortoise, VU) and *Homoroselaps dorsalis* (Striped Harlequin Snake, NT) both have records in areas surrounding the focus area, with potential habitat in the Mountain Bushveld Habitat.

No amphibian species were observed during the site visit and no amphibian SCC are expected to occur within the focus area. The ADU FrogMAP indicated that 18 amphibian species have been recoded within the QDS of the focus area, but due to the lack of any permanent freshwater habitat only few common water independent amphibian species can be expected to be found within the focus area, such as *Schismaderma carens* (Red Toad), *Sclerophrys gutturalis* (Guttural Toad), *Phrynomantis bifasciatus* (Banded Rubber Frog) etc.

The Mountain Bushveld Habitat in the focus area does provide good niche habitat and breeding opportunities for several reptile species, including two potential reptile SCC. Amphibian diversity and abundance is expected to be limited within the focus area. The Preferred WTW area in the Plateau Bushveld Habitat was of less importance for herpetofauna as niche habitat was limited restricting shelter and basking opportunities for such species. This Preferred WTW area will be the recommended site to develop the WTW from a reptile perspective.



Table 10: Field assessment results pertaining to invertebrate species within the focus area.

INVERTEBRATE SPECIES RECORDED IN THE FOCUS AREA							
 a.) <i>Colotis evagore</i> ssp. <i>antigone</i> (Small Orange Tip, LC); b.) <i>Parabuthus transvaalicus</i> (Transvaal Thicktail Scorpion, NYBA); c.) <i>Hadogenes newlandsi</i> (Newlands Rock Scorpion, P - TOPS) and d.) <i>Harpactirella overdijki</i> (Overdijk's Lesser Baboon Spider, NYBA).							
INVERTEBRATE SCC							
Species	Habitat and Resources	Status	POC	Species	Habitat and Resources	Status	POC
<i>Hadogenes newlandsi</i> (Newlands Rock Scorpion)	This scorpion species hides under rocks usually in areas of increased elevation like rocky outcrops or mountains. A specimen was observed in the Mountain Bushveld Habitat, hiding under a rock. This species is endemic to the area and will potentially be impacted upon through the proposed development.	P (TOPS)	Confirmed	<i>Ceratogyrus</i> sp (Horned Baboon Spider) & <i>Harpactira</i> sp (Common Baboon Spider)	Baboon spiders live in silk-lined burrows in the ground, in crevices, under rocks and logs. Development in areas where this species may be found will likely lead to killing of individuals if not relocated before construction or vegetation clearing starts. Individuals of these species may potentially be found within the focus area.	P (TOPS)	Medium
INVERTEBRATE DISCUSSION							
During the field assessment observed invertebrate abundance was moderate throughout the focus area with the diversity being more dependent on habitat, this is anticipated to increase after the first rain has fallen. The Mountain Bushveld Habitat had a higher diversity of invertebrates than that of the other habitats, likely as it was the least impacted upon/degraded whilst some of the characteristic features (such as the rocky areas), support rupicolous invertebrate species that select for such areas. Areas of the Transformed Habitat and the adjacent waste disposal facility also had an abundance of insect species feeding on waste material. The Plateau Bushveld Habitat had the lowest observed invertebrate diversity although the Lepidoptera (Butterflies and Moths) abundances were high. The most abundant insect orders observed within the Mountain Bushveld Habitat were, Hymenoptera (wasps, ants and bees), Coleoptera (beetles) and Lepidoptera (Butterflies and Moths). Insect species are considered a vital and important link in the ecosystem, fulfilling many ecological roles, including pollination, removal of dead animal and plant material, pest predation and							



parasitism and clearing of dung and scat from larger mammals. Insects are generally the most abundant macro-organisms within landscapes providing a vital food resource for many of the other faunal species in the focus area, increasing their importance in an environment.

Arachnids are inherently small, secretive and often nocturnal, making the detection of species in the field difficult. Given the suitability of the habitat and known species records from the region, it is certain that the abundance and diversity will be higher than that which was observed during the site assessment. Evidence of spiders were observed throughout the Mountain Bushveld Habitat and included species such as *Xysticus* sp (Ground Crab Spiders), *Harpactirella overdijki* (Overdijk's Lesser Baboon Spider) and grass spiders in the family Agelenidae. The focus area has the potential to support the TOPS protected spider species: *Ceratogyrus* sp (Horned Baboon Spider) & *Harpactira* sp (Common Baboon Spider), as records of these species is known from the region and potential habitat is present. Three scorpion species have been recorded within the Mountain Bushveld Habitat: *Parabuthus transvaalicus* (Transvaal Thicktail Scorpion), *Uroplectes carinatus* (Common Lesser-Thicktail Scorpion) and the TOPS protected *Hadogenes newlandsi* (Newlands Rock Scorpion). The abundance of rocks within this habitat creates perfect shelter for Arachnids while the abundance of insects provides sufficient food resources. Various millipedes and centipedes were also observed throughout the focus area.

The Mountain Bushveld Habitat in the focus area provides good niche habitat that supports an abundance of invertebrates as observed during the site visit. The Preferred WTW area in the Plateau Bushveld Habitat had much less invertebrate diversity but still had an abundance of common insect species. The Preferred WTW area will be the recommended area to develop the WTW from an invertebrate perspective with less impacts expected.



5 BIODIVERSITY PRIORITY AREAS²¹ / CONSERVATION SIGNIFICANCE

Biodiversity importance/ conservation significance of the focus area is largely determined based on triggering features as identified in the screening tool (Terrestrial Biodiversity Theme) as well as additional provincial datasets as presented in Section 3 of this report. The conservation features and how they pertain to the habitat units identified for the focus area are presented in the below table. Overall, the Mountain Bushveld is considered to be of increased biodiversity importance, whereas the Plateau Bushveld does not contribute significantly towards biodiversity importance, and the Transformed Habitat is not of biodiversity significance at all.

Table 11: Biodiversity Priority Areas / Conservation Significance.

Irreplaceable CBA	The irreplaceable CBA is identified for the entire focus area by the bioregional CBA datasets of the Limpopo Province (Section 3, Figure 6). Given the habitat intactness of the Mountain Bushveld (largely intact) and the Plateau Bushveld (moderately intact), the CBA is still regarded to be functional within these habitat units. Within the greater areas, the Mountain Bushveld is less fragmented than the Plateau Bushveld and further provides 1) an ecological corridor to facilitate movement and dispersal, and 2) specialised habitat for plants and animals (increased rockiness). As such, the Mountain Bushveld is more important for maintaining the CBA, whereas the Plateau Bushveld is not optimally contributing towards the CBA's functionality. Land Management Recommendations: Obtain formal conservation protection where possible. Implement appropriate zoning to avoid net loss of intact habitat or intensification of land use. Incompatible Land-Use: Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines).
Nationally protected area, namely the Fossil Hominid Sites of SA.	The Fossil Hominid Sites of SA are also considered a UNESCO World Heritage Site (https://whc.unesco.org/en/list/915/). As stipulated by Section 50 (5) of the NEMPAA: "No development, construction, or farming may be permitted in a nature reserve or world heritage site without the prior written permission of the management authority". Although the Fossil Hominid Site was gazetted without a buffer zone, liaison with the relevant authorities may be required to establish if 1) the proposed development is viable within the UNESCO World Heritage Site, and 2) if any buffers are relevant.

²¹ Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered and Endangered ecosystems, Critical Biodiversity Areas and Ecological Support Areas, Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, focus areas for land-based protected area expansion, and focus areas for offshore protection.



6 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

Based on the criteria provided in Appendix A of this report, all habitats within the focus area were allocated an importance category, i.e., a SEI category. SEI is a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]). BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

Tables 12 (floral) and 13 (fauna) indicate the individual SEI scoring for each habitat unit within the focus area. Figures 12 (flora) and 13 (fauna) indicate the SEI for the focus area.



Table 12: SEI importance for the different habitat units associated with the focus area (floral perspective).

Unit	CI	FI	BI	RR	SEI	Development Constraints
Mountain Bushveld and associated EDL	Medium High POC for the NT <i>Elaeodendron transvaalense</i> .	High Intact habitat of LC ecosystem with fair habitat connectivity and no significant, direct, persistent negative impacts present.	Medium	Very Low The Mountain Bushveld is associated with specialised habitat due to the increased rockiness and, thus, is unlikely to fully recover its species composition and functionality within the landscape.	High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Plateau Bushveld	Medium Confirmed presence of the NT <i>Elaeodendron transvaalense</i> .	Medium Moderately intact habitat of LC ecosystem. Fair habitat connectivity with impacts to the habitat integrity noted due to tree harvesting and poor fire regimes.	Medium	Medium The habitat is currently degraded and is thus expected to be able to recover to support the current floral composition without significant human intervention and costly rehabilitation. The process will still be slow, but less restricted than for the Mountain Bushveld habitat.	Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Transformed Habitat	Low Some areas retain natural habitat but very low probability to support SCC	Very low Major, negative ecological impacts.	Very low	Very High Habitat can recover rapidly to original species composition.	Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.



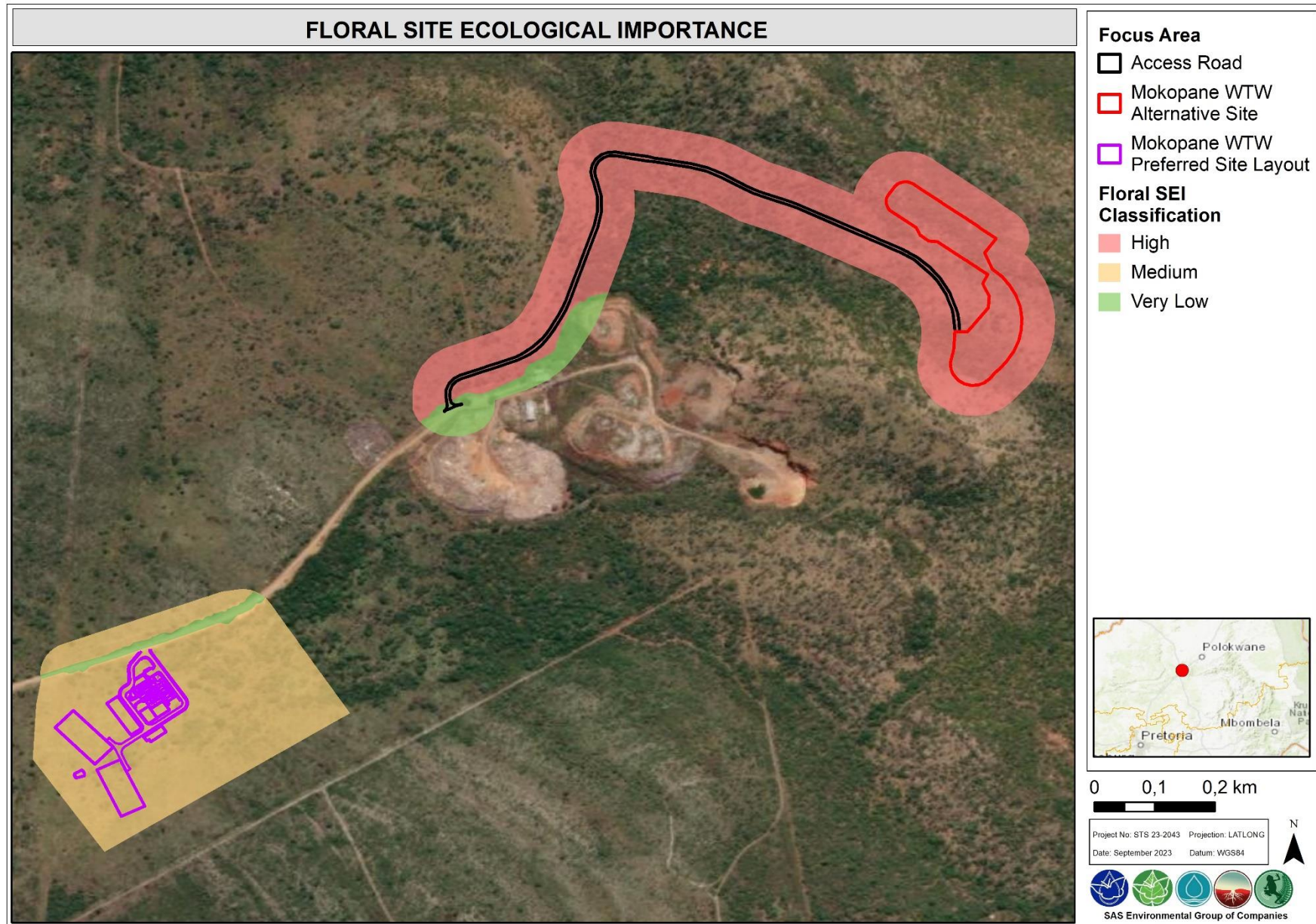


Figure 12: Floral SEI map of the focus area.



Table 13: SEI importance for the different habitat units associated with the focus area (faunal perspective).

Habitat Unit	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	SEI	Development Constraints
Mountain Bushveld	Medium Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	High Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.	Medium	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Plateau Bushveld	Low < 50% of receptor contains natural habitat with limited potential to support SCC.	Low Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.	Low	Medium Will recover slowly (~ more than 10 years) to restore	Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Episodic Drainage Line	Medium Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.



Habitat Unit	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	SEI	Development Constraints
Transformed	Medium Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	Low Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.	Low	High Habitat that can recover relatively quickly (~ 5–10 years) to restore	Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.



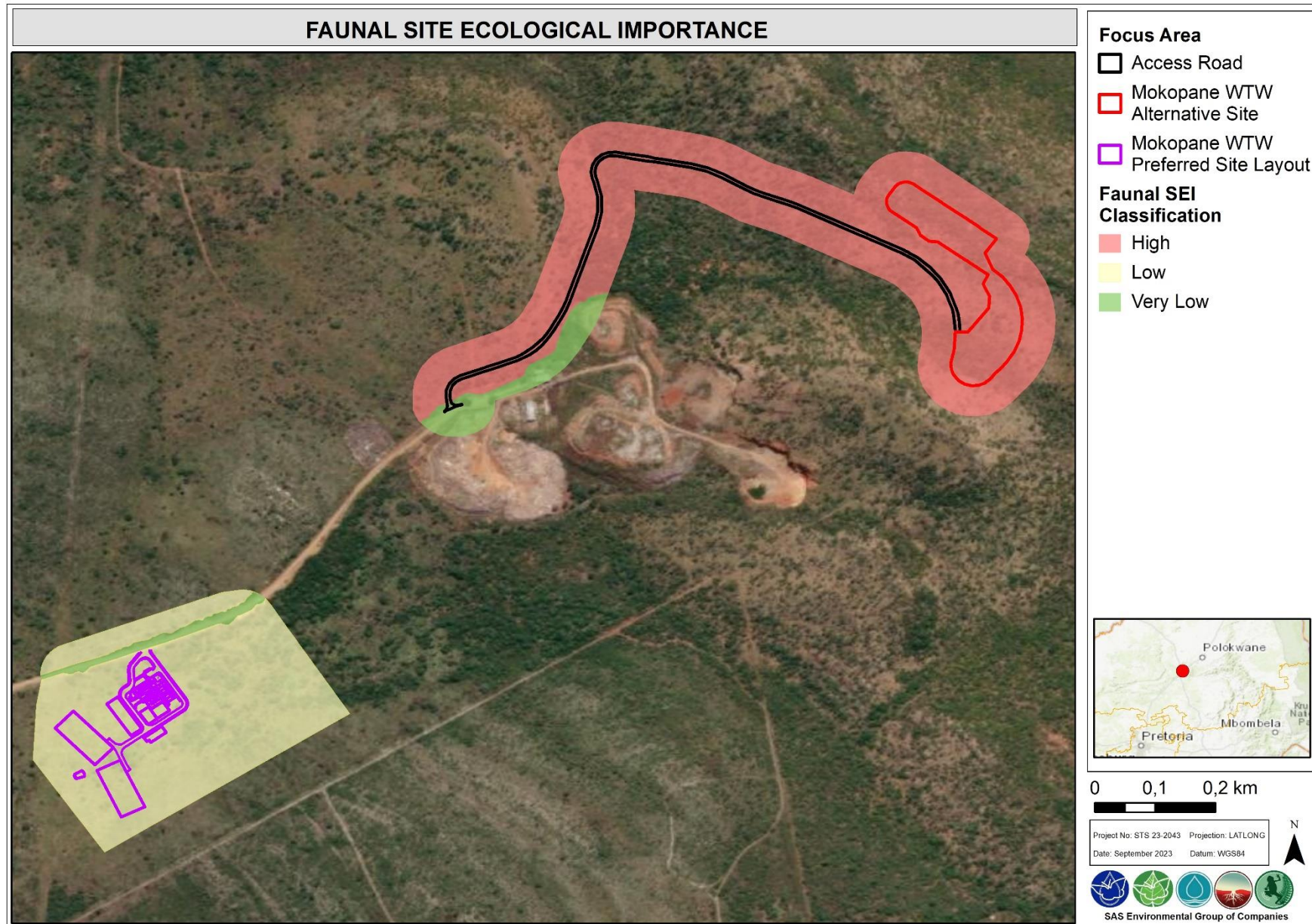


Figure 13: Faunal SEI map of the focus area.



7 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 legislation²². 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).

Legal Context

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

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

²² **Government Notice number 1003:** Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).



Duty of care related to listed invasive species are referred to in NEMBA Section 73²³. 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.

7.1 AIPs identified within the focus area

A total of eight (8) AIP species were recorded within the focus area (Table 14). Of the eight AIPs recorded during the field assessment, five species are listed under NEMBA Category 1b and one species is listed under NEMBA Category 2. The remaining species are not listed under NEMBA. However, several of these species, *Tagetes minuta*, and *Zinnia peruviana* are considered problem plants²⁴ and are deemed pose a threat to native floral species if not controlled. The table below provides an inventory of listed AIP species encountered during the site investigation, including an indication of the areas where they occur.

During the construction and operational phases of the proposed project, it will be necessary to implement AIP control and their spread within and surrounding the focus area must be managed appropriately.

Table 14: List of AIPs observed within the focus area.

Scientific name	Common Name	Country of Origin	NEMBA Status	Mountain Bushveld	Plateau Bushveld	Transformed
WOODY						
<i>Lantana camara</i>	Lantana	Central and South America.	1b	x		x
FORBS						
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	White-flowered Mexicanu poppy	Mexico	1b			x
<i>Flaveria bidentis</i>	Smelter's bush	South America	1b			x
<i>Tagetes minuta</i>	Khaki bush, khaki weed	South and North America	Not Listed	x	x	x

²³ Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-

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

²⁴ A problem plant is any plant, shrub or tree which has a negative environmental impact in a particular locality and result in the subsequent loss of biodiversity, and (potential) excessive water consumption. These species, which can be native, have not been listed or classified as alien or invasive plants by the current South African. The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).



Scientific name	Common Name	Country of Origin	NEMBA Status	Mountain Bushveld	Plateau Bushveld	Transformed
<i>Zinnia peruviana</i>	Peruvian zinnia	Mexico to Brazil, Peru, and Bolivia	Not Listed	x		
SUCCULENTS						
<i>Agave sisalana</i>	Sisal Agave	Central America	2			x
<i>Cereus jamacaru</i>	Queen of the Night	South America	1b		x	
<i>Opuntia ficus-indica</i>	Prickly pear	South America	1b		x	

8 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts on the floral and faunal ecology of the focus area. An impact discussion and assessment of all potential pre-construction, construction, and maintenance and operational phase impacts are provided in Sections 8.2 (flora) and 8.3 (fauna). All mitigatory measures required to minimise the perceived impacts are presented in Sections 8.2 (flora) and 8.3 (fauna).

The proposed and alternate WTW sites have been separately assessed in the impact tables.

8.1 Activities and Aspect Register

The register of activities and aspects for the proposed WTW project is presented in Table 15 below.

Table 15: Activities and Aspects likely to impact on the floral and faunal resources within the focus area.

ACTIVITIES AND ASPECTS REGISTER	
Pre-Construction Phase	
-	Inconsiderate planning, infrastructure placement and design, leading to the loss of floral and faunal species and/or habitat for such species outside of planned footprints.
-	Impact: Degradation and modification of the receiving environment, loss of faunal and floral habitat.
-	Potential failure to design and implement an AIP Management/Control plan before the commencement of construction activities, resulting in the spread of AIPs from the development footprint to surrounding natural habitat.
-	Impact: Spread of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat.
-	Potential failure to design an adequate stormwater management and rehabilitation plan.
-	Impact: Increased erosion and unstable slopes associated with the Alternative WTW area and surrounds, potentially influencing natural areas outside the authorised footprint area.
-	Potential failure to conduct a walkdown of the approved footprint area before construction activities where floral SCC (especially NFA-trees) are marked.
-	Failure to obtain the necessary permits and/or authorisation to relocate or destroy SCCs prior to construction activities taking place.
-	Potential failure to relocate floral SCC or faunal SCC to suitable habitat outside the development footprint.
-	Impact: Loss of faunal and/or floral SCC within the proposed footprint area.
Construction Phase	



ACTIVITIES AND ASPECTS REGISTER	
- Site clearing and the removal of vegetation.	
- Impact: Loss of faunal and floral habitat and diversity. Loss of habitat to meet biodiversity pattern and/or ecological process targets in the province, namely impacting CBA 1 (functional in the Alternative WTW and already impacted in the Preferred WTW).	
- Increased runoff and possible development of erosion within the EDLs.	
- Impact: Increased potential sedimentation within the EDLs that are downgradient of the Alternative WTW site.	
- Inadequate layout optimisation and demarcation for approved footprints, resulting in site clearing beyond what is required.	
- Impact: Loss of faunal and floral habitat. Loss of indigenous vegetation and infringement on habitat outside of the planned footprints.	
- Potential failure to monitor the success of relocated floral SCC.	
- Impact: Loss of relocated faunal and/or floral SCC (where/if applicable).	
- Failure to implement AIP plan throughout all phases of the project, resulting in potential proliferation of AIP species that spread with construction vehicles and construction material – consequently colonising in areas of increased disturbances and outcompeting native species in adjacent natural habitat.	
- Impact: Loss of favourable faunal and floral habitat outside of the direct development footprint, including a decrease in species diversity and habitat integrity.	
- Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance which promotes the establishment and spread of AIPs and further alteration of faunal habitat beyond project footprints.	
- Impact: Loss of preferred faunal and floral habitat, diversity and habitat integrity as AIPs outcompete and replace native species.	
- Increased risk of faunal collisions with construction vehicles.	
- Impact: Local loss of faunal SCC abundance and diversity.	
- Additional pressure on faunal and floral habitat as a result of an increased human presence associated with the proposed development, contributing to:	
• Potential hunting/trapping/removal/collection of faunal and floral species; and	
• Increased human activity may lead to the displacement and/or loss of potential faunal SCC.	
- Impact: Loss of faunal and floral habitat and the potential loss of faunal and floral SCC.	
- Potentially poorly managed edge effects:	
• Ineffective rehabilitation of compacted areas, bare soils, or eroded areas. Limited vegetation cover exposes the soil to the impact of rain, which may lead to increased erosion;	
• Areas left disturbed may promote the ongoing proliferation of AIP species and subsequent spread to surrounding natural areas altering the floral habitat beyond the project footprints;	
• Increased runoff and sediment loads to the EDL; and	
• Compaction of soils, habitat disturbance and fragmentation outside of the footprint areas due to indiscriminate driving of construction vehicles through remaining natural vegetation.	
- Impact: Loss of floral and faunal habitat and diversity within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.	
- Possible increased fire frequency during construction.	
- Impact: Loss or alteration of floral and faunal habitat and species diversity.	
Operational and Maintenance Phases	
- Increased introduction and proliferation of AIPs due to a lack of maintenance activities (and/or rehabilitation actions), or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.	
- Impact: Potentially leading to permanent transformation of faunal and floral habitat and long-term degradation of remaining natural habitat within the surroundings.	
- Implement site specific erosion and storm water runoff management measures to prevent (or if prevention is not possible, to limit) any erosion from occurring within the development footprint area and surrounding natural areas.	
- Impact: Increased erosion surrounding the footprint area reducing the natural habitat and potentially influencing natural areas outside the authorised footprint area.	
- Potential poorly managed SCC relocation activities, or additional harvesting pressures due to increased anthropogenic presence in the area.	
- Impact: Loss of floral SCC.	



8.2 Floral Impact Assessment Tables

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

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



Table 16: Pre-construction Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.

Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
IMPACTS ON FLORAL HABITAT AND DIVERSITY													
Potential loss of floral habitat and diversity due to 1) general site preparation and project planning, and 2) potential poor infrastructure design and planning for all proposed activities (Alternative WTW and associated access road)	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	** Ensure that sound environmental management is in place during the planning phase. ** Minimise loss of indigenous vegetation where possible through adequate planning and, where necessary, by incorporating the sensitivity of the biodiversity report as well as other specialist studies (e.g., freshwater assessment (SAS 23-1135, 2023)). ** Prior to the commencement of construction activities on site, an AIP control plan should be drafted, and the AIP control should subsequently be implemented throughout all phases of the proposed project. The AIP control and management plan should be regularly updated by a suitably trained specialist. It is highly recommended that the AIP Management/ Control Plan should be monitored on a yearly basis (or as specified by an AIP professional).	Medium-term	Site-specific	Moderate - negative	Slightly detrimental	Unlikely	Very low
Potential loss of floral habitat and diversity due to 1) general site preparation and project planning, and 2) potential poor infrastructure design and planning for all proposed activities (Preferred WTW)	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	** Prior to the commencement of construction activities, the entire construction servitude, including lay down areas, should be clearly demarcated. ** Prior to the commencement of construction activities on site, a rehabilitation plan and/or strategy should be developed for implementation throughout the project phases.	Medium-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
IMPACTS ON FLORAL SCC													
Reduced number of floral SCC within the Mountain Bushveld and associated EDL (Removal, destruction, and/or relocation of affected SCC prior to proposed activities)	Medium-term	Regional	High - negative	Highly detrimental	Very Likely	High - negative	** Before any construction activities can occur, a detailed walkdown of the footprint area must take place, during which all SCC should be marked, and permits applied for to remove / cut / destroy these species. ** Before any proposed construction activities may take place, permits from the relevant authorities should be obtained before removal, cutting or destruction of protected species occurs, i.e., Limpopo Economic Development, Environmental and Tourism (LEDET) for provincially protected species and/or DFFE for nationally protected species (e.g., NFA-protected trees), or threatened species.	Medium-term	Local	Moderate - negative	Slightly detrimental	Very Likely	Moderate - negative



Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
Reduced number of floral SCC within the Plateau Bushveld (Removal, destruction, and/or relocation of affected SCC prior to proposed activities)	Medium-term	Local	Moderate - negative	Moderately detrimental	Very Likely	Moderate - negative	** A rescue and relocation plan should be developed (based on the outcome of the floral walkdown) for RDLs, NFA-protected trees, and LEMA-protected species where relevant. The plan must be approved by the relevant authorities (along with the necessary permits where applicable). ** If SCC, which 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 (as stipulated by the SANBI).	Medium-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative
Reduced number of floral SCC within the Transformed Habitat (Removal, destruction, and/or relocation of affected SCC prior to proposed activities)	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	** If RDL plant species will be lost due to clearing of vegetation, such species must be replaced (considering liaison with authorities) either during rehabilitation initiatives or through translocation to suitable habitat surrounding the disturbance footprint. Avoidance of impacts to RDL species, however, must always be prioritised. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential until it is evident that the species have successfully established (a species-specific management plan will be required).	Short-term	Site-specific	Negligible	Negligible	Unlikely	Very low



Table 17: Construction Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.

Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
IMPACTS ON FLORAL HABITAT AND DIVERSITY													
Loss of floral habitat and diversity associated with the Mountain Bushveld and associated EDL (clearance of vegetation)	Long-term	Local	High - negative	Highly detrimental	Certain	High - negative	** 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 during construction activities must be immediately remedied and cleaned up to ensure that these chemicals do not enter the soils. ** 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.	Long-term	Local	High - negative	Highly detrimental	Certain	High - negative
Loss of floral habitat and diversity associated with the Plateau Bushveld (clearance of vegetation)	Long-term	Local	Low - negative	Moderately detrimental	Certain	Moderate - negative	** Mitigation measures as proposed by the Freshwater specialist (SAS 23-1135, 2023) regarding construction related to the EDL must be implemented. Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the delineated freshwater ecosystems and applicable setback area. ** Edge effects of all construction activities, which may affect floral habitat within surrounding areas, must be strictly managed, e.g., implement an AIP control plan from the get-go, mitigate soil erosion by reducing soil compaction caused by movement of construction personnel and vehicles. Stormwater controls such as berms and silt fences must be established and are particularly important in the part of the road alignment falling with the GN509 regulated area (SAS 23-1135, 2023).	Long-term	Site-specific	Low - negative	Slightly detrimental	Certain	Moderate - negative
Loss of floral habitat and diversity associated with the Transformed Habitat (clearance of vegetation)	Short-term	Site-specific	Low - negative	Negligible	Unlikely	Very low	** Open fires must be restricted to fire safe zone facilities and suitable fire control measures must be in place. However, use of trees, shrubs or any vegetation for fire-making purposes must be strictly prohibited. A Fire Management Plan (FMP) must be in place to ensure that any fires that do originate can be managed and / or stopped before significant damage to the environment occurs.	Short-term	Site-specific	Negligible	Negligible	Unlikely	Very low



Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
Degradation of floral habitat beyond the footprint due to uncontrolled or poorly managed edge effects (focus area)	Long-term	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	** No indiscriminate driving through the veld may be allowed. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. ** No collection of indigenous floral species must be allowed by construction personnel. ** A rehabilitation plan should be implemented upon completion of the construction activities to ensure that the affected areas outside of the project footprints return to an ecologically functioning state, thereby increasing habitat connectivity within affected areas. Rehabilitation of natural vegetation should proceed in accordance with the rehabilitation plan (see also Table 18). ** Avoidance of impacts to the CBA 1 associated with the Alternative WTW and associated access road must be prioritised, and the Preferred WTW instead considered as the preferred option. Options to mitigate the loss of habitat associated with a CBA 1 is limited; however, where avoidance is not possible, the focus of mitigation measures should be on managing edge effects to reduce cumulative loss of CBAs through: 1) minimisation of habitat loss through reconsideration of layouts (Preferred WTW preferred), 2) prevention of habitat fragmentation through keeping new construction activities within or close to existing disturbances, and 3) ensuring a rehabilitation plan/strategy is developed and approved by authorities prior to activities commencing that will promote connectivity and ongoing ecological processes within the landscape.	Medium-term	Site-specific	Moderate - negative	Slightly detrimental	Unlikely	Very low
IMPACTS ON FLORAL SCC													
Reduced number of floral SCC within the surrounding Mountain Bushveld and associated EDL (monitoring of rescue and relocation initiatives, and harvesting of flora)	Medium-term	Site-specific	Moderate - negative	Slightly detrimental	Very likely	Low - negative	** No collection of indigenous floral species must be allowed by construction personnel, especially with regards to floral SCC. ** Monitoring of relocated and/or rescued species should occur on a regular basis (e.g., twice yearly). Good record keeping should be implemented. If species have not successfully established post rescue and relocation, then conditions should be assessed, and measures developed to ensure survival of other such species. New	Short-term	Site-specific	Moderate - negative	Slightly detrimental	Fairly likely	Low - negative



Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Reduced number of floral SCC within the surrounding Plateau Bushveld (monitoring of rescue and relocation initiatives, and harvesting of flora)	Medium-term	Site-specific	Moderate - negative	Slightly detrimental	Very likely	Low - negative	species should be planted in the case of unsuccessful establishment of rescued/relocated species. ** 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.	Short-term	Site-specific	Moderate - negative	Slightly detrimental	Fairly likely	Low - negative
Reduced number of floral SCC within the surrounding Transformed Habitat (monitoring of rescue and relocation initiatives, and harvesting of flora)	Short-term	Site-specific	Negligible	Negligible	Very unlikely	Very low		Short-term	Site-specific	Negligible	Negligible	Very unlikely	Very low



Table 18: Operational and Maintenance Phase impacts on floral habitat, diversity, and SCC from the proposed development activities. Required mitigation measures are presented at the bottom of each table section.

Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
Reduced habitat integrity of the habitat surrounding the footprint areas due to poor implementation of maintenance activities and edge effects (applicable to all habitat types)	Long-term	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	** Manage all edge effects or indirect disturbances stemming from operational and maintenance activities: 1) implement erosion control measures where necessary to ensure that further habitat loss does not occur, 2) no uncontrolled or unsanctioned fires must be allowed (FMP should be in place), 3) maintenance vehicles must be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed activities, and 4) implement an AIP Management / Control Plan that includes ongoing monitoring and control of the presence and/or re-emergence of such species. ** Management of AIPs during the operational-phase activities must be focused on limiting their introduction and preventing their spread. For example, roadsides should be monitored, as they serve as common corridors along which AIP species are introduced and dispersed and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated. ** Any natural areas beyond the direct footprint, which have been affected by construction activities must be rehabilitated using indigenous species. As part of rehabilitation activities following the construction of the WTW, ensure that a vegetation layer is reinstated and maintained where natural areas beyond the direct footprint have been affected by construction activities – i.e., to promote soil health and vegetation establishment, to reduced habitat fragmentation, and to provide resources for fauna. In this regard, the use of indigenous plants from the reference vegetation type is recommended for best biodiversity outcomes (e.g., planting trees such as <i>Combretum apiculatum</i>, <i>Dombeya rotundifolia</i>, <i>Sclerocarya birrea</i> subsp. <i>Caffra</i> (NFA-protected species), <i>Phyllogeiton zeyheri</i> (NFA-protected species), <i>Searsia leptodictya</i>, <i>Ziziphus mucronata</i>, and <i>Vitex rehmannii</i>).	Medium-term	Local	Moderate - negative	Moderately detrimental	Unlikely	Low - negative



8.3 Floral Impact Discussion

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development. The below sections break down the various impacts anticipated for the different aspects of the proposed project.

8.3.1 Impact on Floral Habitat and Diversity

The data gathered during the site visit indicated that the Mountain Bushveld and associated EDL is of good ecological condition and obtained a **high SEI**, whereas the Plateau Bushveld is of fair ecological condition and obtained a **medium SEI**, and the Transformed Habitat is of poor ecological condition and obtained a **very low SEI**. The proposed activities will impact these habitats to varying degrees, i.e., the proposed Alternative WTW will impact on approximately 3 ha of Mountain Bushveld and minimally on the EDL (0.003 ha), whereas the proposed Preferred WTW will impact on 0.9 ha of Plateau Bushveld. Within the entire focus area, very little of the Transformed Habitat is utilised as part of the project footprints (i.e., only ± 0.007 ha).

The overall loss of floral habitat that will result from the construction of the proposed Alternative WTW and associated access road is greater in extent than the loss of habitat that will result from the construction of the proposed Preferred WTW (3 ha vs 0.9 ha, respectively). The loss of species diversity will thus be greater within the Alternative WTW and associated access road than within the proposed Preferred WTW (i.e., on average, 70 species recorded across the Alternative WTW and 45 within the Preferred WTW). Moreover, the habitat associated with the Alternative WTW and associated access road is more sensitive (good ecological condition and high SEI) than the habitat associated with the Preferred WTW (fair ecological condition and medium SEI). As such, the impact to floral ecology will be greater and of higher significance for the proposed Alternative WTW and associated access road than for the Preferred WTW. The calculated impact significance is summarised below.

Table 19: Summary of impact significance on floral habitat and diversity.

Proposed WTW	Pre-mitigation	Post-mitigation
PRE-CONSTRUCTION PHASE		
Alternative WTW and associated access road - Mountain Bushveld and associated EDL	Moderate - negative	Very low
Preferred WTW - Plateau Bushveld	Moderate - negative	Very low
CONSTRUCTION PHASE		
Alternative WTW and associated access road - Mountain Bushveld and associated EDL	High - negative	High - negative



Proposed WTW	Pre-mitigation	Post-mitigation
Preferred WTW - Plateau Bushveld	Moderate - negative	Moderate - negative
Alternative WTW and associated access road & Preferred WTW - Transformed Habitat	Very low	Very low
OPERATIONAL AND MAINTENANCE PHASE		
Alternative WTW and associated access road & Preferred WTW - Poorly implemented maintenance activities and edge effect management applicable to all habitat types).	Moderate - negative	Low - negative

As seen in Table 19, the activities associated with the pre-construction phase can be mitigated; the implementation of sound planning can allow for very low impact significance scores for both the Alternative WTW and the Preferred WTW. During the construction phase, not much can be done to reduce impacts to floral habitat and diversity and, as such pre- and post-mitigated impact significance remains the same. However, the impact significance associated with the two options are variable, i.e., the impact significance is – and remains to be – high pre- and post-mitigation for the Alternative WTW and associated access road, whereas the impact significance is – and remains to be – moderate pre- and post-mitigation for the Preferred WTW. During the operational and maintenance phase, if the proposed mitigation measures are implemented, the significance of long-term impacts can be reduced to acceptable levels (for both the Alternative WTW and the Preferred WTW).

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

- Loss of indigenous vegetation and indigenous floral diversity within the observed habitats resulting from vegetation clearing activities;
- Fragmentation of intact floral communities;
- AIP proliferation into adjacent natural vegetation, displacing indigenous flora and altering favourable habitat conditions for the establishment of indigenous species; and
- Illegal dumping of rubble within the surrounding natural habitats, resulting in greater pressure on natural floral habitat.

8.3.2 Impacts on Floral SCC

The focus area is not associated with any RDLs (i.e., VU, EN, or CR species), but habitat associated with the Mountain Bushveld is suitable for RDLs such as Sensitive species 1248 (VU) and Sensitive species 1252 (VU) (albeit of medium POC). Species such as *Combretum petrophilum* (Rare) and the NT *Elaeodendron transvaalense* (also NFA-protected), are further likely to establish in the Mountain Bushveld habitat unit. The Plateau Bushveld is not deemed suitable for the successful establishment of RDLs; however, the NT *Elaeodendron transvaalense* (also NFA-protected) was recorded in this habitat unit.



Given the above, the impact that the proposed Alternative WTW and associated access road will have on RDL floral species, and their habitat, is of higher significance than the impact that the proposed Preferred WTW will have on RDL floral species and their habitat. The impacts will be realised within the pre-construction phase seeing that rescue and relocation must take place prior to the commencement of construction activities. It should be noted, however, that if an RDL is located on site, avoidance should be the mitigation measure, and relocation only seen as a compensation initiative.

Considering nationally (NFA-protected) and provincially (LEMA-protected) species, both the proposed Alternative WTW and associated access road as well as the proposed Preferred WTW is anticipated to have similar impacts. Where protected species are encountered within the footprint areas, permits from the LEDET and/or DFFE must be obtained for their removal and/or destruction prior to construction activities commencing.

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

The focus area is associated with a CBA 1. Based on disturbances associated with the various habitat units, as well as overall connectivity to surrounding, intact habitats and protected areas, the CBA 1 associated with the Mountain Bushveld habitat is of increased importance compared to the CBA 1 habitat associated with the Plateau Bushveld. As such, the proposed Alternative WTW and associated access road will have more detrimental impacts to the CBA 1 than the Preferred WTW. Loss of the CBA 1 within the Preferred WTW footprint is deemed acceptable from a botanical perspective, whereas loss of the CBA 1 within the Mountain Bushveld is considered significant from a botanical perspective (especially considering that the proposed development can be considered as an incompatible land-use (Table 11)). Consultation with regional authorities regarding the suitability of the proposed development within affected CBAs will be required.

8.3.4 Probable Residual Impacts²⁵

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

²⁵ **Probable Residual Impacts:** Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology, and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.



- Permanent loss of floral habitat and diversity due to poorly executed rehabilitation efforts, AIP control, and lack of monitoring during operational and maintenance of the project; and
- Ongoing AIP proliferation encroaching into the adjacent natural vegetation communities.

8.3.5 Possible Cumulative Impacts²⁶

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

- Habitat fragmentation: The focus area is not currently fragmented locally but is surrounded by anthropogenic developments within the larger area. Historically, the focus area was fragmented by agricultural practices. Additional fragmentation of this area will result in cumulative impacts to floral communities but will be more severe for the Alternative WTW than the Preferred WTW given that the Alternative WTW is associated with a small landscape corridor.
- Vegetation harvesting (wood collection and medicinal species collection): Considering the extent of anthropogenic activities surrounding this area, as well as the number of NFA-protected trees, additional pressures from wood harvesting is anticipated if this project proceeds.
- Spread of AIPs: The focus area is not currently associated with high diversities or abundances of AIPs – however, several NEMBA category 1b invaders were noted along the existing road and existing landfill. If AIPs are not managed and are allowed to spread to adjacent areas, there is a risk of cumulative degradation of floral communities within the area.
- Additional (known) planned projects in the area: No additional projects are known to be proposed for the site at this stage.

Overall, the resultant cumulative impacts to the floral habitat and diversity are anticipated to be moderately detrimental.

²⁶ **Possible Cumulative Impacts**: Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.



8.4 Faunal Impact Assessment Tables

The below tables indicate the perceived risks to the faunal ecology associated with all phases of the proposed residential development. The tables also provide the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Mitigation measures applicable to the proposed project have been included in the below tables and are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed activities.

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



Table 20: Pre-construction Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented within each table section.

Within each table section:													
Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
PROPOSED ALTERNATIVE WTW AND ACCESS ROAD													
Loss of faunal habitat and diversity.	Long-term	Site-specific	High - negative	Moderately detrimental	Certain	High - negative	- At all times, ensure that sound environmental management and practices will be implemented during the pre-construction phase; and carried forward to the construction and operational phases; - In the event that any faunal SCC listed in Section 4 or Appendix I are encountered in the focus area and require relocation, the relevant provincial and national permits should be obtained from the Department of Forestry, Fisheries and the Environment (DFFE); - Human and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment; - As far as possible use existing roads. New roads are to be designed in such a way as to minimise habitat fragmentation and habitat loss using suitable culvert designs; and - It is recommended that the Preferred WTW site would be considered as lower impacts can be expected.	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Certain	Moderate - negative
Loss of faunal SCC	Long-term	Local	High - negative	Highly detrimental	Very likely	High - negative		Long-term	Local	High - negative	Highly detrimental	Very likely	High - negative
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Local	Low - negative	Moderately detrimental	Unlikely	Low - negative
PROPOSED PREFERRED WTW													
Loss of faunal habitat and diversity.	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	- At all times, ensure that sound environmental management and practices will be implemented during the pre-construction phase; and carried forward to the construction and operational phases; - In the event that any faunal SCC listed in Section 4 or Appendix I are encountered in the focus area and require relocation, the relevant provincial and national	Long-term	Site-specific	Low - negative	Slightly detrimental	Certain	Moderate - negative



Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
Loss of faunal SCC	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	permits should be obtained from the Department of Forestry, Fisheries and the Environment (DFFE); - Human and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment; and - As far as possible use existing roads. New roads are to be designed in such a way as to minimise habitat fragmentation and habitat loss using suitable culvert designs.	Long-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low



Table 21: Construction Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented within each table section.

Pre-mitigation:							Post-mitigation:							
Impact	Duration	Extent	Intensity	Consequence	Probability	Significance	Recommended mitigation	Duration	Extent	Intensity	Consequence	Probability	Significance	
PROPOSED ALTERNATIVE WTW AND ACCESS ROAD								PROPOSED ALTERNATIVE WTW AND ACCESS ROAD						
Loss of faunal habitat and diversity associated with the Mountain Bushveld	Long-term	Site-specific	High - negative	Moderately detrimental	Certain	High - negative		Where possible, consideration to further footprint reduction should be given;	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Certain	Moderate - negative
Loss of faunal habitat and diversity associated with the EDL	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative		Where roads will cross the freshwater habitat, appropriate culverts and road designs must be implemented to ensure that the hydrological flow is not impacted upon and that freshwater faunal species are still able to traverse along this habitat unit;	Long-term	Site-specific	Low - negative	Moderately detrimental	Very likely	Low - negative
Loss of faunal habitat and diversity associated with the Transformed Habitat	Long-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative		The boundaries of the development footprint must be clearly demarcated and no development activities or movement of personnel or vehicles are to go beyond these boundaries;	Long-term	Site-specific	Low - negative	Moderately detrimental	Unlikely	Very low
Loss of faunal SCC associated with the Mountain Bushveld	Long-term	Local	High - negative	Highly detrimental	Very likely	High - negative		Vegetation clearance must be restricted to the proposed footprints only;	Long-term	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative
Loss of faunal SCC associated with the EDL	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Construction within sensitive habitats should be strictly monitored and should be limited to that which is absolutely necessary and authorised;	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Unlikely	Low - negative
Loss of faunal SCC associated with the Transformed Habitat	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	Vegetation clearance must be planned in such a way that not all areas are cleared at once, whilst clearance activities should be undertaken in a phased manner as to limit habitat fragmentation and allow for faunal species to naturally relocate out of an area;	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Unlikely	Low - negative	
							• Construction vehicles are to utilise existing roads as far as possible, no off-roading is to be allowed to prevent unnecessary soil compaction, habitat disturbance and potential species mortalities from vehicle collisions;							
							• As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is a lower risk to nesting avifauna. As part of the clearing activities, it is acknowledged that during the winter months, reptiles and some invertebrates will be slower moving and/or, in a state of torpor. As such, it is recommended that as vegetation clearance/earth works takes place, a team of trained individuals (may also include construction staff that have been suitably upskilled and trained), moves ahead of these activities and searches for and relocates any species unable to move out of the way themselves. Species are to be moved to the open space areas, ideally of the same or similar habitat type;							
							• No hunting or trapping of fauna (Common and SCC) by construction personnel within the footprints or surrounding natural areas is to be allowed;							
							• Stormwater runoff must be managed in adherence to the stormwater management plan;							
							• All construction related waste and material is to be disposed of at a registered waste facility and no waste or construction rubble is to be dumped in the surrounding natural habitats;							



Impact	Pre-mitigation:					Significance	Recommended mitigation	Post-mitigation:					Significance
	Duration	Extent	Intensity	Consequence	Probability			Duration	Extent	Intensity	Consequence	Probability	
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	- Erosion inspections should be undertaken frequently, but especially following heavy rains. Where erosion activities are identified, they are to be rectified timeously to avoid further erosive action and habitat loss; - If any spills occur, they should be immediately cleaned up to avoid soil contamination. In the event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil; - No on-site informal fires are allowed; - Regular dust suppression must be undertaken on bare soils; - External lighting should be kept to a minimum with downward facing lights being used. Yellow or red fluorescent lights are preferable, while the use of bright white or LED lights should be avoided; - Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report; - Construction personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpions. None of these or other species are to be killed or injured by construction personnel. Should any of these species be encountered, these species are to be safely and carefully relocated to the surrounding natural habitat adjacent the development site, should they not move off on their own; - The contact details of a suitably qualified snake handler be made available to construction teams should a venomous snake be encountered that needs removal. Alternatively, it is recommended that a member of the construction team be trained to handle and remove snakes through a recognised snake handling course; - Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habitat for such species outside of the footprint areas; - Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type. Improper revegetation of the focus area can lead to permanent loss of SCC habitat and food resources; and - Faunal SCC will likely require rescue and relocation. Walkdowns and rescue and relocation activities as mentioned in the planning phase mitigation measures must be implemented during the construction phase as and when necessary.	Long-term	Local	Low - negative	Moderately detrimental	Unlikely	Low - negative
PROPOSED PREFERRED WTW						PROPOSED PREFERRED WTW							
Loss of faunal habitat and diversity associated with the Plateau Bushveld	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Certain	Moderate - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Certain	Moderate - negative
Loss of faunal habitat and diversity associated with the Transformed Habitat	Long-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
Loss of faunal SCC associated with the Plateau Bushveld	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
Loss of faunal SCC associated with the Transformed Habitat	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Local	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low



Table 22: Maintenance and Operational Phase impacts on faunal habitat, diversity, and SCC from the proposed WTW activities. Required mitigation measures are presented at the bottom of each table section.

Pre-mitigation:							Post-mitigation:						
Impact	Duration	Extent	Intensity	Consequence	Probability	Significance	Recommended mitigation - Ensure AIP control plan is implemented and that AIPs are suitably controlled and managed; - Stormwater is to be monitored and managed; - Culvert systems installed at points where roads intersect EDL, habitat must be monitored and maintained to ensure they do not become filled with debris/overgrowth and allow movement of fauna; - No further vegetation clearance is allowed, unless part of mandatory maintenance activities along roadways, fences and inside facilities; - No hunting, trapping or setting of snares is to be allowed; - The contact details of a suitably qualified snake handler must be made available should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members (security team) must be undertaken to effect the safe capture and relocation of snakes; - If any spills occur, they should be immediately cleaned up to avoid soil contamination. In the event of a breakdown, maintenance of vehicles must take place with care, and the collection of spillages should be practised preventing the ingress of hydrocarbons into the topsoil; - No on-site open fires are allowed; - External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided. Lights should not be aimed or cast onto the remaining open space areas; - Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habitat for such species outside of the footprint areas; and - Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type. Improper revegetation of the focus area can lead to permanent loss of SCC habitat and food resources.	Duration	Extent	Intensity	Consequence	Probability	Significance
PROPOSED ALTERNATIVE WTW AND ACCESS ROAD								PROPOSED ALTERNATIVE WTW AND ACCESS ROAD					
Loss of faunal habitat and diversity.	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative		Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative
Loss of faunal SCC	Long-term	Site-specific	High - negative	Moderately detrimental	Very likely	Moderate - negative		Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
PROPOSED PREFERRED WTW								PROPOSED PREFERRED WTW					
Loss of faunal habitat and diversity.	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low
Loss of faunal SCC	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low	



Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Degradation of faunal habitat beyond the footprint due to uncontrolled edge effects	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative		Long-term	Site-specific	Low - negative	Slightly detrimental	Unlikely	Very low



8.5 Faunal Impact Discussion

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected by the proposed development. The below sections break down the various impacts anticipated for the different aspects of the proposed project.

8.5.1 Loss of Faunal Habitat and Diversity

The proposed development activities will result in the clearance of vegetation, which will lead to a loss of faunal habitat and diversity within the footprints and displacing species within the direct footprint into surrounding areas.

The perceived impact significance is summarised below for the different development phases of the project showing the impacts on faunal habitat and diversity within the Alternative WTW site and the Preferred WTW site.

Table 23: Summary of impact significance on faunal habitat and diversity.

PROPOSED ALTERNATIVE WTW AND ACCESS ROAD		
	Without Mitigation	With Mitigation
PRE-CONSTRUCTION PHASE		
Loss of faunal habitat and diversity.	High - negative	Moderate - negative
Uncontrolled edge effects	Low - negative	Low - negative
CONSTRUCTION PHASE		
Mountain Bushveld	High - negative	Moderate - negative
EDL	Moderate - negative	Low - negative
Transformed Habitat	Low - negative	Very low
Uncontrolled edge effects	Low - negative	Low - negative
OPERATIONAL AND MAINTENANCE PHASE		
Loss of faunal habitat and diversity.	Moderate - negative	Low - negative
Uncontrolled edge effects	Low - negative	Very low
PROPOSED PREFERRED WTW		
PRE-CONSTRUCTION PHASE		
Loss of faunal habitat and diversity.	Moderate - negative	Moderate - negative
Uncontrolled edge effects	Low - negative	Very low
CONSTRUCTION PHASE		
Plateau Bushveld	Moderate - negative	Moderate - negative
Transformed Habitat	Low - negative	Very low
Uncontrolled edge effects	Low - negative	Very low
OPERATIONAL AND MAINTENANCE PHASE		
Loss of faunal habitat and diversity.	Low - negative	Very low
Uncontrolled edge effects	Low - negative	Very low



8.5.2 Impact on Important Faunal SCC

Selection of the Alternative WTW site may result in high impacts on SCC (pre mitigation) as the Mountain Bushveld Habitat in this area may support several faunal SCC from different classes, but these impacts can be reduced to moderate levels after mitigation measures are applied. Building within the Preferred WTW area will result in reduced impacts as this area consists of the less sensitive Plateau Bushveld Habitat which has been subject to historic impacts and are less important from a faunal SCC perspective.

Sagittarius serpentarius (Marabou Stork, NT) and *Hadogenes newlandsi* (Newlands Rock Scorpion, P - TOPS) were the only two confirmed SCC during the site visit. The Marabou Storks was seen foraging in the Transformed Habitat which consisted mostly of a waste disposal facility while the Newlands Rock Scorpion was found in the rocky parts of the Mountain Bushveld Habitat. The focus area has medium POC for an additional six mammal, four avifaunal, two reptile and one invertebrate SCC and a high POC for one avifaunal SCC (Refer to Section 4 for more details).

The perceived impact significance is summarised below for the different development phases of the project showing the impacts on faunal habitat and diversity within the Alternative WTW site and the Preferred WTW site.

Table 24: Summary of impact significance on faunal SCC.

PROPOSED ALTERNATIVE WTW AND ACCESS ROAD		
	Without Mitigation	With Mitigation
PRE-CONSTRUCTION PHASE		
Loss of faunal SCC	High - negative	Moderate - negative
CONSTRUCTION PHASE		
Mountain Bushveld	High - negative	Moderate - negative
EDL	Low - negative	Low - negative
Transformed Habitat	Low - negative	Low - negative
OPERATIONAL AND MAINTENANCE PHASE		
Loss of faunal SCC	Moderate - negative	Low - negative
PROPOSED PREFERRED WTW		
PRE-CONSTRUCTION PHASE		
Loss of faunal SCC	Low - negative	Very low
CONSTRUCTION PHASE		
Plateau Bushveld	Low - negative	Very low
Transformed Habitat	Very low	Very low
OPERATIONAL AND MAINTENANCE PHASE		
Loss of faunal SCC	Low - negative	Very low



8.5.3 Probable Residual Impacts²⁷

Even with extensive mitigation, residual impacts on the receiving faunal ecological environment are likely. The following points highlight the key residual impacts that have been identified. It should be noted, however, that some of these impacts are also a result of the already occurring waste disposal facility adjacent to the focus area.

- Continued degradation of natural habitat adjacent to the proposed development footprint as a result of edge effects;
- Altered faunal species diversity;
- Potential loss of faunal abundance in the local area;
- Edge effects such as further habitat fragmentation and AIP proliferation;
- Effects of this development will be long term as this project is ongoing; and
- Loss of faunal SCC and habitat in the focus area.

8.5.4 Possible Cumulative Impacts²⁸

The focus area is situated in a region which has been impacted through various anthropogenic activities such as urban expansion, farming, the waste disposal facility adjacent to the focus area etc. All of these activities have led to the reduction of natural areas within the region impacting on faunal communities, reducing diversity and abundance. Faunal species found within these natural areas are already under pressure and further habitat reduction will lead to faunal species being further displaced into the adjacent habitats. This may lead to increased competition for space and food resources in an already degraded environment which could lead to further decline in numbers in the region. Edge effects and AIP proliferation are more concerning over the long-term. AIP proliferation will ultimately lead to loss of viable habitat in the surrounding areas, displacing faunal species further as indigenous floral species (faunal habitat and food resources) are displaced and lost.

²⁷ **Probable Residual Impacts:** Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology, and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.

²⁸ **Possible Cumulative Impacts:** Past, current, and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.



9 CONCLUSION

The assessment of floral and faunal communities within the focus area determined that the Mountain Bushveld and associated EDL is of higher importance and sensitivity than the Plateau Bushveld and Transformed Habitat. The Mountain Bushveld is more intact and less degraded than the Plateau Bushveld, and it provides more suitable habitat for floral and faunal SCCs and is associated with better CBA functioning. The proposed Alternative WTW and associated access road will impact on the 3 ha of Mountain Bushveld (high floral SEI and high faunal SEI) and will have higher significance impacts on floral and faunal communities than the proposed Preferred WTW, that will impact on 0.9 ha of Plateau Bushveld (medium floral SEI and low faunal SEI).

It is the recommendation of the specialists that the proposed Preferred WTW be pursued and that the proposed Alternative WTW and associated access road be avoided. 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 focus area will be made in support of the principle of sustainable development.



10 REFERENCES

- BirdLife South Africa. Important Bird Areas 2015 [vector geospatial dataset] 2015. Available from the Biodiversity GIS website. Mucina, L. and Rutherford, M.C. (2006).
- Bromilow, C. 2018. Problem plants and alien weeds of southern Africa. Fourth end. Pretoria: Briza Publications.
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA).
- Constitution of the Republic of South Africa, 1996.
- Desmet, P.G., Holness, S., Skowno, A. and Egan, V.T. 2013. Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment and Tourism (LEDET) by ECOSOL GIS.
- Endangered Wildlife Trust (Conservation Breeding Specialist Group). 2004. Red Data Book of the Mammals of South Africa: A conservation Assessment.
- Engelbrecht, I. 2023. Field Guide to Scorpions of South Africa. Struik Nature, Cape Town, RSA.
- Government of South Africa. 2022. South African Red List of Terrestrial Ecosystems: assessment details and ecosystem descriptions. Government Notice 2747, Gazette 4526. Technical Report #7664, SANBI Pretoria, South Africa.
- Gutteridge, L., Liebenberg, L. 2021. Mammals of Southern Africa and their tracks & signs. Revised and updated 2nd edition. Jacana Media, Pretoria, RSA.
- Henning, G.A & Henning, S.F. 1989*. South African Red Data Book of Butterflies. South African National Scientific Programmes Report No. 158.
- Hui, C., and Richardson, D.M., 2017. Invasion dynamics. Oxford University Press.
- Leeming, J. 2003. Scorpions of Southern Africa. Struik Publishers (Pty) Ltd, Cape Town, RSA.
- Leroy, A. & Leroy, J. Second Edition. 2003. Spiders of Southern Africa. Struik Publishers (Pty) Ltd, Cape Town, RSA.
- LEDET LEDET (Limpopo Department of Economic Development & Tourism). 2016. Waterberg District Bioregional Plan. Compiled by ECOSOL GIS for Limpopo Department of Economic Development, Environment and Tourism (LEDET), Polokwane. January 2016
- LEDET. 2018. 2018 Limpopo Province Map of Critical Biodiversity Areas and Ecological Support Areas [Vector] 2018. Available from the Biodiversity GIS website.
- Marais, J. 2004. A complete guide to the Snakes of Southern Africa. Struik Publishers (Pty) Ltd, Cape Town, RSA.
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015a. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.
- Marnewick MD, Retief EF, Wright DR, Theron NT. 2015b. South Africa's Important Bird and Biodiversity Areas Status Report 2015. Johannesburg: BirdLife South Africa.
- Mucina, L. and Rutherford, M.C., 2006. The vegetation of South Africa, Lesotho, and Swaziland. *Strelitzia* 19., (South African National Biodiversity Institute: Pretoria, South Africa). *Memoirs of the Botanical Survey of South Africa*. National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).
- National Web Based Environmental Screening Tool (2023). Accessible online: <https://screening.environment.gov.za/screeningtool/#/pages/welcome>.
- Pyšek, P., Richardson, D.M., Rejmánek, M., Webster, G.L., Williamson, M. and Kirschner, J., 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. *Taxon*, 53(1), pp. 131-143.
- Rejmánek, M., Richardson, D.M. and Pyšek, P., 2005. Plant invasions and invasibility of plant communities. *Vegetation ecology*, 20, pp.332-355.
- Richardson DM, Pyšek P, Carlton JT. 2011. A compendium of essential concepts and terminology in invasion ecology. In: Richardson DM (ed) *Fifty years of invasion ecology. The legacy of Charles Elton*. Wiley-Blackwell, Oxford, pp 409–420.
- SABAP2, 2015. The South Africa Bird Atlas Focus database
- SACAD: Department of Environmental Affairs. 2023. South Africa Conservation Areas Database (SACAD_OR_2023_Q1).



- Online available:
[<http://egis.environment.gov.za>]
- SANBI. 2016. Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.
- SANBI. 2018. 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland [Vector] 2018. Available from the Biodiversity GIS website.
- SANBI. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. <http://hdl.handle.net/20.500.12143/6362>
- SANBI. 2021. Ecosystem Guidelines for the Savanna Biome. South African National Biodiversity Institute, an entity of the Department of Forestry, Fisheries and the Environment, Pretoria. <http://hdl.handle.net/20.500.12143/7500>.
- SANBI. 2022a. The 2022 Red List of Ecosystems (RLE) for terrestrial realm for South Africa - Original extent [Vector] 2021. Available from the Biodiversity GIS website
- SANBI. 2022b. The 2022 Red List of Ecosystems (RLE) for terrestrial realm for South Africa - remnants [Vector] 2021. Available from the Biodiversity GIS website,
- SAPAD: Department of Environmental Affairs. 2023. South Africa Protected Areas Database (SAPAD_OR_2023_Q1). Online available: [<http://egis.environment.gov.za>].
- SAS 23-1135. 2023. Freshwater Ecosystem Compliance Report as part of the Environmental Impact Assessment for the proposed Mokopane Water Treatment Works in the Limpopo Province. Prepared for: Zutari. September 2023.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.
- <http://hdl.handle.net/20.500.12143/6370>
- van Wilgen BW, Wilson JR (eds). 2018. The status of biological invasions and their management in South Africa in 2017. S Afr Nat Biodiv Inst, Cape Town and DST-NRF Cent Excel Invas Biol, Stellenbosch.
- van Wilgen, B.W., 2020. A brief, selective history of researchers and research initiatives related to biological invasions in South Africa. In Biological Invasions in South Africa (pp. 33-64). Springer, Cham.
- Vicente, J.R., Pereira, H.M., Randin, C.F., Goncalves, J., Lomba, A., Alves, P., Metzger, J., Cezar, M., Guisan, A. and Honrado, J., 2014. Environment and dispersal paths override life strategies and residence time in determining regional patterns of invasion by alien plants. Perspectives in Plant Ecology, Evolution and Systematics, 16(1), pp.1-10.
- Wilson, J.R.U., Gaertner, M., Richardson, D.M. and Van Wilgen, B.W., 2017. Contributions to the national status report on biological invasions in South Africa. Bothalia 47 (2): a2207.



APPENDIX A: Indemnity and Terms of Use of This Report

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

Although STS (Pty) Ltd. exercises due care and diligence in rendering services and preparing documents, STS (Pty) Ltd. accepts no liability and the client, by receiving this document, indemnifies STS (Pty) Ltd. and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from, or in connection with, services rendered, directly or indirectly by STS (Pty) Ltd. and by the use of the information contained in this document.

This report must not be altered or added to or used for any other purpose other than that for which it was produced without the prior written consent of the author(s). 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 EA process needs to be followed and EA obtained. 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 anticipated impacts.

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 unauthorized 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 minimize 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 Environment, Forestry and Fisheries (DEFF) (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 utilization."

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

Section 12:

Declaration of trees as protected

- 1) The Minister may declare-
 - a. particular tree,
 - b. a particular group of trees,
 - c. a particular woodland; or
 - d. trees belonging to a particular species, to be a protected tree, group of trees, woodland, or species.
- 2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.



- 3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

Section 15(1):

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

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

NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED²⁹ (NEMPAA)

The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; for the continued existence, governance and functions of South African National Parks; and for matters in connection thereof.

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

The objectives of this Act are:

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

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

²⁹ Amendments to the NEMPAA:

- National Environmental Management: Protected Areas Amendment Act 31 of 2004 – Gazette No. 27274, No. 131. Commencement date: 1 November 2005 [Proc. No. R. 58, Gazette No. 28123]
- National Environment Laws Amendment Act 14 of 2009 – Gazette No. 32267, No. 617. Commencement date: 18 September 2009 [Proc. 65, Gazette No. 32580]
- National Environmental Management: Protected Areas Amendment Act 15 of 2009 – Gazette No. 32660, No. 748. Commencement date: 23 October 2009 – except for sections 1 and 8 [Proc. No. 69, Gazette No. 32660]
- Schedule 2 amended by Government Notice R236 in Government Gazette 36295 dated 27 March 2013. Commencement date: 1 April 2013 of sections 1 and 8 (relating to Schedule 2) of the National Environmental Management Protected Areas Amendment Act, 15 of 2009 [Proc. No. 7, Gazette No. 36296]
- National Environmental Management: Protected Areas Amendment Act 21 of 2014 - Government Notice 445 in Government Gazette 37710 dated 2 June 2014. Commencement date: 2 June 2014.
- Schedule 2 amendment by General Notice 2 of 2016 in Government Gazette 39728 dated 25 February 2016. Commencement date: 25 February 2016.



APPENDIX C: Method of Assessment (Floral and Fauna)

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

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

FLORA

Vegetation Surveys

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

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed pre-construction walkdown efforts.

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

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

Several survey methods, known as rapid biological assessments (Larsen, 2016)³⁰, can be employed. Example of rapid biological assessments include plot-based assessments or transect-based assessments. SANBI (2020) recommends the use of a transect-based approach, namely timed-meander searches (TMS; Goff et al., 1982³¹). The vegetation surveys presented below are a modified version of the TMS methods (hereafter referred to as modified-meander searches (MMS)). The TMS and MMS are subjective sampling methods which employs techniques where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC.

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

- Time, access, and safety constraints are often unpredictable and cannot be planned for prior to a site assessment, especially within remote areas and areas where local communities may

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

³¹ Goff, F.G., Dawson, G.A. and Rochow, J.J., 1982. Site examination for threatened and endangered plant species. *Environmental Management*, 6(4), pp.307-316.



not provide consent to specialist to survey their lands. As such, a timed approach may result in disproportionate efforts in some pre-defined habitats.

- Vegetation surveys are conducted at the same time as the SCC assessments which limits the potential for timed assessments as SCC often occur either sporadically, or are difficult to detect and hence, longer surveys in certain areas are necessary (skewing the timed approach). This is especially true for the pre-defined broad habitats within more sensitive areas such as the Sekhukhune Centre of Plant Endemism where desktop databases may not be a true reflection of on-site habitat extent and heterogeneity. Micro habitats where SCC are often found, are often difficult to detect on digital satellite imagery. As such, timing the surveys according to unverified field data will increase the risk of overlooking importance SCC data or habitat integrity features.
- Subjective decisions need to be made on-site that would otherwise interfere with a times-meander approach.

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

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

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

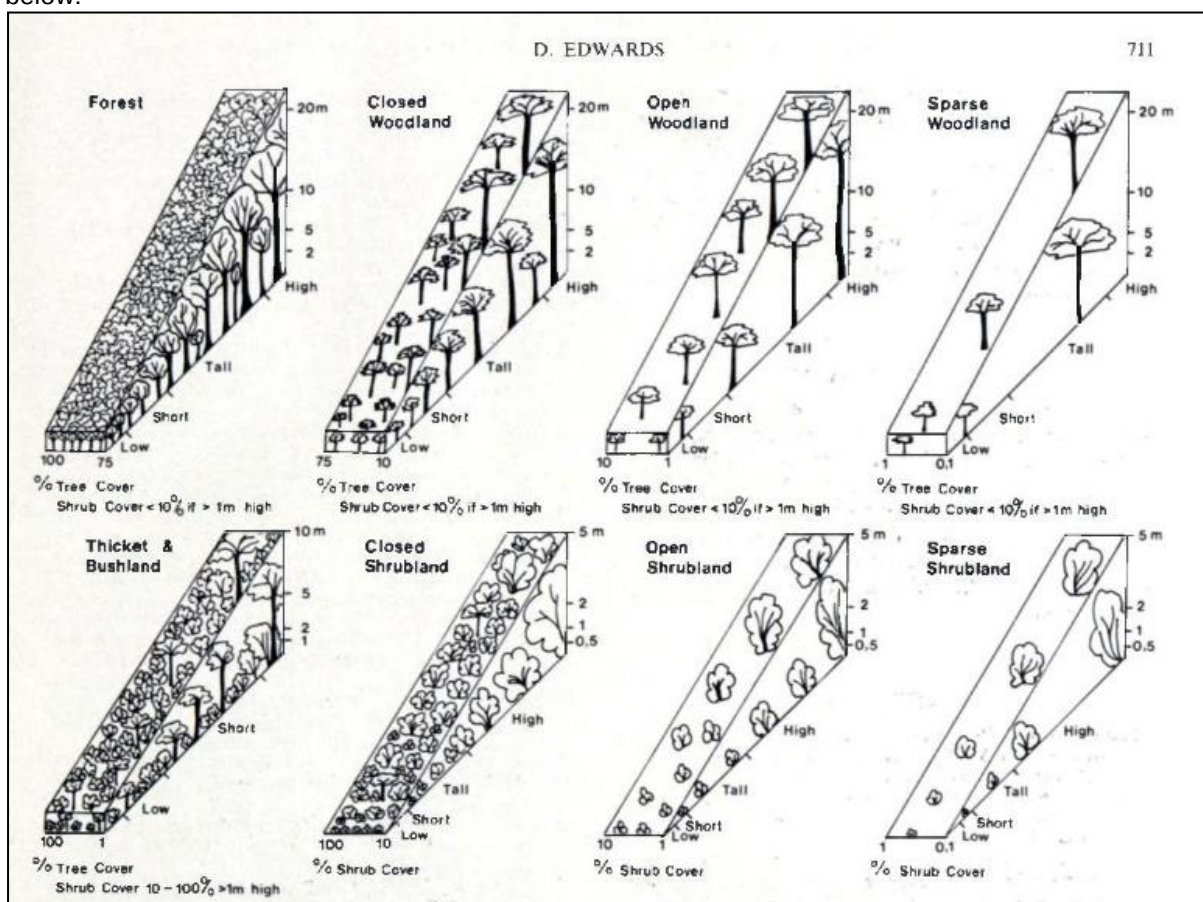


Figure C1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.



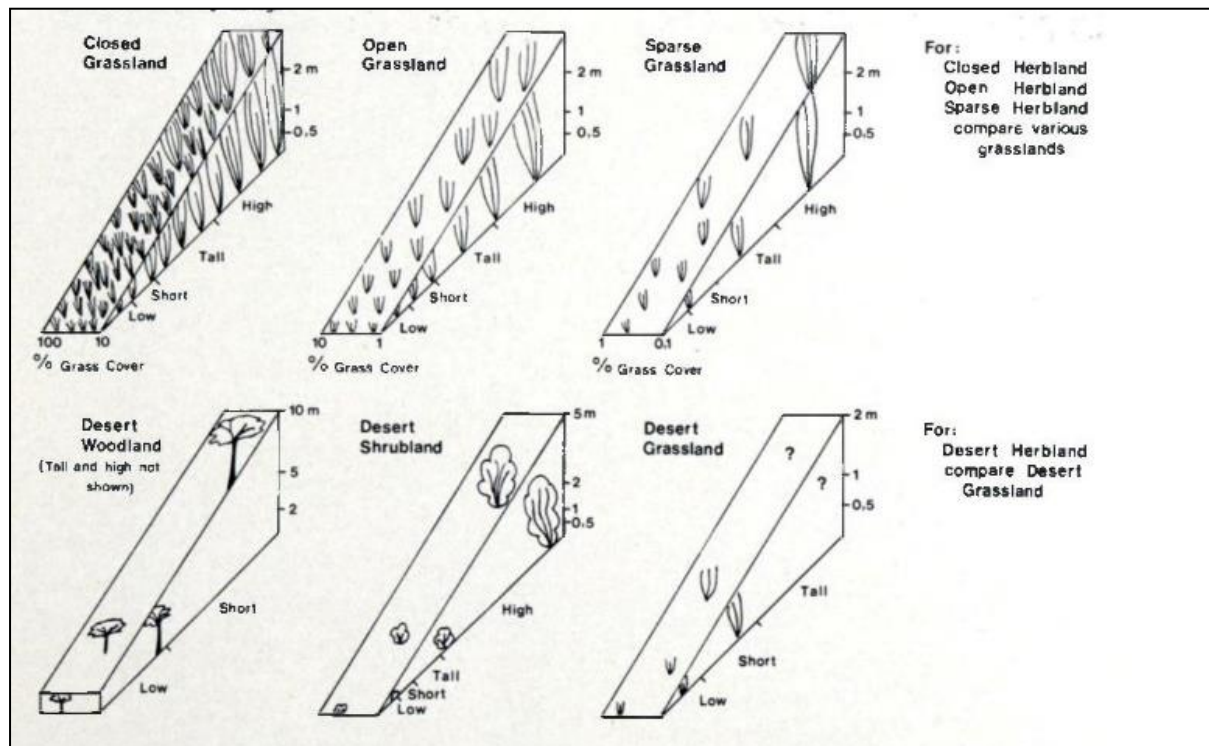


Figure C1 (continued): Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

Floral Species of Conservational Concern Assessment

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

The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “low,” “medium,” “high” and “very high” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below³²:

- **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.

³² More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

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



For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.

- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

BRAHMS Online Website

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

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the BODATSA, which contains records from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).
- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (<http://redlist.sanbi.org/>).
- 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 National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007 and again in GN 627 in Government Gazette 43386 of 2020) were taken into consideration.

List of Protected Tree Species (Government Gazette No. 41887, notice 536 of 2018) under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA)

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

Provincially Protected Species: Specially Protected and Protected Species

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



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

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

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

Low POC	Medium POC	High POC	Confirmed
---------	------------	----------	-----------

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

Consideration and application of the precautionary approach

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

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

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

FAUNA

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities near the study area may have an impact on faunal behaviour and in turn the rate of observations.

Mammals

Mammal species were recorded during the field assessment with the use of visual identification by actively searching/listening for individuals or the presence of spoor, calls and dung. Specific attention was given to mammal SCC listed on a regional and national level, as well as those identified by the Screening Tool. Desktop analysis of the study area was used to determine areas of higher value to mammal species and focus were placed within these areas during the field survey. Transects were walked throughout the study area to cover maximum ground within the given timeframe.

Avifauna

The Southern African Bird Atlas Project 2 database (<http://sabap2.adu.org.za/>) was compared with the recent field survey of avifaunal species identified in the study area. Field surveys were undertaken utilising direct observation and bird call identification techniques in order to accurately identify avifaunal species. Specific attention was given to avifaunal SCC listed on a regional and national level, as well as those identified by the Screening Tool.



Reptiles

Reptiles were identified during the field survey. Suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected, and all reptiles encountered were identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the study area. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Amphibians

Identifying amphibian species is done by the use of direct visual identification along with call identification technique. Amphibian species flourish in and around wetland, riparian, and moist grassland areas. It is unlikely that all amphibian species will have been recorded during the site assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the study area as well as the surrounding area. Specific attention was given to amphibian SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Invertebrates

Whilst conducting transects through the study area, all insect species visually observed were identified, and where possible photographs taken. Sweep netting was undertaken in the more open areas in order to further capture, photograph and identify invertebrate species which may have otherwise gone unnoticed. Pitfall traps were also employed at selected locations (where soil substrates were suitable) to increase observation rates, notably for ground dwelling invertebrate species which are nocturnal.

It must be noted however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the study area at the time of the survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC scorpions within the study area.

Faunal Species of Conservation Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution; Habitat availability; Food availability; and Habitat disturbance.

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

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

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



APPENDIX D: Site Ecological Importance (SEI)

SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site³³) and its resilience to impacts (receptor resilience [RR]) as follows:

$$SEI = BI + RR$$

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

Table D1: Matrix of CI and FI to determine BI.

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

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

Table D2: Guidelines for interpreting SEI in the context of the proposed development activities.

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

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

$$BI = CI + FI$$

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

Table D3: Matrix of CI and FI to determine BI.

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

³³ Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.



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

Conservation importance is defined here as:

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

These criteria are defined as follows:

- IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status³⁴ should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) to appropriately apply these for the evaluation of SEI. This criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species. Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat. Range-restricted species – the presence of terrestrial flora, vertebrate and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km² or less.
- Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons. y Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e., proportion) and how threatened (CR, EN, VU) the vegetation types are.
- Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint, but best practice recommendation is that it should be determined for all habitats within the entire Project Area of Influence (PAOI)³⁵.

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table D4). Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming

³⁴ <http://speciesstatus.sanbi.org/>. For mammals: <https://www.ewt.org.za/wp-content/uploads/2020/04/2020-updated-2016-Red-List-of-Mammals-of-South-Africa-Lesotho-Swaziland-Summary-Listings.xlsx>; for plants: <http://redlist.sanbi.org>.

³⁵ Because CI needs to be assigned to a receptor (e.g., the vegetation/fauna community or habitat type), it is customary to use the flora community delineation developed for a PAOI by a botanical specialist. However, such delineation is often too fine scaled to define fauna-specific habitats, which are generally more structural than phytosociological in nature. Where this is the case, the fauna specialist should merge two or more relevant floral communities to correlate with the specific fauna habitat type that is characteristic of a particular taxon assemblage. In certain cases, the faunal specialist will have to demarcate habitats that have not been classified by the botanical specialist; a pertinent example is the presence of cliffs, which are frequently important breeding habitat for some bird SCC.



to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

Table D4: CI criteria.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare³⁶ or Critically Rare³⁷ species that have a global EOO of < 10 km². - Any area of natural habitat³⁸ of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent³⁹) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).
High	- Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. - Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. - Presence of Rare species. - Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	- Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. - Any area of natural habitat of threatened ecosystem type with status of VU. - Presence of range-restricted species. - > 50% of receptor contains natural habitat with potential to support SCC.
Low	- No confirmed or highly likely populations of SCC. - No confirmed or highly likely populations of range-restricted species. - < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	- No confirmed and highly unlikely populations of SCC. - No confirmed and highly unlikely populations of range-restricted species. - No natural habitat remaining.

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

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

These criteria can be defined as:

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

³⁶ For butterflies, as per Armstrong *et al.* (2013).

³⁷ For plants, as per Raimondo *et al.* (2009).

³⁸ This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g., Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.

³⁹ This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: <http://bgis.sanbi.org/Projects/Detail/49>).



- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat. Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.
- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table D5) and will require justification by the specialist.

Table D5: FI criteria.

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

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

RR is defined here as:

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



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

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

SEI should be described in the above manner for each impact receptor within the area of influence and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities (Table D1) must be provided by the specialist.

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

Table D6: Resilience criteria.

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



APPENDIX E: Impact Assessment Methodology (as provided by the proponent)

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

This section briefly outlines the proposed method for assessing the significance of the potential environmental and socio-economic impacts identified during the construction, operational and decommissioning phase.

For each predicted impact, criteria are applied to establish the significance of the impact based on likelihood (probability) and consequence, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place.

The criteria that contribute to the consequence of the impact are **INTENSITY** (the degree to which pre-development conditions are changed – Table E1); the **DURATION** (length of time that the impact will continue – Table E2); and the **EXTENT** (spatial scale – Table E2) of the impact.

Table E1: Impact Intensity Scores.

Intensity	
Very high - negative	-4
High - negative	-3
Moderate - negative	-2
Low - negative	-1
Negligible	0
Low - positive	1
Moderate - positive	2
High - positive	3
Very high - positive	4

Table E2: Impact Duration and Extent Scores.

Duration		Extent	
Short-term	0	Site-specific	0
Medium-term	1	Local	1
Long-term	2	Regional	2

The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration, and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the ratings provided.

The consequence is then established using the formula:

$$\text{Consequence} = \text{intensity} \times (\text{duration} + \text{extent})$$

Depending on the numerical result of this calculation, the impact's consequence would be classified as one of the following (Table E3):

- Extremely, highly; moderately; slightly detrimental;
- Negligible; or
- Slightly, moderately, highly, or extremely beneficial.



Table E3: Impact Consequence Scores.

Consequence = (Duration + Extent) x Intensity	
Extremely detrimental	-8
Highly detrimental	-7
Highly detrimental	-6
Moderately detrimental	-5
Moderately detrimental	-4
Slightly detrimental	-3
Slightly detrimental	-2
Negligible	-1
Negligible	0
Negligible	1
Slightly beneficial	2
Slightly beneficial	3
Moderately beneficial	4
Moderately beneficial	5
Highly beneficial	6
Highly beneficial	7
Extremely beneficial	8

To determine the significance of an impact, the probability (or likelihood) of that impact occurring is also taken into account (Table E3). In assigning probability, the specialist must take into account the likelihood of occurrence and the degree of uncertainty and detectability of the impact.

Table E4: Impact Probability Scores.

Probability	
Very unlikely	0
Unlikely	1
Fairly likely	2
Very likely	3
Certain	4

Significance is calculated according to the following formula:

$$\text{Significance} = \text{consequence} \times \text{probability}$$

Depending on the numerical result of this calculation, the impact would fall into a significance category of one of the following (Table E5):

- Very Low;
- Low (negative or positive);
- Moderate (negative or positive);
- High (negative or positive); or
- Very High (negative or positive).

Table E5: Significance Scores.

Significance	
Very high - negative	-4
High - negative	-3
Moderate - negative	-2
Low - negative	-1
Very low	0
Low - positive	1
Moderate - positive	2
High - positive	3
Very high - positive	4



METHODOLOGY FOR IDENTIFICATION OF MITIGATION MEASURES

The mitigation hierarchy (Figure E1) illustrates the actions which can be undertaken to respond to negative impacts and the preference given to mitigation measures. The topmost measures are preferred, and the preference for mitigation measures decreases the further one moves down the hierarchy.

For each impact assessed, mitigation measures will be proposed to reduce and/ or avoid negative impacts and enhance positive impacts. The mitigation measures identified by the specialists will be reviewed for feasibility with the proponent and then incorporated into the Environmental Management Programme (EMPr) during the EIA Phase to ensure that they are implemented throughout the lifecycle of the proposed project. The EMPr would become a legally binding document should this project receive an EA.

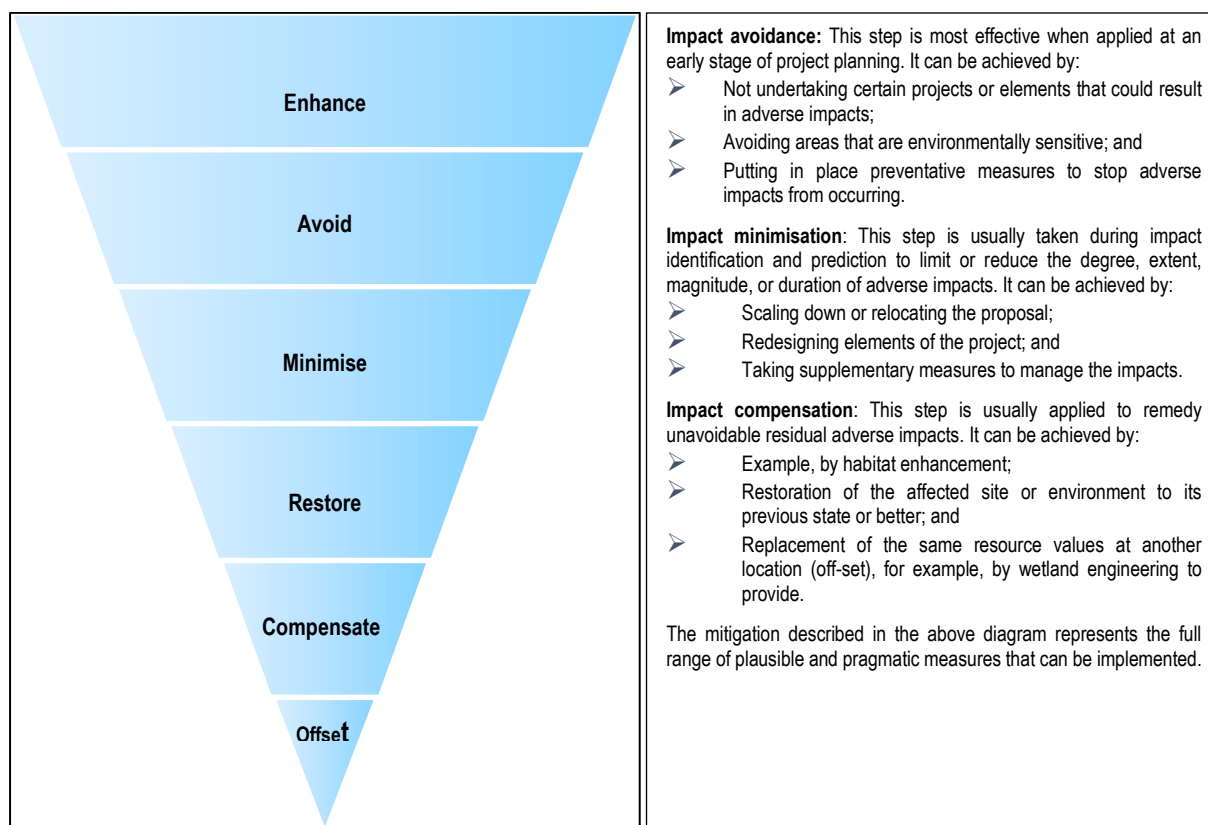


Figure E1: Mitigation Hierarchy



		Pre-mitigation															
Probability	Certain			1.													
	Very likely																
	Fairly likely																
	Unlikely																
	Very unlikely																
		Extreme	High	Moderate		Slight		Negligible		Slight		Moderate		High		Extreme	
		Consequence															
		Beneficial															

		Post-mitigation																
Probability	Certain																	
	Very likely						1.											
	Fairly likely																	
	Unlikely																	
	Very unlikely																	
		Extreme	High	Moderate		Slight		Negligible				Slight		Moderate		High		Extreme
		Consequence																
		Beneficial																

Mitigation measure development

According to the Department of Environmental Affairs (DEA) *et al.*, (2013)⁴⁰ “Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine, and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding which is attenuated by wetlands”.

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

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and fresh water;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;

⁴⁰ Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria. 100 pages.



- Regulating services are the benefits obtained from an ecosystem's control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing, and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA of 2005)⁴¹, which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.*, (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world. The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including⁴²:

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

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

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

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

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

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

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology, and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no

⁴¹ Reid, W.V. and Raudsepp-Hearne, C., 2005. Millennium ecosystem assessment.

⁴² Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.



project” option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;

- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
 - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
 - **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the focus area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
 - **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community or community suitable for supporting the intended post closure land use; and
 - **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.
- **Offset impact:** refers to compensating for residual or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.⁴³

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

- Mitigation and performance improvement measures and actions that address the risks and impacts⁴⁴ are identified and described in as much detail as possible;
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation where possible; and

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

⁴³ Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.

⁴⁴ Mitigation measures should address both positive and negative impacts



with estimates of the resources (including human resource and training requirements) and responsibilities for implementation wherever possible.

Recommendations

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



APPENDIX F: Vegetation Type(s)

Polokwane Plateau Bushveld (SVcb 23)



Figure F1: SVcb 23 Polokwane Plateau Bushveld: very open savanna with low *Acacia tortillis* trees at an altitude of 250 m on Pilgrimshoop, north of Polokwane. Image Source: Mucina & Rutherford (2006) Figure 9.31, page 477.

Biogeographically Important Taxa (Central Bushveld endemics) Graminoid: *Mosdenia leptostachys*. Herb: *Oxygonum dregeanum* subsp. *canescens* var. *dissectum*. Geophytic Herb: *Ledebouria crispa*.

Remarks: Woody plants have increased in parts of the unit in the past few decades.



Table F1: Dominant & typical floristic species of the Polokwane Plateau Bushveld (Mucina & Rutherford, 2012).

Group	Species
Woody Species	
Small trees	<i>Acacia</i> [now <i>Senegalia</i>] <i>caffra</i> (d), <i>A.</i> [now <i>Vachellia</i>] <i>permixta</i> (d), <i>A.</i> [now <i>Vachellia</i>] <i>rehmanniana</i> (d), <i>A.</i> [now <i>Vachellia</i>] <i>karroo</i> , <i>A.</i> [now <i>Vachellia</i>] <i>tortilis</i> subsp. <i>heteracantha</i> , <i>Combretum molle</i> , <i>Ormocarpum kirkii</i> , <i>Ziziphus mucronata</i> .
Succulent Tree	<i>Aloe marlothii</i> subsp. <i>marlothii</i>
Tall shrubs	<i>Acacia</i> [now <i>Vachellia</i>] <i>hebeclada</i> subsp. <i>hebeclada</i> (d), <i>Gymnosporia senegalensis</i> (d), <i>Combretum hereroense</i> , <i>Diospyros lycioides</i> subsp. <i>sericea</i> , <i>Euclea crispa</i> subsp. <i>crispa</i> , <i>Heteromorpha arborescens</i> var. <i>abyssinica</i> , <i>Lippia javanica</i> , <i>Rhus</i> [now <i>Searsia</i>] <i>pyroides</i> var. <i>pyroides</i> , <i>Tephrosia rhodesica</i> , <i>Triumfetta pilosa</i> var. <i>tomentosa</i> .
Low shrubs	<i>Anthospermum rigidum</i> subsp. <i>rigidum</i> , <i>Gymnosporia glaucophylla</i> , <i>Hirpicium bechuanense</i> , <i>Lantana rugosa</i> , <i>Senecio burchellii</i> , <i>Sida rhombifolia</i> , <i>Solanum panduriforme</i> .
Succulent Shrub	<i>Aloe cryptopoda</i> .
Woody Climber	<i>Asparagus africanus</i> .
Graminoid Species	
Graminoids	<i>Aristida diffusa</i> (d), <i>Brachiaria nigropedata</i> (d), <i>Digitaria eriantha</i> subsp. <i>eriantha</i> (d), <i>Eragrostis curvula</i> (d), <i>Themeda triandra</i> (d), <i>Aristida congesta</i> , <i>Cymbopogon caesius</i> , <i>Cynodon dactylon</i> , <i>Digitaria diagonalis</i> , <i>Diheteropogon amplexans</i> , <i>Elionurus muticus</i> , <i>Eragrostis gummiflua</i> , <i>E. racemosa</i> , <i>E. superba</i> , <i>Eustachys paspaloides</i> , <i>Panicum maximum</i> , <i>Pogonarthria squarrosa</i> , <i>Sporobolus africanus</i> .
Succulent Species	
Succulent shrubs	<i>Euphorbia bergii</i> , <i>Kalanchoe rotundifolia</i> , <i>Lycium cinereum</i> .
Herbaceous species	
Herbs	<i>Felicia mossamedensis</i> , <i>Hermbsaetdia odorata</i> , <i>Pollichia campestris</i> .
Herbaceous climber	<i>Momordica balsamina</i> , <i>Rubia petiolaris</i> .
Geophytic Herb	<i>Eulophia petersii</i> , <i>Hypoxis hemerocallidea</i> .
Succulent Herb	<i>Aloe greatheadii</i> var. <i>greatheadii</i> .

*(d) – Dominant species for the vegetation type



APPENDIX G: Species List

Observed Floral Species

The below tables include the floral species recorded during the site assessment.

Table G1: Dominant floral species encountered in the focus area. Alien species are indicated with an asterisk (*). Floral SCCs are emboldened.

Scientific name	Mountain Bushveld	Plateau Bushveld	Transformed
WOODY			
* <i>Lantana camara</i>	X		X
<i>Asparagus buchananii</i>	X	X	
<i>Athrixia elata</i>		X	
<i>Boscia albitrunca</i> (NFA)	X	X	
<i>Boscia foetida</i>		X	
<i>Brachylaena rotundata</i>	X		
<i>Burkea africana</i>		X	
<i>Carissa bispinosa</i>	X	X	
<i>Combretum apiculatum</i>	X	X	
<i>Combretum molle</i>	X		
<i>Combretum zeyheri</i>	X		
<i>Commiphora mollis</i>	X		
<i>Commiphora</i> sp.		X	
<i>Croton gratissimus</i>	X		
<i>Cryptolepis oblongifolia</i>	X		
<i>Dichrostachys cinerea</i>	X	X	
<i>Dombeya rotundifolia</i>	X	X	
<i>Elaeodendron transvaalense</i> (NFA)		X	
<i>Elephantorrhiza</i> cf. <i>burkei</i>	X		
<i>Euclea crispa</i>	X	X	
<i>Euclea natalensis</i>	X		
<i>Euclea undulata</i>	X	X	
<i>Faurea saligna</i>	X		
<i>Ficus glumosa</i>	X		
<i>Grewia bicolor</i>	X		
<i>Grewia flavescens</i>	X		
<i>Grewia vernicosa</i>		X	
<i>Gymnosporia</i> sp.		X	
<i>Lannea discolor</i>	X		
<i>Mundulea sericea</i> subsp. <i>sericea</i>	X		
<i>Ormocarpum trichocarpum</i>	X		
<i>Ozoroa sphaerocarpa</i>	X		
<i>Pappea capensis</i>	X	X	
<i>Peltophorum africanum</i>	X	X	
<i>Petalidium oblongifolium</i>		X	
<i>Phyllogeiton zeyheri</i> (NFA)	X	X	
<i>Psiadia punctulata</i>	X	X	
<i>Schotia brachypetala</i>	X	X	
<i>Sclerocarya birrea</i> subsp. <i>caffra</i> (NFA)	X		
<i>Scolopia zeyheri</i>	X		
<i>Searsia leptodictya</i>		X	



Scientific name	Mountain Bushveld	Plateau Bushveld	Transformed
<i>Senegalia burkei</i>	X		
<i>Senegalia caffra</i>	X		
<i>Senegalia mellifera</i>	X		
<i>Strychnos madagascariensis</i>	X		
<i>Strychnos pungens</i>	X		
<i>Tarchonanthus camphoratus</i>		X	
<i>Terminalia sericea</i>	X		
<i>Vachellia cf. exuvialis</i>		X	
<i>Vachellia gerrardii</i>	X	X	
<i>Vachellia nilotica</i> subsp. <i>kraussiana</i>	X		
<i>Vachellia permixta</i>	X		
<i>Vachellia robusta</i>	X		
<i>Vachellia tortilis</i> subsp. <i>heteracantha</i>		X	
<i>Vitex rehmannii</i>	X		
<i>Volkameria glabra</i>	X		
<i>Ziziphus mucronata</i>	X	X	
FORBS			
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>			X
* <i>Flaveria bidentis</i>			X
* <i>Tagetes minuta</i>	X	X	X
* <i>Zinnia peruviana</i>	X		
<i>Blepharis cf. subvulabilis</i>	X		
<i>Dicliptera</i> sp.	X		
<i>Haplocarpha scaposa</i>	X		
<i>Helichrysum nudifolium</i>	X		
<i>Lasiosiphon capitatus</i>	X		
<i>Leonotis nepetifolia</i>		X	
<i>Pentarrhinum insipidum</i>		X	
<i>Rhynchosia</i> sp.			
SUCCULENTS			
* <i>Agave sisalana</i>			X
* <i>Cereus jamacaru</i>		X	
* <i>Opuntia ficus-indica</i>		X	
<i>Aloe ammophila</i>		X	
<i>Aloe marlothii</i>	X	X	
<i>Sansevieria aethiopica</i>	X		
<i>Viscum combreticola</i>	X		
<i>Viscum rotundifolium</i>	X	X	
GRAMINOIDS			
<i>Aristida</i> sp.		X	
<i>Aristida spectabilis</i>	X		
<i>Cenchrus ciliaris</i>		X	
<i>Chloris gayana</i>	X		
<i>Cymbopogon cf. prolixus</i>	X		
<i>Cymbopogon</i> sp.		X	
<i>Digitaria eriantha</i>	X		
<i>Eragrostis rigidior</i>	X	X	
<i>Heteropogon contortus</i>		X	X
<i>Hyparrhenia hirta</i>	X	X	X
<i>Hyperthelia dissoluta</i>	X	X	X
<i>Melinis repens</i>	X		



Scientific name	Mountain Bushveld	Plateau Bushveld	Transformed
<i>Panicum maximum</i>	x	x	
<i>Paspalum urvillei</i>		x	
<i>Pogonarthria squarrosa</i>	x		x
<i>Themeda triandra</i>	x	x	
<i>Tricholaena monachne</i>	x		
<i>Trichoneura grandiglumis</i>	x		
<i>Triraphis andropogonoides</i>	x		



Observed Faunal Species

Table G2: Mammal species observed within the focus area.

Scientific Name	Common Name	Conservation Status
MAMMALS		
<i>Lepus saxatilis</i>	Scrub hare	LC
<i>Mungos mungo</i>	Banded Mongoose	LC
<i>Herpestes sanguineus</i>	Common Slender Mongoose	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC
<i>Papio ursinus</i>	Chacma Baboon	LC
<i>Potamochoerus larvatus</i>	Bushpig	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC
AVIFAUNA⁴⁵		
<i>Vanellus coronatus</i>	Crowned Lapwing	LC
<i>Onychognathus morio</i>	Red-winged Starling	LC
<i>Acridotheres tristis</i>	Common Myna	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Cinnyris talatala</i>	White-bellied Sunbird	LC
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC
<i>Zosterops virens</i>	Cape White-eye	LC
<i>Turdus smithi</i>	Karoo Thrush	LC
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	LC
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC
<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC
<i>Laniarius ferrugineus</i>	Southern Boubou	LC
<i>Cercotrichas leucophrys</i>	White-browed Scrub Robin	LC
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC
<i>Cisticola chiniana</i>	Rattling Cisticola	LC
<i>Sylvietta rufescens</i>	Long-billed Crombec	LC
<i>Crithagra mozambica</i>	Yellow-fronted Canary	LC
<i>Colius striatus</i>	Speckled Mousebird	LC
<i>Brunhilda erythronotos</i>	Black-faced Waxbill	LC
<i>Phyllastrephus terrestris</i>	Terrestrial Brownbul	LC
<i>Crithagra gularis</i>	Streaky-headed Seedeater	LC
<i>Oena capensis</i>	Namaqua Dove	LC
<i>Batis molitor</i>	Chinspot Batis	LC
<i>Chlorophoneus sulfureopectus</i>	Orange-breasted Bushshrike	LC
<i>Cypsiurus parvus</i>	African Palm Swift	LC
<i>Merops bullockoides</i>	White-fronted Bee-eater	LC
<i>Merops pusillus</i>	Little Bee-eater	LC
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC
<i>Bubulcus ibis</i>	Western Cattle Egret	LC
<i>Curruca subcoerulea</i>	Chestnut-vented Warbler	LC
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC
<i>Motacilla capensis</i>	Cape Wagtail	LC
<i>Hirundo smithii</i>	Wire-tailed Swallow	LC
<i>Ptyonoprogne fuligula</i>	Rock Martin	LC
<i>Sporopipes squamifrons</i>	Scaly-feathered Weaver	LC
<i>Passer domesticus</i>	House Sparrow	LC

⁴⁵ Data on avifauna were sourced from BirdLife International (2021) IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 05/07/2021



Scientific Name	Common Name	Conservation Status
<i>Plocepasser mahali</i>	White-browed Sparrow-Weaver	LC
<i>Melaenornis mariquensis</i>	Marico Flycatcher	LC
<i>Pogoniulus chrysoconus</i>	Yellow-fronted Tinkerbird	LC
<i>Lybius torquatus</i>	Black-collared Barbet	LC
<i>Chloropicus namaquus</i>	Bearded Woodpecker	LC
<i>Leptoptilos crumenifer</i>	Marabou Stork	NT
<i>Ciconia ciconia</i>	White Stork	LC
<i>Cossypha humeralis</i>	White-throated Robin-Chat	LC
<i>Turdus libonyana</i>	Kurrichane Thrush	LC
<i>Estrilda astrild</i>	Common Waxbill	LC
<i>Pternistis natalensis</i>	Natal Spurfowl	LC
<i>Dryoscopus cubla</i>	Black-backed Puffback	LC
<i>Cisticola aberrans</i>	Lazy Cisticola	LC
<i>Lagonosticta rhodopareia</i>	Jameson's Firefinch	LC
<i>Coracias caudatus</i>	Lilac-breasted Roller	LC
<i>Crinifer concolor</i>	Grey Go-away-bird	LC
INVERTEBRATES		
<i>Graphium antheus</i>	Large Striped Swordtail	NYBA
<i>Trinervitermes</i> sp.	Snouted harvester termites	NYBA
<i>Anacridium moestum</i>	Tree Locust	NYBA
<i>Conocephalus caudatus</i>	Meadow Katydid	NYBA
<i>Junonia hierta</i>	Yellow Pansy	LC
<i>Colotis evagore</i> ssp. <i>antigone</i>	Small Orange Tip	LC
<i>Anthene amarah amarah</i>	Black-striped Hairtail	LC
<i>Musca domestica</i>	House Fly	NYBA
<i>Creoleon</i> sp.	Large Grassland Antlion	NA
<i>Pinacopteryx eriphia</i>	Zebra White	LC
<i>Platypleura haglundi</i>	Orange-wing	NYBA
<i>Mylabris</i> sp.	Blister Beetle	NA
<i>Acrotylus</i> sp.	Burrowing Grasshoppers	NYBA
<i>Lycus</i> sp.	Net-winged Beetle	NA
<i>Garreta</i> sp.	Dung Beetle	NYBA
<i>Danaus chrysippus</i>	African Monarch	LC
<i>Sonchias sternalis</i>	Four-spot Leaf Beetle	NYBA
<i>Anomalipus elephas</i>	Large Armoured Darkling Beetle	NYBA
<i>Alcimus</i> sp.	Robber Fly	NA
<i>Thermophilum homoplutum</i>	Two-spotted Ground Beetle	NYBA
<i>Macrotoma palmata</i>	Large Brown Longhorn	NYBA
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Utetheisa pulchella</i>	Crimson-speckled Flunkey	NYBA
<i>Hycleus oculatus</i>	CMR Blisterbeetle	NYBA
<i>Anthia burchelli</i>	Ground Beetle	NYBA
<i>Miomantis caffra</i>	South African Mantis	NYBA
<i>Phymateus viridipes</i>	Green Milkweed Locust	NYBA
<i>Platypleura</i> sp.	Orangewing Cicadas	NYBA
<i>Belenois aurota</i>	Pioneer White	LC
<i>Leucocelis amethystina</i>	Amethyst Small Fruit Chafer	NYBA
<i>Phoxomela umbrosa</i>	A member of Rose Chafers	NYBA
<i>Pedinorrhina trivittata</i>	Yellowheart Fruit Chafer	NYBA
<i>Conchyloctenia hybrida</i>	Tortoise and Hispine Beetles	NYBA
<i>Platycorynus dejeani</i>	Metallic Milkweed Leaf Beetle	NYBA
<i>Clinteroides permutans</i>	Larger Variable Fruit Chafer	NYBA



Scientific Name	Common Name	Conservation Status
<i>Deroplax silphoides</i>	Common Voodoo Shieldbug	NYBA
<i>Promachus sp</i>	Giant Robber Flies	NYBA
<i>Acrida acuminata</i>	Common Stick Grasshopper	NYBA
<i>Brachythemis leucosticta</i>	Southern Banded Groundling	NYBA
<i>Dichtha inflata</i>	Toktokkie	NYBA
<i>Parabuthus transvaalicus</i>	Transvaal Thicktail Scorpion	NYBA
<i>Hadogenes newlandsi</i>	Newlands Rock Scorpion	P
<i>Uroplectes carinatus</i>	Common Lesser-Thicktail Scorpion	NYBA
<i>Harpactirella overdijkii</i>	Overdijk's Lesser Baboon Spider	NYBA
<i>Xysticus sp</i>	Ground Crab Spiders	NYBA

HERPETOFAUNA**Reptiles***

<i>Pachydactylus punctatus</i>	Pointed Thick-toed Gecko	LC
<i>Trachylepis margaritifera</i>	Rainbow Skink	LC
<i>Trachylepis varia</i>	Variable Skink	LC

LC = Least Concern, NYBA = Not yet been assessed by the IUCN, N/A = Not Applicable.



APPENDIX H: Floral SCC

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. For the POC assessment, a list of RDL species previously recorded within the 10 km of the focus area was pulled from the BODATSA (<http://posa.sanbi.org/>). This list was further cross-checked with the 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** 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** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **CR, Possibly Extinct** Possibly Extinct is a special tag associated with the category CR, 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.
- **CR** A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction.
- **EN** A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction.
- **VU** A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction.
- **NT** A species is NT when available evidence indicates that it nearly meets any of the IUCN criteria for VU 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: EOO <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.
- **LC** A species is LC when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as LC 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 assess 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 NE 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 NE and the reasons why they have not been assessed are included in the assessment justification.

The below tables present the results of the POC assessment.



POC for RDL Floral SCC obtained from BODATSA

Table H1: Red Data Listed plant species recorded in the QDS 2429AA. Species list obtained from BODATSA and the Screening Tool (data extracted within 10 km of the focus area). Information on species distributions and conservation status were derived from the Red List of South African Plants website (<http://redlist.sanbi.org/index.php>). Some details for sensitive species are omitted to protect against species harvesting.

Taxonomic family	Scientific Name	Red List Status and Criteria	Habitat Requirements	POC	POC Justification and/or Suitable habitat within the study area
Undisclosed for security purposes	Sensitive species 550	CR A2ace; B2ab(ii,iii,v)	Range: Polokwane and near Mokopane. Description: Gentle slopes of quartzite ridges in savanna, with gentle slopes with northern and north-eastern aspects.	Low	Site is on south-facing slopes and outside of the known distribution range.
	Sensitive species 1248	VU A2ad	Range: Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. Description: Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas which receive approximately 200 - 800 mm of annual rainfall. Flower between September to April.	Medium	The habitat within the Mountain Bushveld and EDL is suitable, and the species distribution overlaps with the focus area. No signs of the species were, however, noted while on site.
	Sensitive species 1252	VU A2cd	Major habitats: Terrestrial. Description: Wooded and relatively mesic places, such as the moister bushveld areas, coastal bush and wooded mountain kloofs. Flowering time: November	Medium	The habitat within the focus area is sub-optimal as it lacks the moister wooded habitats that provide more suitable conditions.
COMBRETACEAE	<i>Combretum petrophilum</i>	Rare	Range: Waterberg, Strydpoort Mountains, Loskop Dam and Mpumalanga Drakensberg Mountains. Description: Rocky outcrops in mountain bushveld. Between rocks in fissures or along edges on north-western or southern slopes in sourish mixed bushveld.	Medium	Suitable habitat within the Mountain bushveld, however, the species known distribution does not overlap with the site.



Taxonomic family	Scientific Name	Red List Status and Criteria	Habitat Requirements	POC	POC Justification and/or Suitable habitat within the study area
CELASTRACEAE	<i>Elaeodendron transvaalense</i>	NT A4ad	Range: Widespread in Southern Africa, including Angola, Namibia, Botswana, Zambia, Zimbabwe, Swaziland and Mozambique. In South Africa it is restricted to eastern, summer rainfall areas from the KwaZulu-Natal coast northwards through eastern Mpumalanga into Limpopo and North West provinces. Description: Savanna or bushveld, from open woodland to thickets, often on termite mounds.	Confirmed	Recorded within the Plateau Bushveld and likely to be present in the Mountain Bushveld.
IRIDACEAE	<i>Hesperantha bulbifera</i>	Rare	Range: This species has a wide, but scattered distribution across the eastern summer rainfall areas, from the Soutpansberg in Limpopo to the Boschberg near Somerset East, Eastern Cape. It has not been recorded in KwaZulu-Natal but is likely to occur there. Description: It is localized to ledges on wet cliffs and damp places in the spray of waterfalls.	Low	No wet conditions on site.
ACANTHACEAE	<i>Justicia minima</i>	Rare	Range: Waterberg district. Description: Rocky riverbeds.	Low	No rocky river beds associated with the focus area.



NEMBA TOPS List for South Africa⁴⁶

Table H2: 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>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
<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>Diaphananche 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 procera</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

⁴⁶ 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>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
<i>Encephalartos laevifolius</i>	Kaapsehoo p 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



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



NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	Common Name	POC	Provincial Distribution	Conservation Status
<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 H3: Protected Plants (Schedule 12) for the Limpopo Province⁴⁷.

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 zanguebarica</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>	Medium
	<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
The following Hibiscus species	<i>Hibiscus articulatus</i>	Low
	<i>Hibiscus barnardii</i>	Low
	<i>Hibiscus sabiensis</i>	Low
Large Cape Myrtle	<i>Myrsine pillansii</i>	Low
Largeleaved Dragon Tree	<i>Dracaena hookerana</i>	Low
Largeleaved Saucerberry	<i>Cordia africana</i>	Low
The following 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

⁴⁷ <https://www.thetreeapp.co.za/team/>



Common name	Scientific name	POC
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>Alchomea 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 not protected under LEMA
Aloe Catstail	<i>Aloe castanea</i>	
Aloe Krans	<i>Aloe arborescens</i>	
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. One species in this genus is known from the area, namely <i>Brachystelma circinatum</i> and suitable habitat for this species is available within the Mountain Bushveld habitat.	High
All species of <i>Ceropegia</i>	<i>Ceropegia</i> spp. Two species in this genus are known from the larger area, namely <i>Ceropegia carnososa</i> and <i>Ceropegia stapeliiformis</i> - suitable habitat for these species is present within the Mountain Bushveld habitat (albeit sub-optimal).	Medium
All species of <i>Duvalia</i>	<i>Duvalia</i> spp.	Low
The following species <i>Euphorbias</i> :	<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>	Low
All species of Ghaap	<i>Tavaresia</i> spp.	Low



Common name	Scientific name	POC
	<i>Huernia</i> spp.	High
	One species in this genus is known from the area, (i.e., <i>Huernia zebrina</i> subsp. <i>magniflora</i>) and suitable habitat for this species is available within the Mountain Bushveld habitat.	
All species of <i>Huernia</i>		
All species of <i>Huerniopsis</i>	<i>Huerniopsis</i> spp.	
The following Impala Lilies	<i>Adenium multiflorum</i>	
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
	<i>Orbea</i> spp.	Medium
	Two species in this genus are known from the larger area, namely <i>Orbea lutea</i> and <i>Orbea melanantha</i> - suitable habitat for these species is present within the Mountain Bushveld habitat and Plateau Bushveld habitat (albeit sub-optimal).	
All species of <i>Orbeas</i>		
All species of <i>Orbeopsis</i>	<i>Orbeopsis</i> spp	
All species of <i>Pachycymbiums</i>	<i>Pachycymbium</i> spp.	
All species of <i>Riocreuxias</i>	<i>Riocreuxia</i> spp.	Low
All species of <i>Stapeliads</i>	<i>Stapelia</i> spp.	Low
Stone Plant	<i>Lithops lesliei</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 <i>Arum</i> Lilies:		Low
Jucunda, Pentlandii and Rehmannii	<i>Zantedeschia jucunda</i> , <i>Z. pentlandii</i> , <i>Z. rehmannii</i>	Low
The following <i>Babiana</i> Species	<i>Babiana hypogea</i> var. <i>longituba</i>	Low
Batesiana Gasteria	<i>Gasteria batesiana</i>	Low
Blue Squill	<i>Scilla natalensis</i>	Low
Clivia	<i>Clivia caulescens</i>	Low
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</i> spp.	Low
The following <i>Freylinia</i> species	<i>Freylinia tropica</i>	Low
The following <i>Gladiolus</i> species	<i>Gladiolus macneillii</i>	Low
The following <i>Habernaria</i> species	<i>Habernaria kraenzliniana</i>	Low
The following <i>Heinsia</i> species	<i>Heinsia crinita</i>	Low
The following <i>Hermstaedtia</i> species	<i>Hermstaedtia capitata</i>	Low
The following <i>Hippocratea</i> species	<i>Hippocratea parvifolia</i>	Low
The following <i>Hymenodictyon</i> species	<i>Hymenodictyon parvifolium parvifolium</i>	Low
The following <i>Hyptis</i> species	<i>Hyptis spicigera</i>	Low
The following <i>Inula</i> species	<i>Inula paniculata</i>	Low
The following <i>Jasminum</i> species	<i>Jasminum abyssinicum</i>	Low



Common name	Scientific name	POC
The following Kalanchoe species	<i>Kalanchoe crundallii</i>	Low
	<i>Kalanchoe rogersii</i>	Low
	<i>Kniphofia coralligemma</i>	Low
The following Kniphofia species	<i>Kniphofia crassifolia</i>	Low
	<i>Kniphofia rigidifolia</i>	Low
The following Kotschya species	<i>Kotschya thymodora</i>	Low
The following Melinus species	<i>Melinus tenuissima</i>	Low
The following Mondia species	<i>Mondia whitei</i>	Low
The following Monsonia species	<i>Monsonia lanuginosa</i>	Low
The following Neobulosia species	<i>Neobulosia tysonii</i>	Low
The following Nervillia species	<i>Nervillia umbrosa</i>	Low
The following Nymphaea species	<i>Nymphaea lotus</i>	Low
The following Oberonia species	<i>Oberonia distichia</i>	Low
The following Oreosyce species	<i>Oreosyce africana</i>	Low
Paint Brush	<i>Haemanthus montanus</i>	Low
	<i>Peristrophe cliffordii</i>	Low
The following Peristrophe species	<i>Peristrophe gillilandorum</i>	Low
	<i>Peristrophe transvaalensis</i>	Low
The following Phyllanthus species	<i>Phyllanthus pinnatus</i>	Low
The following Pilea species	<i>Pilea rivularis</i>	Low
The following Plinthus species	<i>Plinthus rehmannii</i>	Low
The following Polycarpea species	<i>Polycarpea eriantha</i> var. <i>effusa</i>	Low
The following Polystachya species	<i>Polystachya albescens imbricata</i>	Low
	<i>Portulaca foliosa</i>	Low
The following Portulaca species	<i>Portulaca trianthemoides</i>	Low
The following Rhyncosia species	<i>Rhyncosia vendae</i>	Low
Royal Paint Brush (Blood lily)	<i>Scadoxys puniceus</i>	Medium
The following Sartidia species	<i>Sartidia jucunda</i>	Low
The following Schizagyrium species	<i>Schizagyrium brevifolium</i>	Low
All species of South African Orchid	Family Orchidaceae	Medium
The following Stadmania species	<i>Stadmania oppositifolia</i>	Low
The following Streptocarpus species	<i>Streptocarpus decipiens</i>	Low
The following Strophanthus species	<i>Strophanthus luteolus</i>	Low
The following Sutera species	<i>Sutera maerantha</i>	Low
The following Thorncroftia species	<i>Thorncroftia media</i>	Low
All species of Tree Ferns	<i>Cyathea</i> spp	Low
All species of Tree Moss	<i>Porothamnium</i> , <i>Pilotrichella</i> and <i>Papillaria</i> spp	Low
The following Trilepisium species	<i>Trilepisium madagascariensis</i>	Low
The following Tristachya species	<i>Tristachya trifaria</i>	Low
The following Turbina species	<i>Turbina shirensis</i>	Low
	<i>Watsonia densiflora</i>	Low
The following Watsonia species	<i>Watsonia transvaalensis</i>	Low
	<i>Watsonia wilmsii</i>	Low
Wild Ginger	<i>Burmannia madagascariensis</i>	Low
Wild Ginger	<i>Siphonochilus aethiopicus</i>	Low
The following Xylopia species	<i>Xylopia parviflora</i>	Low



Table H4: NFA plant list for species with a known distribution range falling within the focus area⁴⁸.

SCIENTIFIC NAME	Habitat & Distribution ⁴⁹ & ⁵⁰	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	Confirmed
<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>Philenoptera violacea</i>	Alluvial flats in bushveld	LC P	Low
<i>Phyllogeiton zeyheri</i>	In open woodland, often on termite mounds, rocky ridges or near watercourses.	LC P	Confirmed
<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>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>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	Medium
<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

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

⁴⁸ <https://www.thetreeapp.co.za/team/>

⁴⁹ <http://pza.sanbi.org/>

⁵⁰ <http://redlist.sanbi.org/index.php>



APPENDIX I: Faunal SCC

Faunal Species of Conservation Concern

Table I1: Red Data Mammal species listed in the Limpopo SoER 2004 report including IUCN status.

SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Diceros bicornis</i>	Black Rhinoceros	CR	CR	L
<i>Neamblysomus julianae</i>	Juliana's golden mole	CR	VU	L
<i>Loxodonta africana</i>	African elephant	VU	VU	L
<i>Lycaon pictus</i>	African wild dog	EN	EN	L
<i>Amblysomus gunningi</i>	Gunning's golden mole	VU	EN	L
<i>Lutra maculicollis</i>	Spotted-necked otter	VU	LC	L
<i>Acinonyx jubatus</i>	Cheetah	VU	VU	L
<i>Felis lybica</i>	African Wild Cat	VU	NYBA	L
<i>Panthera leo</i>	Lion	VU	VU	L
<i>Ceratotherium simum</i>	White rhinoceros	NT	NT	L

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN.

Table I2: Red Data Bird species listed in the Limpopo SoER 2004 report including IUCN status.

SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Gyps coprotheres</i>	Cape Vulture	T	VU	M
<i>Ciconia nigra</i>	Black Stork	T	LC	M
<i>Falco naumanni</i>	Lesser Kestrel	T	LC	L
<i>Certhilauda chuana</i>	Short-clawed Lark	T	LC	L
<i>Pterocles gutturalis</i>	Yellow throated Sandgrouse	T	LC	L
<i>Anthropoides paradiseus</i>	Blue Crane	T	VU	L
<i>Gyps africanus</i>	White backed Vultures	T	CR	L
<i>Ardeotis kori</i>	Kori Bustard	T	LC	L
<i>Scotopelia peli</i>	Pel's Fishing Owl	T	LC	L
<i>Bucorvus leadbeateri</i>	Southern Ground Hornbill	T	VU	L
<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	T	LC	M
<i>Terathopius ecaudatus</i>	Bateleur	T	NT	L
<i>Polemaetus bellicosus</i>	Martial Eagle	T	NT	L
<i>Aquila rapax</i>	Tawny Eagle	T	LC	M
<i>Torgos tracheliotos</i>	Lappet faced Vulture	T	VU	L
<i>Trigonoceps occipitalis</i>	White headed Vulture	T	VU	L
<i>Buphagus africanus</i>	Yellow billed Oxpecker	T	LC	L



SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Stephanoaetus coronatus</i>	Crowned hawk Eagle	T	NT	L

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province

Table I3: Red Data Amphibian species listed in the Limpopo SoER 2004 report including IUCN status.

SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Breviceps sylvestris</i>	Transvaal forest rain frog	VU	EN	L
<i>Ptychadena uzungwensis</i>		P	LC	L
<i>Leptopelis bocagii</i>		P	LC	L
<i>Hemius guineensis</i>	Guinea Snout-burrower	P	LC	L

LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Table I4: Red Data Reptile species listed in the Limpopo SoER 2004 report including IUCN status.

SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Homoroselaps dorsalis</i>	Striped Harlequin snake	R	NT	M
<i>Xenocalamus transvaalensis</i>	Transvaal Quill-snout snake	R	DD	L
<i>Lamprophis swazicus</i>	Swazi Rock Snake	R	NT	L
<i>Python natalensis</i>	African Python	VU	NYBA	L
<i>Lygodactylus methueni</i>	Methuen's Dwarf Gecko	VU	VU	L
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	L
<i>Lycophidion variegatum</i>	Variegated Wolf snake	P	NYBA	L
<i>Psammophis jallae</i>	Jalla's Sand snake	P	NYBA	L

R = Rare, DD = Data Deficient, LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Table I5: Red Data Invertebrates species mentioned in the Limpopo SoER 2004 report including IUCN status.

SCIENTIFIC NAME	COMMON NAME	LIMPOPO SOER 2004 STATUS	IUCN RED LIST STATUS	POC
<i>Taurhina splendens</i>	Splendid fruit chafer *	T	NYBA	L
<i>Charaxes marieps</i>	Marieps Charaxes butterfly *	T	NYBA	L
<i>Trichostetha fascicularis</i>	Protea beetle *	T	NYBA	L
<i>Ischnestoma ficqui</i>	Fruit eating beetles *	T	NYBA	L

R = Rare, DD = Data Deficient, LC = Least concerned, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province. * Very little detailed or general information exists on terrestrial invertebrates in the Limpopo Province, thus in general there is very little consolidated information regarding invertebrates (Limpopo SOER, 2004).



Table I6: Animal species triggering the medium sensitivity for the Animal Species Theme as identified by the National Web-based Screening Tool.

SCIENTIFIC NAME	COMMON NAME	IUCN	POC
<i>Crocodyra maguassiensis</i>	Makwassie Musk Shrew	VU	M
<i>Dasyms robertsii</i>	Robert's Shaggy Rat	DD	L
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	VU	M

Table I7: NEMBA: TOPS list (2007) of all faunal SCC that require a permit should they need to be relocated as a result of the proposed development and activities.

SCIENTIFIC NAME	COMMON NAME
CRITICALLY ENDANGERED SPECIES	
REPTILIA	
<i>Caretta caretta</i>	Loggerhead Sea Turtle
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle
<i>Eretmochelys imbricate</i>	Hawksbill Sea Turtle
AVES	
<i>Grus carunculatus</i>	Wattled Crane
<i>Hirundo atrocaerulea</i>	Blue Swallow
<i>Neophron percnopterus</i>	Egyptian Vulture
<i>Poicephalus robustus</i>	Cape Parrot
MAMMALIA	
<i>Bunolagus monticularis</i>	Riverine Rabbit
<i>Chrysospalax</i>	Rough-haired Golden Mole
ENDANGERED SPECIES	
REPTILIA	
<i>Chelonia mydas</i>	Green Turtle
<i>Cordylus giganteus</i>	Giant Girdled Lizard
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle
<i>Psemmobates geometricus</i>	Geometric Tortoise
AVIFAUNA	
<i>Anthropoides paradiseus</i>	Blue Crane
<i>Balearica regulorum</i>	Grey Crowned Crane
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork
<i>Gypaetus barbatus</i>	Bearded Vulture
<i>Gyps africanus</i>	White-backed Vulture
<i>Gyps coprotheres</i>	Cape Vulture
<i>Necrosyrtes</i>	Hooded Vulture
<i>Pelecanus rufescens</i>	Pink-backed Pelican
<i>Scotopelia peli</i>	Pel's Fishing Owl
<i>Torgos tracheliotus</i>	Lappet-faced Vulture
MAMMALIA	
<i>Amblysomus robustus</i>	Robust Golden Mole
<i>Damaliscus tunatus</i>	Tsessebe
<i>Diceros bicornis</i>	Black Rhinoceros
<i>Equus zebra</i>	Mountain Zebra
<i>Lycaon pictus</i>	African Wild Dog
<i>Neamblysomus gunningi</i>	Gunning's Golden Mole
<i>Ourebia ourebi</i>	Oribi
<i>Paraxerus palliatus</i>	Red Squirrel
<i>Petrodromus tetradactylus</i>	Four-toed Elephant-shrew
INVERTEBRATA	
<i>Colophon spp - species</i>	Stag Beetles
VULNERABLE SPECIES	
AVES	
<i>Trigonoceps occipitalis</i>	White-headed Vulture



SCIENTIFIC NAME	COMMON NAME
<i>Aquila rapax</i>	Tawny Eagle
<i>Ardeotis kori</i>	Kori Bustard
<i>Ciconia nigra</i>	Black Stork
<i>Circaetus fasciolatus</i>	Southern Banded Snake Eagle
<i>Eupodotis caerulescens</i>	Blue Korhaan
<i>Falco fasciinucha</i>	Falcon
<i>Falco naumanni</i>	Lesser Kestrel
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Geronticus calvus</i>	Bald Ibis
<i>Neotis ludwidgei</i>	Ludwig's Bustard
<i>Polemaetus bellicosus</i>	Martial Eagle
<i>Terathopus ecaudatus</i>	Bateleur
<i>Tyto capensis</i>	Grass Owl
MAMMALIA	
<i>Acinonyx jubatus</i>	Cheetah
<i>Chrysospalax trevelyani</i>	Giant Golden Mole
<i>Cricetomys gambianus</i>	Giant Rat
<i>Damaliscus pyrgorgus pygargus</i>	Bontebok
<i>Dendrohyrax arboreus</i>	Tree Hyrax
<i>Hippotragus equinus</i>	Roan Antelope
<i>Pholidota temminckii</i>	Pangolin
<i>Neamblysomus julianae</i>	Juliana's Golden Mole
<i>Neotragus moschatus</i>	Suni
<i>Panthera leo</i>	Lion
<i>Panthera pardus</i>	Leopard
<i>Philantomba monticola</i>	Blue Duiker
INVERTEBRATA	
<i>Peripatopsis alba</i>	White Cave Velvet Worm
PROTECTED SPECIES	
AMPHIBIA	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog
<i>Pyxicephalus edulis</i>	African Bullfrog
REPTILIA	
<i>Bitis gabonica</i>	Gaboon Adder
<i>Bitis schneideri</i>	Namaqua Dwarf Adder
<i>Bradypodion taeniabronchum</i>	Smith's Dwarf Chameleon
<i>Cordylus cataphractus</i>	Girdled Lizard
<i>Crocodylus niloticus</i>	Nile crocodile
<i>Python natalensis</i>	African Rock Python
AVES	
<i>Bucowus leadeateri</i>	Southern Ground-Hornbill
<i>Circus ranivorus</i>	African Marsh Harrier
<i>Neotis denhami</i>	Denham's Bustard
<i>Spheniscus</i>	Jackass Penguin
MAMMALIA	
<i>Atelerix frontalis</i>	South African Hedgehog
<i>Ceratotherium simum</i>	White Rhinoceros
<i>Connochaetes</i>	Black Wildebeest
<i>Crocuta crocuta</i>	Spotted Hyaena
<i>Felis nigripes</i>	Black-footed Cat
<i>Parahyaena brunnea</i>	Brown Hyaena
<i>Leptailurus serval</i>	Serval
<i>Loxodonta africana</i>	African elephant



SCIENTIFIC NAME	COMMON NAME
<i>Lutra maculicollis</i>	Spotted-necked Otter
<i>Millivora capensis</i>	Honey Badger
<i>Raphicerus sharpei</i>	Sharpe's Grysbok
<i>Redunca</i>	Reedbuck
<i>Vulpes chama</i>	Cape Fox
INVERTEBRATA	
<i>Aloeides clarki</i>	Coega Copper Butterfly
<i>Ceratogyrus spp - All species</i>	Horned Baboon Spiders
<i>Echinodiscus bisperforatus</i>	Pansy Shell
<i>Dromica spp - All species</i>	Tiger Beetles
<i>Graphipterus assimilis</i>	Velvet Ground Beetle
<i>Hadogenes spp -species</i>	Flat Rock Scorpions
<i>Haliotis midae</i>	South African Abalone
<i>Harpactira spp - All species</i>	Common Baboon Spiders
<i>Ichneutoma - Aspecies</i>	Fruit Chafer Beetles
<i>Manticora spp - Aspecies</i>	Monster Tiger Beetles
<i>Megacephala asperata</i>	Tiger Beetle
<i>Megacephala regalis</i>	Tiger Beetle
<i>Nigidius auriculatus</i>	Stag beetle
<i>Oonotus adspersus</i>	Stag Beetle
<i>Oonotus interioris</i>	Stag Beetle
<i>Oonotus rex</i>	Stag Beetle
<i>Oonotus sericeus</i>	Stag Beetle
<i>Opisthacanthus spp - All species</i>	Creeping Scorpions
<i>Opisthophthalmus spp - All species</i>	Burrowing Scorpions
<i>Platychile pallida</i>	Tiger Beetle
<i>Prosopocoilus petitclerci</i>	Stag Beetle
<i>Prothyma guttipennis</i>	Tiger Beetle
<i>Pterinochilus spp - All species</i>	Golden Baboon Spiders

NL= Not Listed; EN= Endangered; CR= Critically Endangered; VU= Vulnerable; P = Protected (TOPS 2007); NT = Near Threatened

South African Bird Atlas Project 2 list

Table I8: Avifaunal Species for the focus area within the pentad 2410_2900.

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2410_2900	http://sabap2.birdmap.africa/coverage/pentad/2410_2900



APPENDIX J: Details, Expertise and Curriculum Vitae of Specialists

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

Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Christien Steyn	MSc Plant Science (University of Pretoria)
Jandre Potgieter	BSc Hons (Zoology & Entomology) (University of Pretoria)
Samantha-Leigh Daniels	PhD Plant Science (University of Pretoria)
Stephen van Staden	MSc Environmental Management (University of Johannesburg)

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

Company of Specialist:		Scientific Terrestrial Services	
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Fax:	086 724 3132
Telephone:	011 616 7893		
Name / Contact person:	Chris Hooton		
E-mail:	chris@sasenvgroup.co.za		
Qualifications	BTech Nature Conservation (Tshwane University of Technology) National Diploma Nature Conservation (Tshwane University of Technology)		
Name / Contact person:	Christien Steyn		
E-mail:	christien@sasenvgroup.co.za		
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)		
Registration / Associations	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) Member of the South African Wildlife Management Association (SAWMA)		
Name / Contact person:	Jandre Potgieter		
E-mail:	jandre@sasenvgroup.co.za		
Qualifications	PGCE Senior and Intermediate Phase (UNISA) BSc (Hons) Entomology (University of Pretoria) BSc Entomology (University of Pretoria)		
Name / Contact person:	Samantha Daniels		
E-mail:	samantha@sasenvgroup.co.za		
Qualifications	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)		
Registration / Associations	PhD (Plant Science) (University of Pretoria) MSc (Plant Science) (University of Pretoria) BSc (Hons) Zoology & Entomology (University of Pretoria) BSc Zoology & Entomology (University of Pretoria)		
Name / Contact person:	Stephen van Staden		
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		



Registration / Associations

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
 Accredited River Health Practitioner by the South African River Health Program (RHP)
 Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
 Member of the Gauteng Wetland Forum
 Member of International Association of Impact Assessors (IAIA) South Africa;
 Member of the Land Rehabilitation Society of South Africa (LaRSSA)

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

I, Christopher Hooton, 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 June 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 June have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Specialist Signature

I, Christien Steyn, 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 June 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 June 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, Jandre Potgieter, declare that -

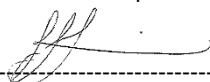
- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity 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, Samantha-Leigh Daniels, declare that -

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



Signature of the Specialist

I, Stephen van Staden, declare that -

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



Signature of the Specialist





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **CHRISTOPHER HOOTON**

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

AREAS OF WORK EXPERIENCE

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

Africa - Zimbabwe, Sierra Leone, Zambia

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF 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)
 Member of the South African Wildlife Management Association (SAWMA)

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

- BotSoc Branch: Species Environmental Assessment Guidelines Course (2022).
- Advanced Grass Identification Course (2021).
- 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





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **JANDRE POTGIETER**

PERSONAL DETAILS

Position in Company	Faunal Ecologist
Joined SAS Environmental Group of Companies	2022

EDUCATION

Qualifications

PGCE Senior and intermediate phase (UNISA)	2021
BSc (Hons) Entomology (University of Pretoria)	2013
BSc Entomology (University of Pretoria)	2012

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Eastern Cape, Limpopo, Western Cape, Mpumalanga, Northern Cape and KZN

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **SAMANTHA-LEIGH DANIELS**

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

PhD (Plant Science) (University of Pretoria)	2023
MSc (Plant Science) (University of Pretoria)	2017
BSc (Hons) Zoology & Entomology (University of Pretoria)	2014
BSc Zoology & Entomology (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Training

- Plant species identification
- Herbarium usage and protocols





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **STEPHEN VAN STADEN**

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
 Accredited River Health Practitioner by the South African River Health Program (RHP)
 Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
 Member of the Gauteng Wetland Forum
 Member of International Association of Impact Assessors (IAIA) South Africa;
 Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

AREAS OF WORK EXPERIENCE

South Africa – All Provinces

Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia

Eastern Africa – Tanzania Mauritius

West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona

Central Africa – Democratic Republic of the Congo

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

Freshwater Assessments

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning



- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

