

**REPORT**

**TERRESTRIAL BIODIVERSITY SPECIALIST  
ASSESSMENT FOR THE PROPOSED NORTH AND  
MERENSKY VENTILATION ACCESS ROAD  
PROJECT**

*Anglo American - Modikwa Platinum Mine*

Submitted to:

**Avhashoni Mashamba**

Modikwa Platinum Mine  
Steelpoort Region, Onverwacht 293 KT Farm  
Portion 0 (Remaining Extent)

Submitted by:

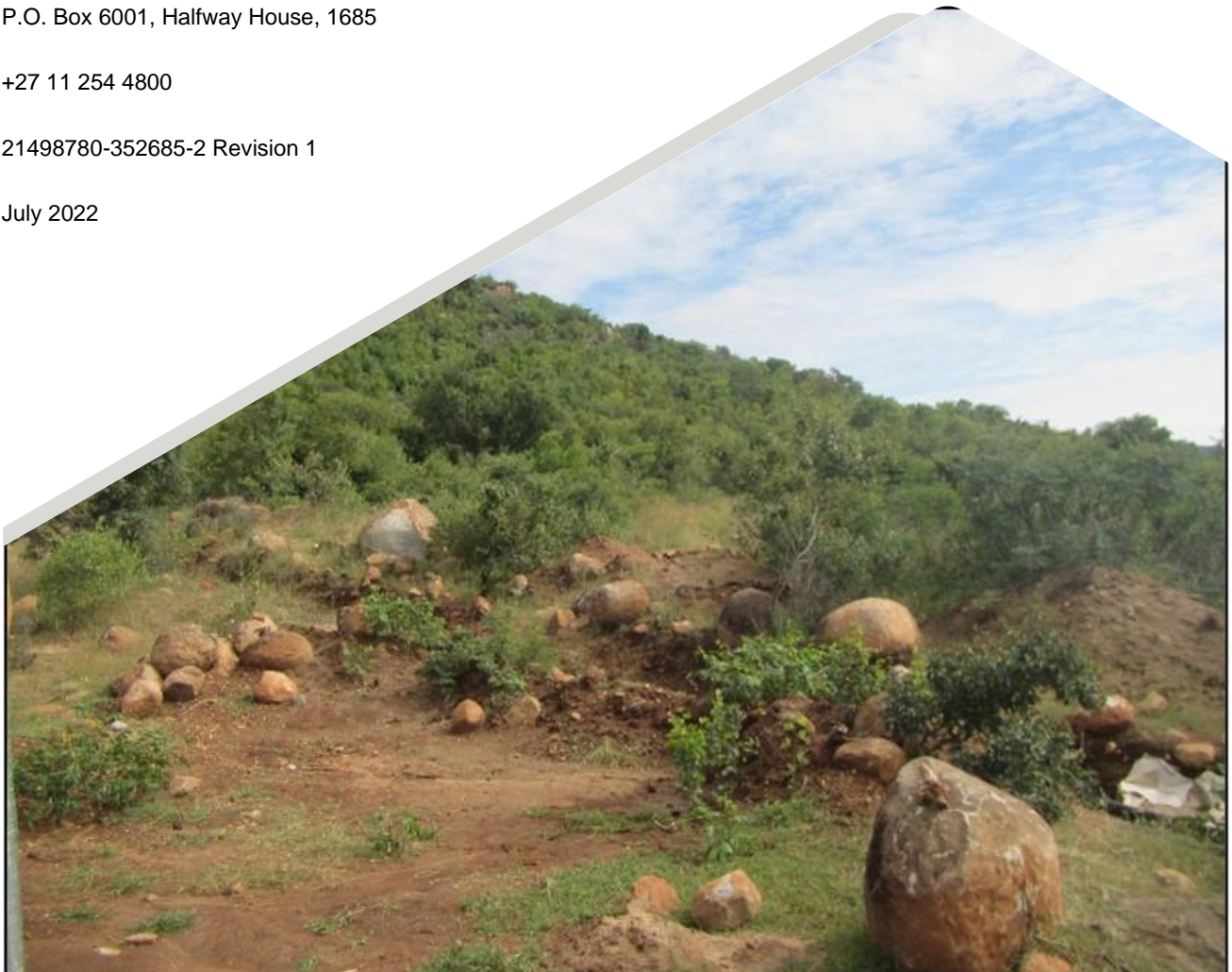
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## DECLARATION OF INDEPENDENCE BY SPECIALIST

I, Andrew Zinn, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed North Shaft and South Shaft (Merensky) Access Road Project at Modikwe Platinum Mine;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have, nor will have, a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and
- Undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.

## ACRONYMS AND ABBREVIATIONS

Abbreviation	Explanation
<b>AIS</b>	Alien Invasive Species
<b>AOO</b>	Area of Occupancy
<b>BI</b>	Biodiversity Importance
<b>CA</b>	Conservation Areas
<b>CBA</b>	Critical Biodiversity Areas
<b>CI</b>	Conservation Importance
<b>EIA</b>	Environmental Impact Assessment
<b>EMP</b>	Environmental Management Programme
<b>EOO</b>	Extent of Occurrence
<b>FI</b>	Functional Integrity
<b>Ha</b>	Hectare
<b>IBA</b>	Important Bird Areas
<b>NEMA</b>	National Environmental Management Act
<b>NEMBA</b>	National Environmental Management Biodiversity Act
<b>NFEPA</b>	National Freshwater Ecosystem Priority Areas
<b>PA</b>	Protected Areas
<b>QDS</b>	Quarter Degree Square
<b>RR</b>	Receptor Resilience
<b>SANBI</b>	South African National Biodiversity Institute
<b>SAPAD</b>	South African Protected Areas Database
<b>SEI</b>	Site Ecological Importance
<b>SWSA</b>	Strategic Water Source Areas
<b>ToPS</b>	Threatened or Protected Species

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### **APPENDIX A**

Document Limitations

### **APPENDIX B**

Rating Criteria for Conservation Importance, Functional Integrity and Receptor Resilience and Scoring Matrices, as per (SANBI, 2020)

### **APPENDIX C**

List of Flora species recorded during the 2022 field visit

### **APPENDIX D**

Bird species recorded at Modikwe Platinum Mine (SAS, 2015 and 2022 field visit).

### **APPENDIX E**

Herpetofauna species recorded in the 2430CA QDS according to FrogMAP and ReptileMAP.

## APPENDIX 6 OF THE EIA REGULATIONS

Where applicable, this baseline report has been written in compliance with Appendix 6 of the EIA Regulations.

Section	Requirements	Section addressed in report
<b>1.(1)</b>	A specialist report prepared in terms of these Regulations must contain	
<b>(a)</b>	Details of	
<b>(i)</b>	the specialist who prepared the report; and	Preceding Page
<b>(ii)</b>	the expertise of that specialist to compile a specialist report including a curriculum vitae	Preceding Page
<b>(b)</b>	a declaration that the specialist is independent in a form as may be specified by the competent authority	Preceding Page
<b>(c)</b>	an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.2
<b>(cA)</b>	an indication of the quality and age of base data used for the specialist report;	Section 2.0
<b>(cB)</b>	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4.3
<b>(d)</b>	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.0
<b>(e)</b>	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2.0
<b>(f)</b>	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 6.0
<b>(g)</b>	an identification of any areas to be avoided, including buffers;	Section 6.0
<b>(h)</b>	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 6.0
<b>(i)</b>	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.0
<b>(j)</b>	a description of the findings and potential implications of such findings on the impact of	Section 7.0

Section	Requirements	Section addressed in report
	the proposed activity (including identified alternatives on the environment) or activities;	
<b>(k)</b>	any mitigation measures for inclusion in the EMPr;	N/A
<b>(l)</b>	any conditions for inclusion in the environmental authorisation;	N/A
<b>(m)</b>	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
<b>(n)</b>	a reasoned opinion—	
<b>(i)</b>	(as to) whether the proposed activity, activities or portions thereof should be authorised;	N/A
<b>(iA)</b>	regarding the acceptability of the proposed activity or activities; and	
<b>(ii)</b>	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
<b>(o)</b>	a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
<b>(p)</b>	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
<b>(q)</b>	any other information requested by the competent authority.	N/A
<b>2.</b>	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

## 1.0 INTRODUCTION

Modikwa Platinum Mine (Modikwa), a joint venture of Anglo American Platinum and African Rainbow Minerals, appointed Golder Associates Africa (Pty) Ltd. (now WSP) to undertake a terrestrial biodiversity specialist assessment of two proposed access roads (the study area), referred to as North Ventilation Shaft 3 (North Shaft) and Merensky Shaft (South Shaft), access road to inform a Basic Assessment (BA) process in terms of the National Environmental Act (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) regulations of 2014, as amended for an Environmental Authorisation.

### 1.1 Purpose of the report

This report describes the outcomes of the site sensitivity verification of the potential environmental sensitivity of the site under consideration for proposed development (as described in Section 2.0) and describes the baseline status of terrestrial biodiversity of the study area in accordance with the gazetted requirements for a Terrestrial Biodiversity Specialist Assessment. This report will be submitted together as part of the application for Environmental Authorisation, in accordance with the requirements of the Environmental Impact Assessment Regulations of 2014, as amended.

## 2.0 PROPOSED DEVELOPMENT

Modikwa is located approximately 18.4 km north of Steelpoort and 20.5 km north-west of Bugersfort, in Limpopo Province, South Africa. Nearby residential communities include Mokorwane, which is located along the R37 arterial road located approximately 6 km to the east of the main mine complex, and Mamphahlane and Difagate villages, which are located 2.2 km to the north-west and 400 m to the west of Modikwa, respectively (Figure 1).

The proposed development entails the construction of two access roads to the north and south ventilation shafts. The proposed access roads will be approximately 6 m in width (3 m either side of the center line), untarred, and will connect existing untarred roads to the ventilation shafts.

- The **North Ventilation Shaft 3** (herewith referred to as North Shaft) Access road will be approximately 308 m in length and will require an area of approximately 2,464 m<sup>2</sup> to be cleared. This road will branch from an existing untarred community road within close proximity to a watercourse (referred to as Road 1 in Figure 2);
- The **Merensky Shaft** (herewith referred to as South Shaft) Access road will be approximately 198 m in length and will require an area of approximately 1,586 m<sup>2</sup> to be cleared (referred to as Road 2 in Figure 2).

The field work for this study focussed on the proposed access road footprints and their immediate vicinity. When discussing the specific characteristics of the two proposed development footprints/Project sites, reference is made to either the 'North Shaft Access Road' or the 'South Shaft Access Road'. When discussing broader-scale ecological characteristics or processes, reference is also made to 'Modikwa'.

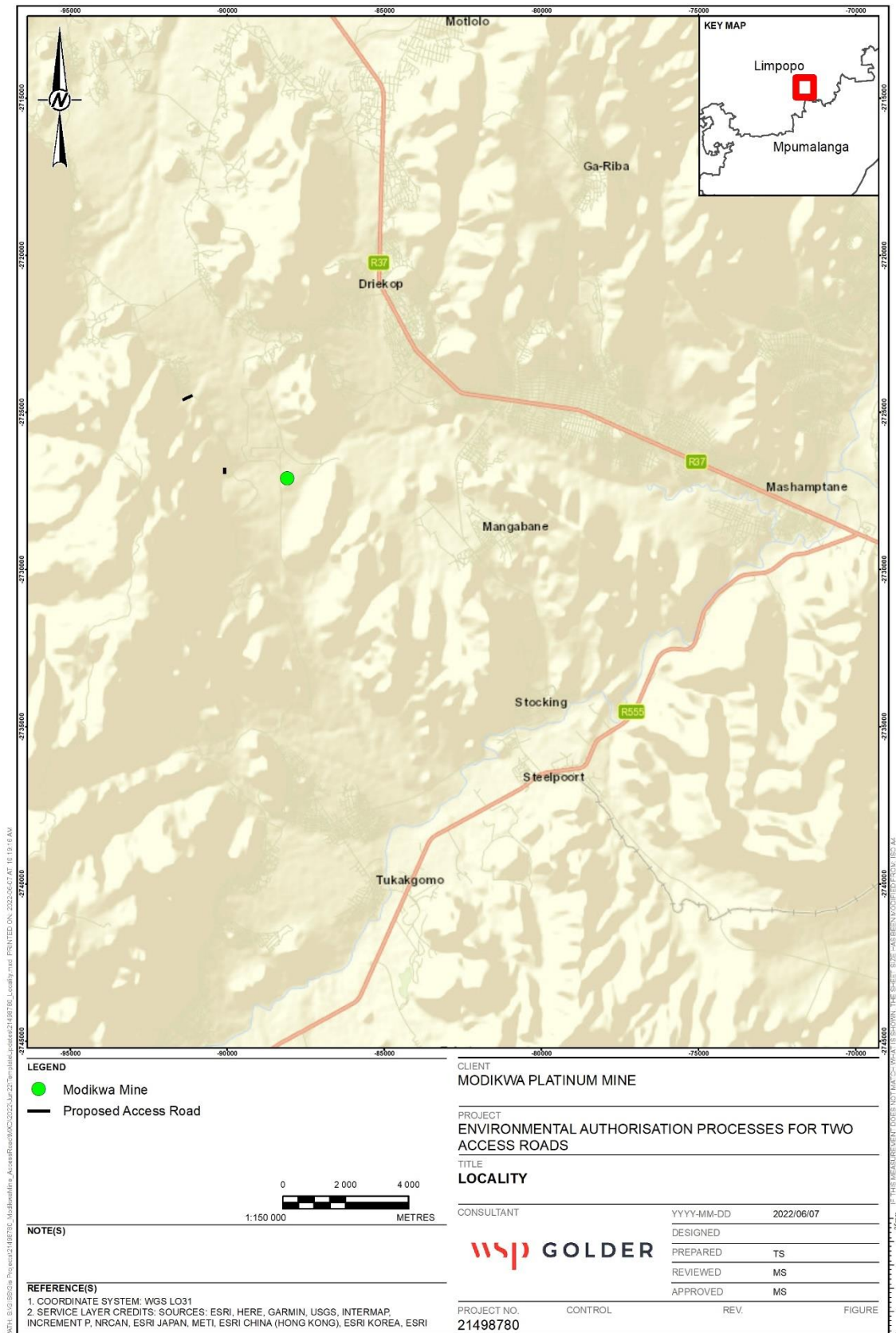


Figure 1: Location of Modikwa Platinum Mine and proposed access roads.



Figure 2: The location of the two proposed access roads at Modikwa Platinum Mine.

### 3.0 APPLICABLE LEGISLATION, GUIDELINES AND POLICY

Applicable national and provincial legislation, associated regulations and policies that are pertinent to biodiversity, which were used to guide this study, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
  - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
  - ToPS – National lists of critically endangered, endangered, vulnerable and protected species (2007);
  - National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
  - National list of alien and invasive species (2016);
- Environment Conservation Act (Act No. 73 of 1989), specifically the Lists of declared weeds and invader plants (CARA, 1983);
- National Water Act (Act No. 36 of 1998); Limpopo Environmental Management Act (Act No. 7 of 2003)
- Limpopo Environmental Management Act (2003), specifically Schedules 2, 3, 10, 11 and 12 concerning Specially Protected and Protected flora and fauna; and
- National Protected Area Expansion Strategy (2016).

Recent, relevant South African national policies and guidance were also taken into consideration, in the development of the baseline description and impact assessment, including:

- Draft National Biodiversity Offset Policy (2017);
- Species Environmental Assessment Guideline (SANBI, 2020).

### 4.0 METHODOLOGY

The terrestrial biodiversity specialist assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation'.

In line with the assessment and reporting requirements set out in the protocol, the terrestrial ecology assessment included two main study components; a desktop literature review, followed by a field survey. The objectives and tasks associated with these components are described below.

#### 4.1 Study Area

The study area for the Terrestrial Specialist Assessment was defined at two levels:

- The proposed development footprint, within which direct impacts on biodiversity receptors (i.e. direct habitat loss, fauna mortality) are anticipated
- The area within 20 m of the road footprint, which indirect impacts on biodiversity receptors (e.g. dust deposition, sensory disturbance) are anticipated.

## 4.2 Literature Review

The aim of the literature review was to collate and review the available ecological information related to important biodiversity and conservation features in the region, key ecological processes and function, and the likely composition and structure of local flora and fauna communities.

### 4.2.1 Ecosystem Attributes and Conservation Context

- General literature and data sources that were consulted during the desktop literature review component to provide an overview of the ecological and conservation context of Modikwa included:
  - Mucina and Rutherford (2011) for a full description of the relevant regional vegetation type, and Scholes and Walker (1993) for a biome-level description;
  - The Limpopo Conservation Plan Version 2 (2013) (Desmet, *et al.*, 2013);
  - The National List of Threatened Ecosystems (NEMBA Threatened Ecosystems, 2011);
  - The South African Protected Areas Database website (SAPAD, 2021) to identify protected areas (legally gazetted) and conservation areas in the landscape surrounding Modikwa;
  - Marnewick, *et al.*, (2015) for a description of Important Bird Areas (IBA) in the region surrounding Modikwa; and
  - The Strategic Water Source Areas (SWSA) and National Freshwater Ecosystem Priority Area (NFEPA) databases for information on the hydrological setting of Modikwa.

### 4.2.2 Flora

- A list of flora species that were previously recorded in the Modikwa region and as such may be present in the proposed Project sites was obtained from SANBI's online Botanical Database of Southern Africa (BODATSA);
- Data on vegetation and flora presented in the 2015 terrestrial ecology assessment report for the construction of the vent shaft and crusher plant at Modikwa (SAS, 2015) was also reviewed;
- The list of potential flora species was cross-referenced against both national and provincial lists of threatened and/or protected flora (refer to Section 4.4) to determine the conservation status of flora species that are potentially present; and
- Available aerial imagery was also studied to identify potential land/habitat units in the proposed Project footprints, and to guide the field survey.

### 4.2.3 Fauna

The previous terrestrial ecology assessment report (SAS, 2015) for the construction of the vent shaft and crusher plant at Modikwa was reviewed to obtain lists of mammals, birds, herpetofauna (amphibians and reptiles) and arthropods previously recorded at Modikwa. These data were augmented with the following:

- A list of mammals that are known to occur in the broader region based on the historic distribution ranges presented in Stuart and Stuart (2007) and data extracted from the MammalMAP database (FitzPatrick Institute of African Ornithology, 2022) for the 2430CA Quarter Degree Square (QDS);
- A list of expected bird species from South African Bird Atlas Project 2 (SABAP2, 2021) records for the pentads that encompass Modikwa and the immediate surrounding landscape;
- Lists of herpetofauna potentially occurring on-site were sourced from FrogMAP and ReptilesMAP (FitzPatrick Institute of African Ornithology, 2022) for the 2430CA Quarter Degree Square (QDS); and



- Lists of spiders and scorpions potentially occurring on-site were sourced from SpiderMAP and ScorpionMAP (FitzPatrick Institute of African Ornithology, 2022) for the 2430CA Quarter Degree Square (QDS).

### 4.3 Field survey

The desktop assessment is supported by a single wet-season field survey that was conducted from 17 – 18 March 2022.

#### 4.3.1 Flora and Vegetation

- Field work focused on assessing the character and condition of vegetation within the proposed Project site/footprints (i.e., the proposed access road corridors);
- Vegetation was sampled using timed-meander searches. Each proposed access road route was walked in a meandering fashion covering an approximate 40 m wide corridor. All flora species observed within the corridor were recorded along with estimated abundances. Notes were also made on vegetation structure, general soil characteristics, local topography and onsite/adjacent land uses and disturbances;
- Reference works that were used to identify flora species included Van Wyk and Van Wyk (1997), Van Oudtshoorn (1999), Coates Palgrave (2002), Schmidt *et al.*, (2002), Van Der Walt (2009), Crouch *et al.*, (2011) and Smith *et al.*, (2017); and
- Flora nomenclature is based on Germishuizen *et al.*, (2006) or more recent name changes, as presented in SANBI's Red List of South African Plants website.

#### 4.3.2 Fauna

- Opportunistic observations and encounters of fauna in the field were recorded, along with any observations of the presence of fauna, such as scats, tracks, burrows, etc. No formal fauna trapping or detailed surveys were conducted during the field visit; and
- Notes on general habitat condition, connectivity and disturbances were also made, and used to inform the habitat suitability assessments of fauna species of conservation concern that potentially occurring in the area (refer to Section 4.5)

### 4.4 Assessment of Species of Conservation Concern

Flora and fauna species of conservation concern were defined as those listed as either threatened or near threatened on the national Red Lists, as well as species listed as Protected (or Specially Protected), according to national and/or provincial legislation. These included:

- Red List of South African Plants (SANBI, 2020);
- Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al.*, 2015)
- Red List of Mammals of South Africa, Lesotho and Swaziland (Child *et al.*, 2016);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.*, 2014);
- IUCN Red List of Threatened Species for amphibians (IUCN, 2021-3);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) - Threatened or Protected Species List (Notice 389 of 2013) (NEMBA ToPS List, 2007);
- National Forest Act (Act No. 84 of 1998) list of protected tree species; and
- Limpopo Environmental Management Act (2003), specifically Schedules 2, 3, 10, 11 and 12 concerning Specially Protected and Protected flora and fauna.

## 4.5 Habitat Suitability Assessment of Species of Conservation Concern

A 'probability of occurrence' for species of conservation concern categorised as threatened, near threatened and/protected, that were determined to potentially occur on-site was established by conducting habitat suitability assessments. The flora habitat suitability assessments focused on the direct disturbance footprint of each proposed access route, while those for fauna focused on broader habitat suitability at Modikwa. The following parameters were used in these assessments:

- Habitat requirements: Most threatened species have very specific habitat requirements. The presence of these habitats in and adjacent to the Project area was evaluated;
- Habitat status: The status or ecological condition of available habitat was assessed. Often a high level of habitat degradation will negate the potential presence of sensitive species; and
- Habitat linkage: Dispersal and movement between natural areas for breeding and feeding are important population-level processes. Habitat connectivity in and adjacent to the Project area and to surrounding natural habitat and corridors was evaluated to determine the likely persistence of species of conservation concern.

Probability of occurrence is presented in the following categories:

- Recorded: Any species of conservation concern observed/documentated during the field visit;
- Probable: The species is likely to occur on the site due to suitable habitat and resources being present on the site;
- Possible: The species may occur on the site, or move through the site (in the case of mobile species), due to potential habitat and/or resources; and
- Unlikely: the species will not likely occur on the site due to lack of suitable habitat and resources, or significant differences in its Area of Occupancy (AOO) compared to its Extent of Occurrence (EOO).

## 4.6 Alien Invasive Flora Species

Alien invasive plant species were categorised according to the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) - 2020 listing of declared alien invasive species, and Regulation 15 of the Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983).

## 4.7 Flora of Medicinal Value

Many common and widespread flora species have medical or cultural utility to humans, and as such, have value to local communities. Flora of medicinal value recorded during the field survey were therefore highlighted and their purported uses described based on Van Wyk, *et al.*, (2009).

## 4.8 Assessment of Site Ecological Importance

The ecological importance (sensitivity) of vegetation communities and habitats was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

- **Conservation Importance** is defined 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” (SANBI, 2020).
- **Functional Integrity** is defined as “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” (SANBI, 2020).
- **Receptor Resilience** is defined 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” (SANBI, 2020).

For tables detailing the rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, refer to Appendix A. Table 1 presents a guideline for interpreting the SEI (SANBI, 2020).

**Table 1: 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 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.
<b>Source: SANBI (2020).</b>	

## 4.9 Impact Assessment

Impacts were identified for the construction and operational phases. For impacts identified, the standard national approach to the assessment of the significance of the identified impacts was conducted (Section 8.0).

### 4.9.1 Impact Assessment Methodology (for new/changed impacts)

The significance of identified impacts will be determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further subdivided as follows (Table 2):

**Table 2: Impact Assessment Factors**

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude of impact

The four ranking scales used to assess the factors for each impact are outlined in Table 3.

**Table 3: Impact assessment scoring scales**

Magnitude	Duration
10- Very high/unknown	5- Permanent (>7 years)
8- High	4- Long-term (6-7 years, impact ceases after site closure has been obtained)
6- Moderate	3- Medium-term (3 months-7 years, impact ceases after the operational life of the activity)
4- Low	2- Short-term (0 - 3 months, impact ceases after the construction phase)
2- Minor	1- Immediate
Scale	Probability
5- International	5- Definite/Unknown
4- National	4- Highly Probable
3- Regional	3- Medium Probability
2- Local	2- Low Probability
1- Site Only	1- Improbable
0- None	0- None

The following definitions are applicable to the ranking scales outlined above:

- **Magnitude:** is a measure of the degree of change in a measurement or analysis (e.g., the area of pasture or the concentration of a metal in water compared to the water quality guideline value for the metal), and is classified as none/negligible, low, moderate or high. The categorisation of the impact magnitude may be based on a set of criteria (e.g. health risk levels, ecological concepts and professional judgement) pertinent to each of the discipline areas and key questions analysed. The various levels of magnitude, as applicable to this study, are summarised in Table 4. Appropriate, widely recognised standards are to be used as a measure of the level of impact;
- **Scale/Geographic extent:** refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international;
  - International- activity expected to have an impact beyond the South African boundary;
  - National- activity expected to have a nationwide impact (South Africa);
  - Regional- activity expected to have impact on the Sekhukune Plains Bushveld and the Sekhukune Mountains Bushveld;
  - Local- activity expected to have an impact on a local extent (within the Modikwa Mining Right footprint)
  - Site- predicted impacts will be restricted to proposed North and South Shaft Access Road footprint.

- **Duration:** refers to the length of time over which an environmental impact may occur i.e. immediate/transient, short-term (0 to 3 months), medium-term (3 months to 7 years), long-term (greater than 7 years with impact ceasing after closure of the project), or permanent; and
- **Probability of occurrence:** is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40% to 60% chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur).

**Table 4: Magnitude definition for biodiversity assessment**

Magnitude	Biodiversity Context
Minor	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation
Low	Minor shift away from existing baseline conditions. Change arising from the loss/disturbance will be discernible, but underlying character, composition and/or attributes of the baseline condition will be similar to pre-development circumstances or patterns. Having a minor effect on the known population/range of a species of concern, or extent of a natural habitat or an ecosystem of concern.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed. Loss of a moderate proportion of the known population/range of a species of concern, or extent of an ecosystem of concern
High	Major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed. Loss of a high proportion of the known population/range of a species of concern, or extent of an ecosystem of concern
Very High / Unknown	Total loss of key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed. Total loss of the known population/range of a species of concern, or extent of an ecosystem of concern

Once these factors are ranked for each impact, the significance of the two aspects, occurrence and severity, is assessed using the following formula:

$$\text{Significance Points} = (\text{Magnitude} + \text{Duration} + \text{Scale}) \times \text{Probability}.$$

The maximum value is 100 significance points (SP). The impact significance will then be rated as follows:

Points	Significance	Description
SP>60	High environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 - 60	Moderate environmental significance	An impact or benefit which is sufficiently important to require management, and which could have an influence on the decision unless it is mitigated.
SP<30	Low environmental significance	Impacts with little real effect and which will not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

## 4.10 Study Assumptions and Limitations

The following assumptions, uncertainties and gaps in knowledge are highlighted for this biodiversity assessment:

### 4.10.1 Data used for Specialist Assessments

- Field work was conducted over a two-day period in March 2022 and focused specifically on the proposed access road development footprints. This period coincides with the end of the summer rainy season. It is thus possible that certain herbaceous taxa that are most readily visible or distinguishable when in leaf or flower during the early and mid- wet season, may have been overlooked during field visit;
- The absence or non-recording of a specific fauna species, at a particular time, does not necessarily indicate that 1) the species does not occur there; 2) the species does not utilise resources in that area; or 3) the area does not play an ecological support role in the ecology of that species.

### 4.10.2 Assumptions, uncertainties, or gaps in knowledge

- Given the limitations in fully sampling and characterising the abundance and distribution of flora and fauna species in the study area during the short period of time allocated to field work, the baseline descriptions were qualitative; and
- The delineation of habitat units was conducted using available Google Earth imagery and GPS-mapped observations made during the field visit, and as such is limited by, *inter alia*, the spatial and resolution accuracy of the imagery and hand-held GPS.

## 5.0 TERRESTRIAL BIODIVERSITY BASELINE DESCRIPTION

### 5.1 Regional Vegetation Characteristics

Based on SANBI's (2018) updated delineations of Mucina and Rutherford's (2011) regional vegetation map, both proposed Project sites are located within the Sekhukhune Plains Bushveld (SVcb27) vegetation type of the savanna biome. Sekhukhune Mountains Bushveld (SVcb28) characterises the mountains to the immediate

west of each site ((Figure 3). These vegetation types form part of a unique, serpentine-related floristic region known as the Sekhukhuneland Centre of Plant Endemism (Siebert *et al.* 2002).

The floristic and vegetation attributes of the savanna biome, Sekhukhune Plains Bushveld is summarised in Sections 5.1.1 to 5.1.3. A brief description of the Sekhukhuneland Centre of Plant Endemism is presented in Section 5.1.3.

### 5.1.1 Savanna Biome

The savanna biome is the largest biome in South Africa, covering approximately 35% of the country's land surface (Scholes and Walker, 1993). Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, yet distinct woody plant component. Primary determinants of savanna composition, structure and functioning are; fire, a distinct seasonal climate, substrate type, and browsing and grazing by large herbivores (Scholes and Walker, 1993).

Compositionally, Africa's savannas are distinguished as either fine-leaved savannas or broad-leaved savannas. The distribution of these forms is based primarily on soil fertility (Scholes and Walker, 1993); fine-leaved savannas occur on nutrient rich soils and are dominated by microphyllous woody species of the Fabaceae family (most commonly indigenous *Acacia*'s). These savannas have a productive and diverse herbaceous layer that is dominated by grasses and can support large populations of mammalian herbivores (Scholes and Walker, 1993). Conversely, broad-leaved savannas usually occur on nutrient poor soils and are dominated by macrophyllous woody species from the Combretaceae family (common genera: *Combretum* & *Terminalia*). Compared to fine-leaved savannas, broad-leaved savannas are less productive and support a lower herbivore biomass (Scholes and Walker, 1993). The study area is located in a region historically characterised by broad-leaved savanna.

### 5.1.2 Vegetation Classification

Based on Mucina and Rutherford's (2011) and the recently updated vegetation classification map by SANBI (2018) the study area is located within the– Sekhukhune Plains Bushveld (Figure 3). The key characteristics of the Sekhukhune Plains Bushveld vegetation type is described in the section that follow.

#### 5.1.2.1 Sekhukhune Plains Bushveld

The Sekhukhune Plains Bushveld vegetation type extends along the lowland areas of the Steelpoort River from Burgersfort in the south through to Jobskop and Legwareng in the north, whereupon it stretches through the Olifants River basin to Tswaing, and the Lepellane and Mohlaletsi Rivers. It is characterised by semi-arid plains and open valleys surrounded by chains of small mountains and hills (Mucina & Rutherford, 2011).

Based on Mucina & Rutherford's (2011) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species as important taxa in the Sekhukhune Plains Bushveld vegetation type:

**Trees:** *Vachellia nilotica*, *Vachellia erioloba*, *Senegalia mellifera* subsp. *detinens*, *Vachellia tortilis* subsp. *heteracantha*, *Philenoptera violacea*, *Albizia anthelmintica*, *Boscia foetida* subsp. *rehmanniana*, *Balanites maughamii*, *Combretum imberbe*, *Schotia brachypetala*, *Commiphora glandulosa*, *Ziziphus mucronata*, *Dichrostachys cinerea*, *Searsia engleri*, *Cadaba termitaria*, *Rhigozum brevispinosum* and *Rhigozum obovatum*.

**Shrubs:** *Felicia clavipilosa*, *Seddera suffruticosa*, *Gnidia polycephala*, *Gossypium herbaceum*, *Jamesbrittenia atropurpurea*, *Jatropha latifolia* var. *latifolia*, *Lantana rugosa*, *Melhaniania rehmannii*, *Monechma divaricatum*, *Aloe crytopoda*, *Euphorbia enormis*, *Kleinia longiflora*.

**Graminoides:** *Enneapogon cenchroides*, *Eragrostis barbinodis*, *Panicum maximum*, *Panicum coloratum*, *Schmidtia pappophoroides*, *Aristida adscensionis*, *Aristida congesta*, *Tragus berteronianus*, *Stipagrostis hirtiglumis* and *Urochloa mossambicensis*.

**Herbs:** *Becium filamentosum*, *Phyllanthus maderaspatensis*, *Ipomoea magnusiana*, *Blepharis integrifolia*, *Corchorus asplenifolius* and *Hibiscus praeteritus*.

**Endemic Taxon:** A number of species are endemic to the Sekhukhune Plains Bushveld including *Lydenburgia cassinoides*, *Nuxia gracilis*, *Amphiglossa triflora*, *Asparagus fourei*, *Hibiscus barnardii*, *Orthosiphon fruticosa*, *Petalidium oblongifolium*, *Searsia batophylla*, *Asparagus sekukuniensis*, *Aneilema longirrhizum*, *Chlorophytum cyperaceum* and *Piaranthus atosanguineus*.

### 5.1.3 Sekhukhuneland Centre of Plant Endemism

The Sekhukhuneland Centre of Plant Endemism (SCPE) stretches from southern Limpopo Province into Mpumalanga Province and includes the towns of Steelpoort, Burgersfort, Roossenkall, Schoonoord Mecklenburg and Sekhukhune (Siebert, *et al.*, 2002). It is approximately 4 000 km<sup>2</sup> in extent and straddles much of the north-eastern Drakensburg Escarpment (Siebert, *et al.*, 2002).

The topography of the Sekhukhuneland region is diverse, but mostly characterised by mountains and flat to undulating valleys. The regions ultramafic rocks, which are exposed as surface outcrops, form part of the mineral rich Rustenburg Layered Suite. They derive soils comprising mainly red or black montmorillonitic clays that display high heavy metal concentrations (Siebert, *et al.*, 2002). The mineral rich soils, coupled with local topography, geology and climate have resulted in the evolution of the SCPE's unique serpentine-related flora assemblage, which consists of many endemic species.

From a botanical perspective, the SCPE is of considerable conservation value. Siebert, *et al.*, (2002) indicate that the destruction of the plant communities in the SCPE could potentially lead to the extinction of several plant species, as both the population size and area of occupancy (AOO) of many endemic species is small.



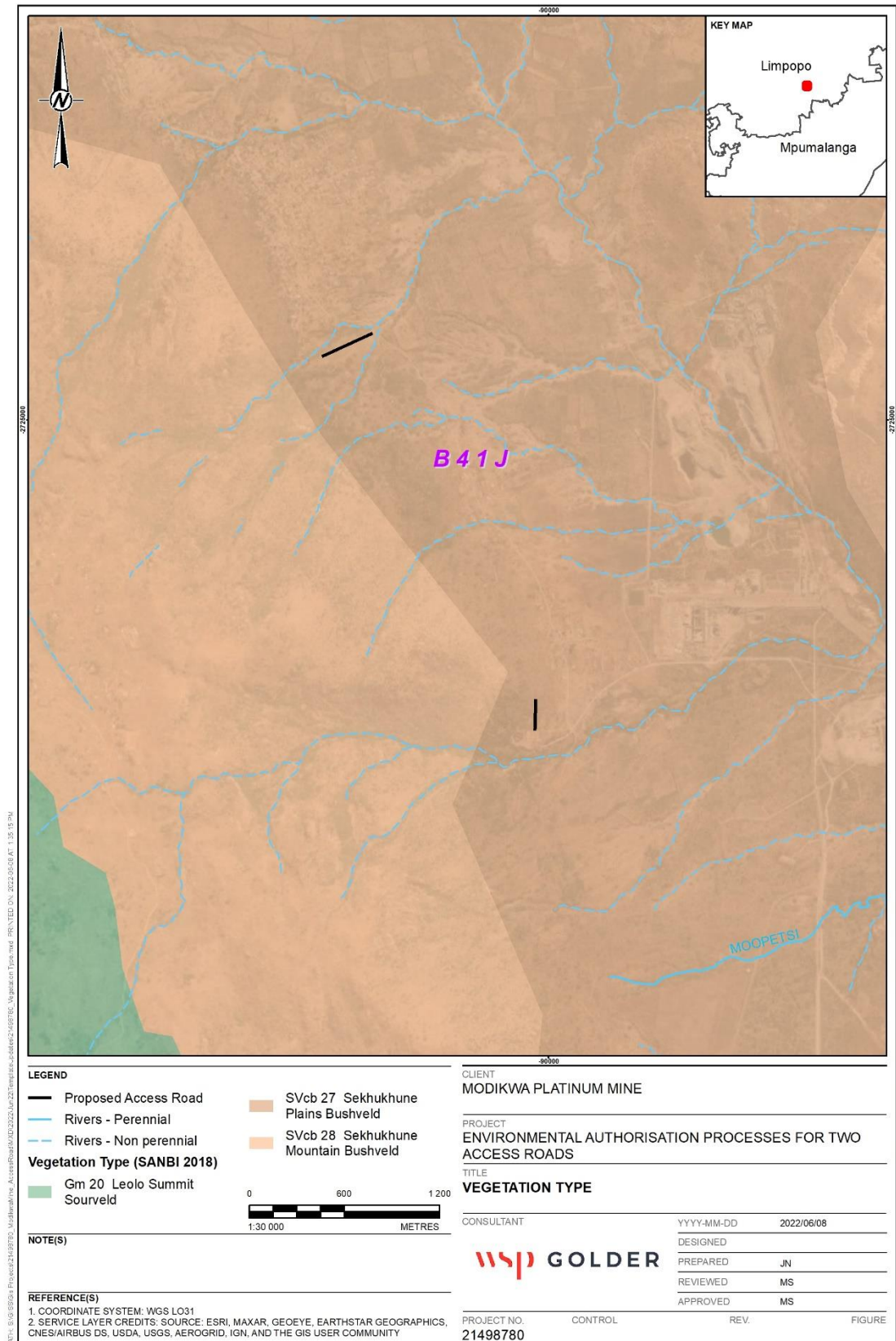


Figure 3: Study area vegetation type (SANBI, 2018)

## 5.2 Environmental Screening Tool

The proposed Project footprint was assessed at desktop level using the National Web-based Environmental Screening Tool. According to the National Web Based Screening Tool:

- The Terrestrial Biodiversity Theme for the study area is rated as ‘Very High Sensitivity’ on account of land designated as Critical Biodiversity Area 1 (CBA 1), CBA 2, Ecological Support Area 1 (ESA 1), ESA 2, and the presence of the Apiesboomen Private Nature Reserve;
- The Plant Species Theme is rated as ‘Medium Sensitivity’, on account of the potential presence of 11 threatened flora species (Table 5); and
- The Animal Species Theme was also rated ‘Medium Sensitivity’ on account of the potential presence of nine threatened fauna species, including four mammals, two birds, two reptiles and one invertebrate taxa (Table 5).

**Table 5: Animal Species as identified in the Environmental Screening Tool**

Plant Species	Animal Species
Invertebrate - <i>Aroegas fuscus</i>	<i>Asparagus fouriei</i>
Aves - <i>Sagittarius serpentarius</i>	<i>Asparagus sekukuniensis</i>
Aves - <i>Aquila verreauxii</i>	<i>Plectranthus venterii</i>
Mammalia - <i>Chrysospalax villosus</i>	<i>Polygala sekhukhuniensis</i>
Mammalia - <i>Crocidura maquassiensis</i>	<i>Searsia batophylla</i>
Mammalia - <i>Dasymys robertsii</i>	<i>Searsia sekhukhuniensis</i>
Mammalia - <i>Hydriectis maculicollis</i>	<i>Combretum petrophilum</i>
Sensitive species 1*	Sensitive species 1252*
Sensitive species 2*	Sensitive species 1033*
	Sensitive species 587*
	Sensitive species 92*

\*Sensitive species names can be provided upon request

Details on the conservation status of these species (plant and animals) is provided in section 5.5 and 5.6)

## 5.3 Conservation Management Context

The proposed development site was compared to available spatial biodiversity planning datasets in order to assess the local and regional biodiversity context of the site. The following datasets were considered:

- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
  - ToPS – National lists of critically endangered, endangered, vulnerable and protected species (2007);
  - National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
  - National list of alien and invasive species (2016);
- Limpopo Conservation Plan (V2)
- The South African Protected Areas Database (SAPAD)

### 5.3.1 Nationally Threatened Ecosystems

The SANBI Threatened Ecosystems (2018) lists the Sekhukhune Plains Bushveld as endangered Least Threatened (Figure 4), based high levels of natural habitat conversion, high levels of endemism, and better fine-scale mapping. This is reflected in the delineations of the Limpopo Conservation Plan (V2) – see Section 5.3.2.

### 5.3.2 Limpopo Conservation Plan

According to the Limpopo Conservation Plan (V2), the proposed North Shaft Access Road is located on land designated as Ecological Support Area 1 (ESA1). The mountain chain to the immediate west of this site is designated as Critical Biodiversity Areas 2 (CBA 2) and extends southward to encompass the proposed South Shaft Access Road – shown in Figure 5.

Areas designated as CBA 2 have been selected to meet biodiversity pattern and/or ecological process targets in the Limpopo Province (Desmet, *et al.*, 2013). The assigned management objectives of CBA2 land include *inter alia* maintenance in a natural state and minimising impact on threatened species (Desmet, *et al.*, 2013). Areas designated as ESA1 are natural and degraded habitats that support CBA by maintaining ecological processes. The land management objectives of areas designated ESA 1 are to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity (Desmet, *et al.*, 2013). According to Desmet, *et al.* (2013), activities such as road development are generally incompatible with both CBA 2 and ESA 1, however certain elements may be allowed subject to detailed impact assessment.

### 5.3.3 Protected Areas and Conservation Areas

According to the SAPAD (2022), the nearest formal protected area to Modikwa is Apiesboomen Private Nature Reserve, which is located to the south-east of Modikwa, approximately 6.6 km to the east of the proposed South Shaft Access Road site and 8.7 km south-east of the proposed North Shaft Access Road site. Apiesboomen Private Nature Reserve was declared a protected area in 1962 and is approximately 3 375 ha in extent (Figure 6) (SAPAD, 2022).

Bordering on the south-eastern boundary of the Apiesboomen Private Nature Reserve is Luiperdhoek Private Nature Reserve (1 959 ha) and Glen Ora Private Nature Reserve (2 196 ha). The Kruger to Canyons Biosphere is located 52 km to the west of Modikwa (SAPAD, 2022).

#### 5.3.3.1 Important Bird Areas

Modikwa is not located within or near an Important Bird Area (IBA) (Marnewick, *et al.*, 2015).

### 5.3.4 Strategic Water Source Areas

No strategic water source areas occur in the region of the proposed development footprint, and as such are not included as receptors for the current impact assessment or considered further here.

### 5.3.5 Freshwater Ecosystem Priority Area (FEPA) sub-catchments

The proposed development footprint in relation to Freshwater Ecosystem Priority Areas (FEPA) sub-catchments and National Freshwater Ecosystem Priority Areas (NFEPA) wetlands is illustrated on Figure 7.

According to the NFEPA\_ FEPAs mapping of sub-quaternary catchments, Modikwa is located in the Steelpoort Sub Water Management Area. Modikwa is not however, located within a Fish Support Area (FSA).

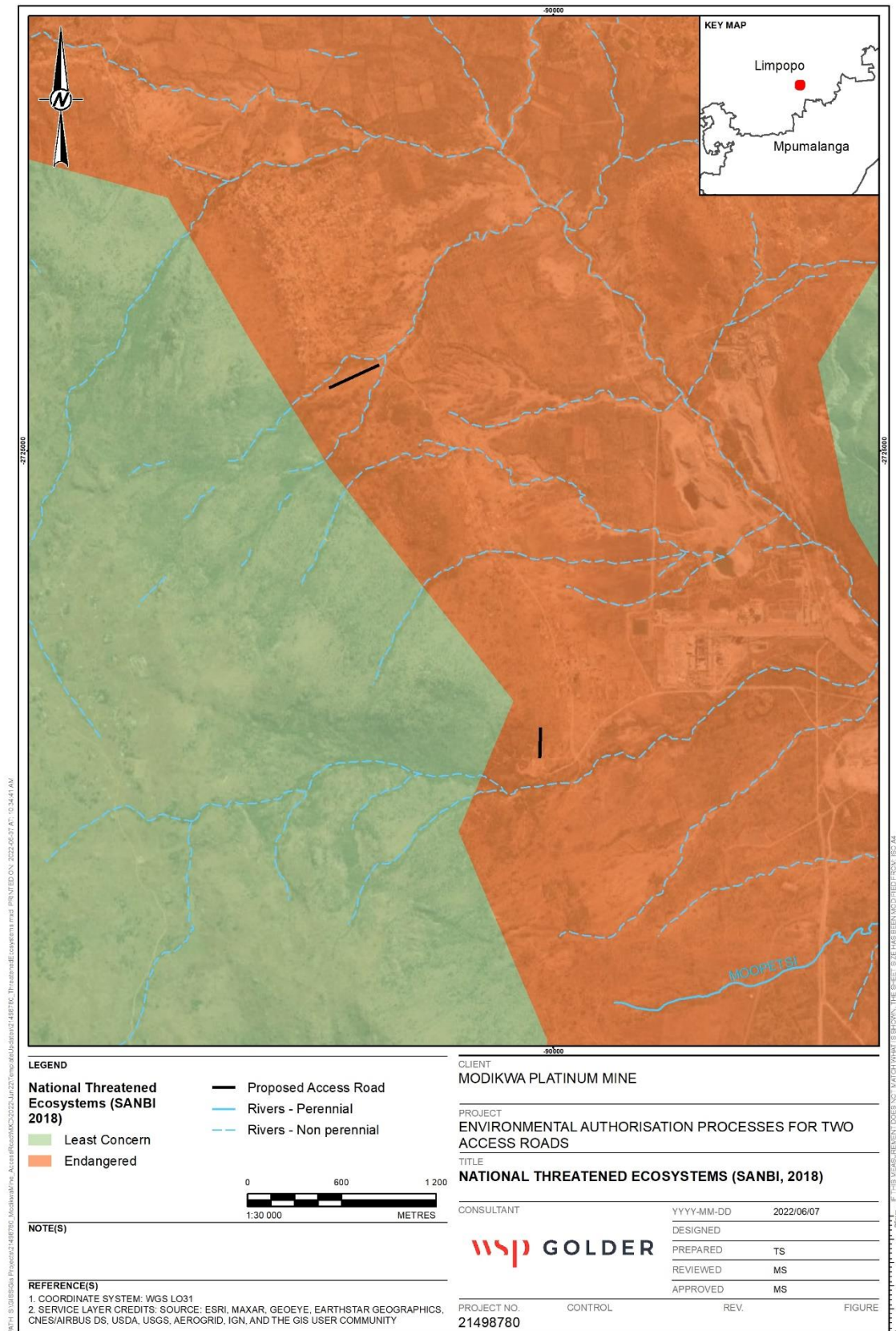


Figure 4: The proposed Project sites in relation to the National Threatened Ecosystems (SANBI, 2018).

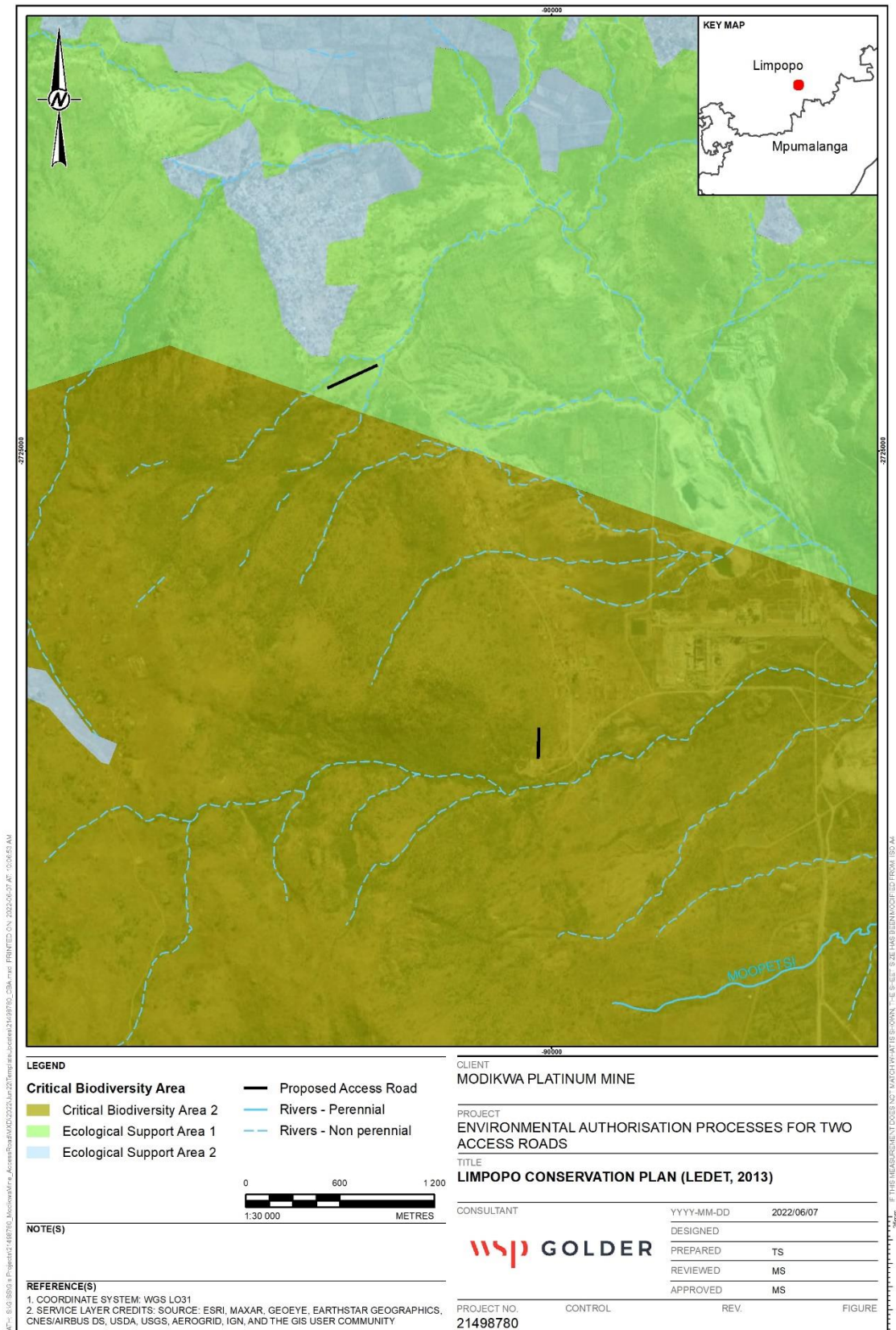


Figure 5: Modikwa Platinum Mine and the proposed Project sites in relation to delineations of the Limpopo Conservation Plan (2013).



Figure 6: Protected Areas in the landscape surrounding Modikwa Platinum Mine.

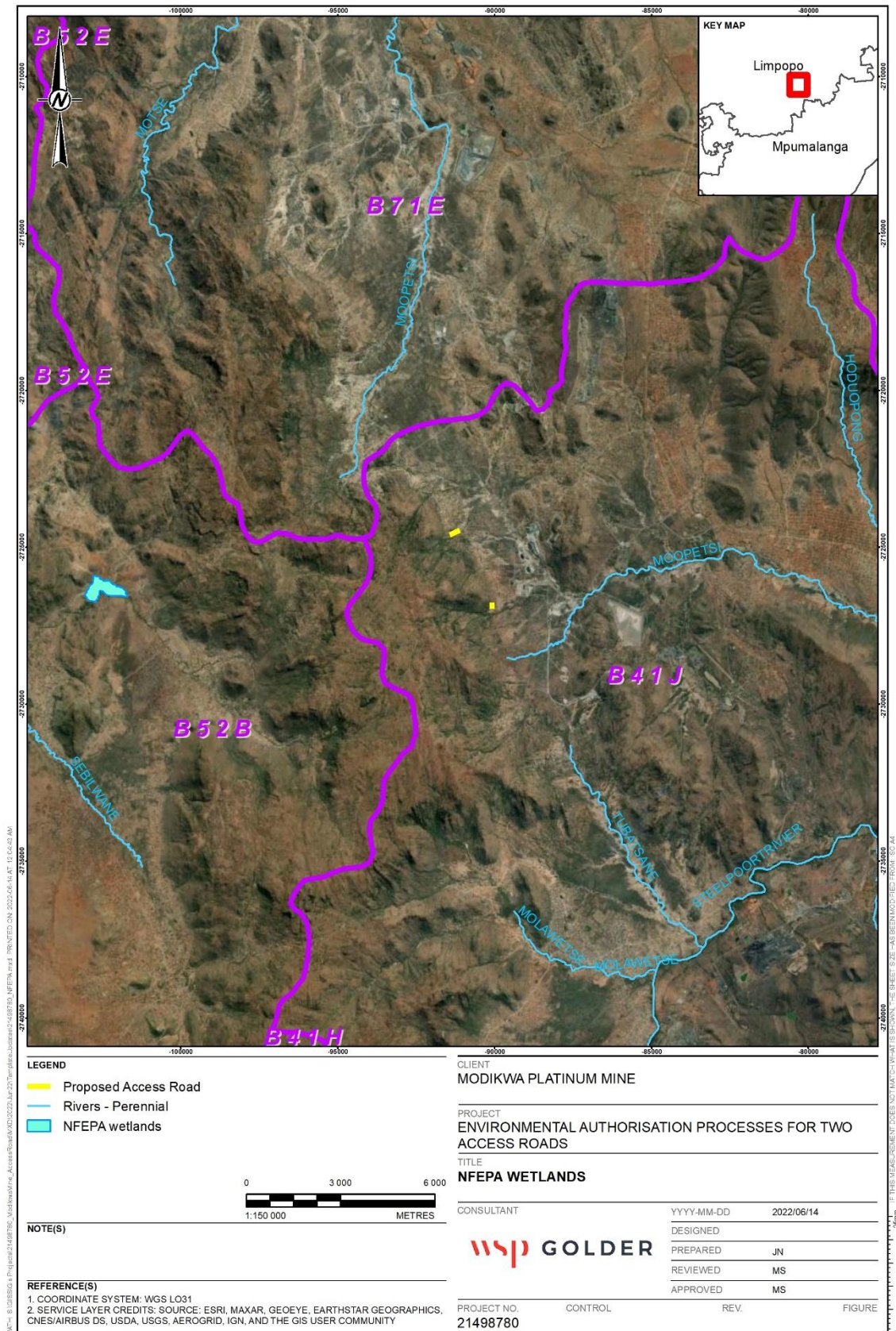


Figure 7: Proposed Project sites in relation to NFEPA wetlands.

## 5.4 Landscape Setting and Existing Impacts

## 5.5 Vegetation and Flora Assessment

### 5.5.1 Landscape Setting and Existing Impacts

The key features and character of the landscape surrounding the two proposed access road sites and any existing ecological impacts and disturbances are summarised as follows:

- Modikwa is located in a complex landscape matrix, characterised by several large modified and developed sites that are embedded within a broader network of mountain and valley-bottom savanna habitat, as well as non-perennial drainage lines and channels (Figure 8).
- Modified and developed sites in the immediate landscape include numerous small rural villages (see Figure 9 and Figure 10), larger residential communities (mostly along the R37 arterial road), various mine and mine-related facilities, old cultivated fields, and large eroded areas associated with drainage lines;
- The landscape is also fragmented by numerous formal and informal roads and access tracks. These are associated with both local mining operations and rural communities;
- Apart from livestock farming, which appears to be mostly cattle and goats, agricultural activities observed include small-scale subsistence cultivation in fertile bottom-land areas that are located adjacent to drainage features;
- Drainage features in the landscape include several small ephemeral drainage lines as well as the larger Moopetsi River, which flows through the centre of the Modikwa property;
- It is expected that harvesting of natural resources and possibly subsistence hunting by members of local communities is taking place in the landscape;
- The North Shaft 3 Access Road site borders on the southern boundary of Mamphahlane village (Figure 10). Mamphahlane is a fairly large village, and is characterised by numerous small residential dwellings, and apart from scattered trees, is largely denuded of vegetation. Much of the remaining land to the east of the proposed North Shaft Access Road site is undeveloped, but degraded by severe soil erosion and the presence of a number of old abandoned cultivated fields. Land to the west of the proposed North Shaft Access Road site is undeveloped and comprises open, mountainous savanna and well-wooded drainage line habitat;
- The Merensky Shaft facility dominates land to the immediate south of the proposed South Shaft Access Road footprint (shown in Figure 11). Land to the east of this site is characterised by a mosaic of modified and developed areas associated with Modikwa mine facilities, residential villages, and natural savanna habitat displaying varying levels of disturbance. Land to the west of this site comprises natural, mountainous savanna; and
- Alien invasive plant species observed while traversing the landscape during the field visit were mostly recorded at developed or degraded sites (e.g., villages and road sides) and along drainage features (e.g., streams).

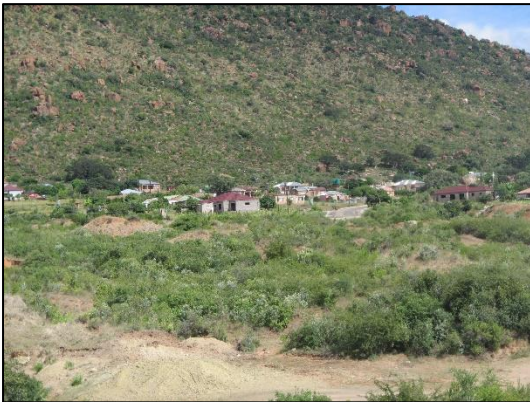




**Figure 8: Mountainous and valley-bottom savanna habitat characterises large portions of the landscape surrounding Modikwa.**



**Figure 9: Difagate village is located 400 m to the north-east of the Merensky Shaft Facility.**



**Figure 10: Mamphalane village is located to the north of the proposed North Access Road footprint.**



**Figure 11: The Merensky Shaft Facility, adjacent to the proposed South Access Road footprint. Note undeveloped mountainous habitat beyond the facility.**

## 5.5.2 Habitat Descriptions

This section presents descriptions of vegetation and habitat for both the proposed North Shaft and South Shaft Access Road sites, based on the findings of the field visit. The site level vegetation mapping is shown on Figure 15 and Figure 18.

### 5.5.2.1 North Shaft Access Road

The proposed route for the North Shaft Access Road is set in a bottomland area between two nonperennial drainage lines. The route is characterised by a highly eroded and undulating land surface, dominated by sparsely vegetated erosion gullies and broad areas of sheet erosion (see Figure 12 and Figure 13). This degradation is likely historic and caused by high levels of livestock grazing and trampling occurring on clayey/mineral rich soils that are highly susceptible to erosion.

### **Open Shrubland in Eroded Area**

In line with Edwards (1983) structural classification, vegetation structure along the proposed North Shaft Access Road route is defined as short sparse- to open shrubland, with both poorly developed woody- and herbaceous components.

Fifty-nine flora species were recorded along this proposed access road route. In terms of composition, broad-leaf species dominate the woody component. *Euclea linearis* and *Searsia keetii* are the most dominant woody species. Other frequently noted taxa include *inter alia*, *Dichrostachys cinerea*, *Diospyros lycioides* subsp. *nitens*, *Elephantorrhiza praetermissa*, *Euclea crispa*, *Grewia vernicosa*, *Hippobromus pauciflorus*, *Pavetta zeyheri* subsp. *zeyheri*, *Vitex obovata* subsp. *wilmsii* and *Ximenia americana*. The field layer is grass dominated, with *Aristida adscensionis* the most dominant species. Other noted species include *inter alia*, *Digitaria tricholaenoides*, *Diheteropogon amplexans*, *Loudetia simplex*, *Themeda triandra* and *Triraphis andropogonoides*. Common forbs/herbs include *Dicoma anomala* and *Jamesbrittenia macrantha*. For a list of flora species recorded during the field visit refer to APPENDIX C.

Flora species of conservation concern recorded along the North Shaft Access Road footprint include *Aloe marlothii*, *Elephantorrhiza praetermissa*, *Jamesbrittenia macrantha*, *Lydenburgia cassinoides*, *Polygala sekhukhuniensis*, *Searsia sekhukhuniensis* and *Sclerocarya birrea* subsp. *caffra*. Refer to Section 5.5.4 for discussion on flora species of conservation concern.

### **Drainage Channel Vegetation**

Well-defined and vegetated nonperennial drainage lines are located to the north and south of the proposed North Shaft Access Road route. Vegetation along these drainage lines is both taller and denser than the adjacent upland areas (Figure 14). Woody vegetation is characterised by many of the same species recorded along the proposed development route, along with other larger woody taxa such as the abundant *Dodonaea angustifolia*, as well as *inter alia*, *Nuxia gracilis*, *Peltophorum africanum* and *Vachellia karroo*.

These well-vegetated drainage lines emanate in the mountains to the west of the site, and drain eastward past the site, before joining a larger river/stream channel that flows through the centre of Modikwa. As such, they are functionally important as movement and dispersal corridors.



**Figure 12: View along the proposed route of the North Shaft Access Road route.**



**Figure 13: Sparsely vegetated eroded gullies.**



**Figure 14: Drainage line adjacent to the proposed North Shaft Access Road route.**

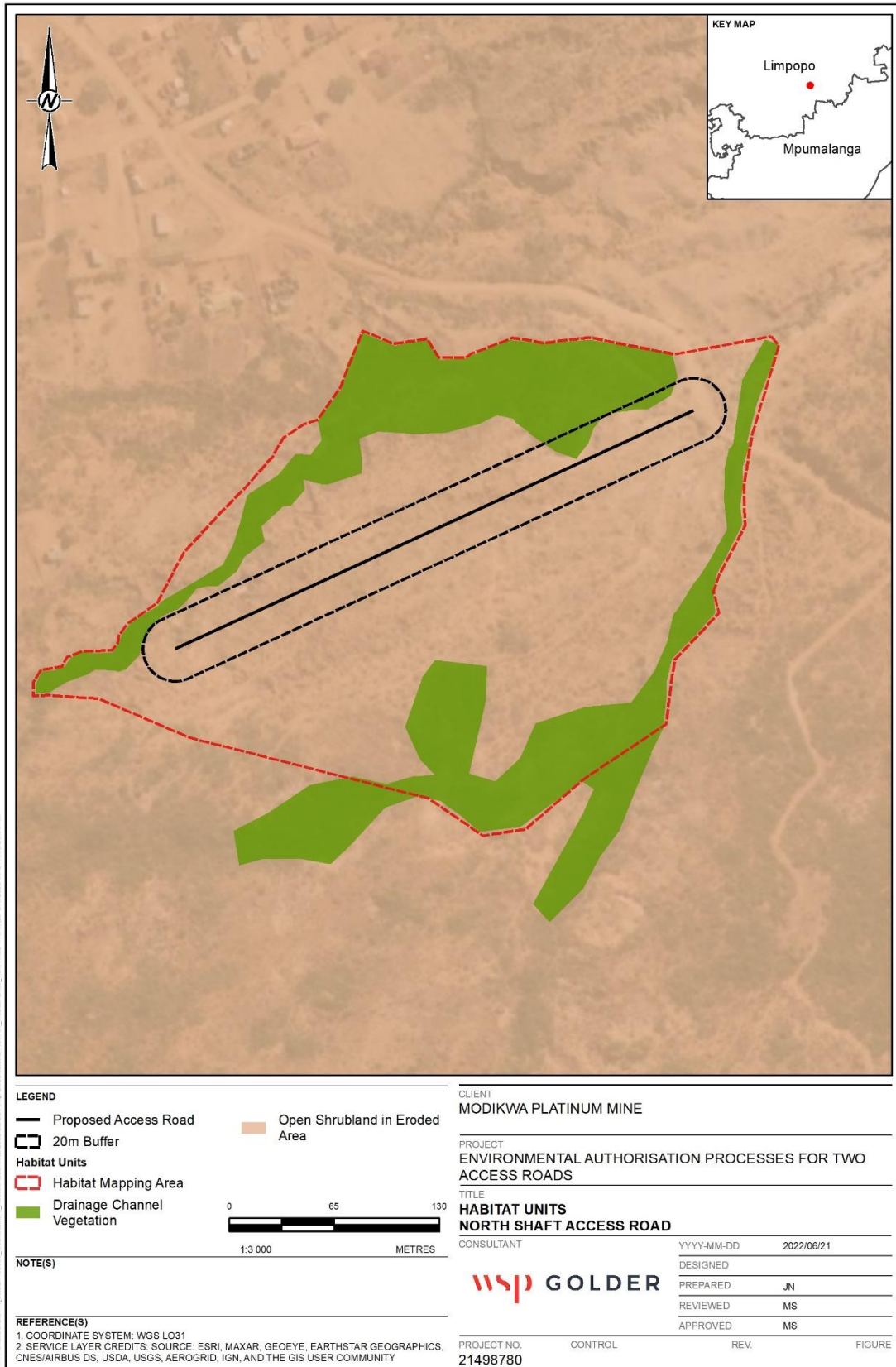


Figure 15: North Shaft Access Road Habitat Unit

### 5.5.2.2 South Shaft Access Road-Sekhukhune Mountain Bushveld

The proposed South Shaft Access Road route emanates from the Merensky Shaft Facility and traverses in a northerly direction, up the west-facing footslope of an adjacent mountain for approximately 200 m (Figure 16). The proposed route has a steep gradient and is characterised by shallow stony soils with an abundance of large surface boulders.

Vegetation immediately adjacent to the Merensky Shaft Facility has been disturbed and is dominated by alien vegetation, including the listed invasive species *Senna occidentalis* and *Xanthium spinosum*. Vegetation along the remainder of the proposed road route however, is characterised by natural well-wooded savanna habitat, that approximates Sekhukhune Mountain Bushveld.

Vegetation structure comprises low- to short, closed woodland, as per Edwards (1983) (Figure 17). Broad-leaf woody species are dominant, with a sparsely- to moderately developed herbaceous layer that is grass dominated. In terms of species composition, 71 flora species were recorded along the proposed South Shaft Access Road route. The most dominant woody species are *Elephantorrhiza praetermissa*, *Hippobromus pauciflorus* and *Vitex obovata*. Other frequently noted woody taxa include *inter alia*; *Euclea crispa*, *Grewia vernicosa*, *Lydenburgia cassinoides*, *Peltophorum africana*, *Rhoicissus sekhukhuniensis*, *Senegalia caffra*, *Tinnea rhodesiana* and *Triaspis glaucophylla*.

The herbaceous layer is grass dominated, with *Aristida adscensionis*, *Aristida aequiglumis* *Enneapogon scoparius*, *Heteropogon contortus* and *Themeda triandra* commonly recorded. Other fairly common flora taxa recorded include *inter alia*; a maculata *Aloe* species, *Lantana rugosa* and *Pellaea calomelanos* var. *calomelanos*. Refer to Appendix B for a list of all flora species recorded along this access road footprint.

Several flora species of conservation concern were recorded along this route, including *Berchemia zeyheri*, *Elaeodendron transvaalense* and *Lydenburgia cassinoides*, which are both listed as Near Threatened on the national Red List, and *Searsia sekhukhuniensis* which is listed as Rare. A single *Sclerocarya birrea* subsp. *caffra* tree was also recorded (Refer to Section 5.5.4).

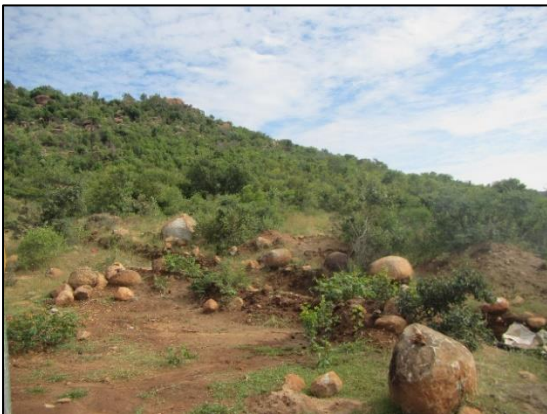


Figure 16: The route of the proposed South Shaft Access Road.



Figure 17: Low- to short, closed woodland dominates the proposed route.

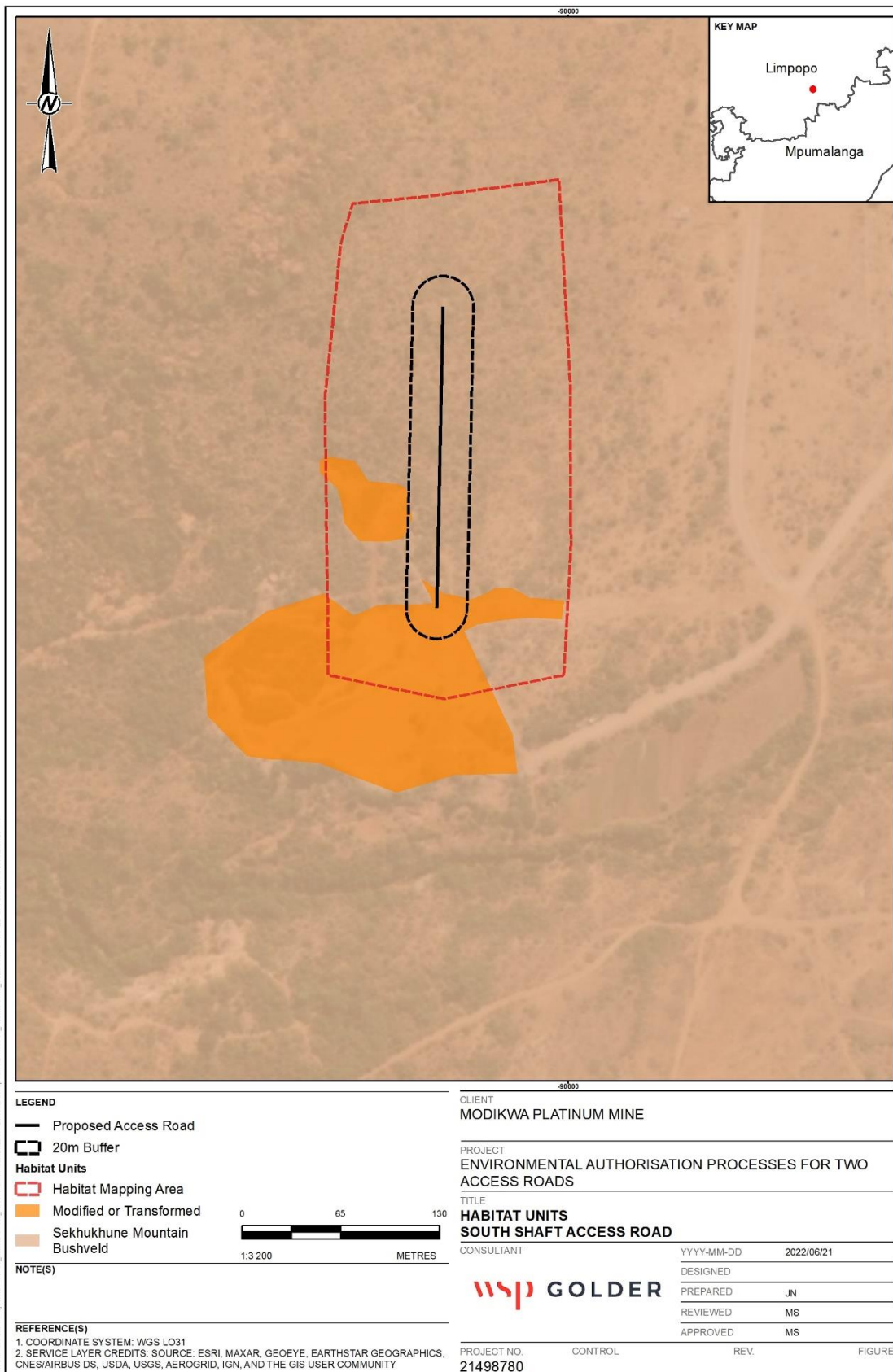


Figure 18: South Shaft Access Road Habitat Unit

### 5.5.3 Summary of General Floristics

In total, 107 flora species, representing 43 families, were identified during the field visit. The most represented family is the Poaceae with 23 species, followed by the Fabaceae with 13 species (APPENDIX C). The majority of identified species are indigenous taxa (92%), with only 8 alien taxa recorded.

Trees are the most abundant growth form with 53 species, followed by 23 graminoid species, 22 herbs, four succulents, three geophytes and 1 fern (APPENDIX C). Considering that the field visit was conducted during the late wet season, it is anticipated that additional graminoid and herb species are likely to be recorded during further seasonally representative surveys.

### 5.5.4 Flora Species of Conservation Concern

Ten flora species of conservation concern were recorded during the 2022 field visit (Table 6). These include Red List species, as well as taxa listed as either nationally or provincially protected:

- Six species are listed on the South African Red List of Threatened Species, namely *Elaeodendron transvaalense* (Near Threatened) -Figure 19, *Jamesbrittenia macrantha* (Near Threatened), *Lydenburgia cassinoides* (Near Threatened) - Figure 20, *Polygala sekhukhuniensis* (Vulnerable) *Searsia batophylla* (Vulnerable) - Figure 21, and *Searsia sekhukhuniensis* (Rare);
- Four trees are listed as protected according to the National Forest Act (Act No. 84 of 1998) – *Berchemia zeyheri*, *Elaeodendron transvaalense*, *Lydenburgia cassinoides* and *Sclerocarya birrea* subsp. *caffra* - Figure 22;
- Three species listed as protected at a provincial level according to the Limpopo Environmental Management Act (2003) - *Aloe marlothii*, *Elephantorrhiza praetermissa* and *Searsia batophylla*.

*Lydenburgia cassinoides* and *Searsia sekhukhuniensis* were noted at both the North Shaft and South Shaft Access Road sites, with *Lydenburgia cassinoides* particularly abundant at the latter site. *Jamesbrittenia macrantha* and *Polygala sekhukhuniensis* were only observed at the North Shaft Access Road, while *Berchemia zeyheri* and a single *Elaeodendron transvaalense* were observed at the South Shaft Access Road. Although not recorded in either proposed development footprint, *Searsia batophylla* was observed to occur along bottomland drainage features at Modikwa.

An additional nineteen species of conservation importance are known from the region and potentially occur at Modikwa. These are also see listed in Table 6, along with their conservation status, habitat preferences and a probability of occurrence.



**Figure 19: *Eleaodendron transvaalense* (Near Threatened).**



**Figure 20: *Lydenburgia cassinoides* (Near Threatened).**



**Figure 21: *Searsia batophylla* (Vulnerable).**



**Figure 22: *Sclerocarya birrea* subsp. *caffra* (Protected).**



**Table 6: Flora species of conservation concern recorded and potentially occurring at Modikwe Platinum Mine.**

Family	Species Name	National Red List Status (2020-1)	NEMBA ToPS Status (2007)	National Forest Act (1998)	Limpopo Protected Status	Sekhukhune Endemic	Habitat Preferences	Probability of Occurrence
Passifloraceae	<i>Adenia fruticosa subsp. fruticosa</i>	Near Threatened	-	-	-	Endemic	Arid woodland and rocky outcrops.	Probable – suitable habitat present at the South Shaft Access Road site.
Asphodelaceae	<i>Aloe marlothii</i>	Least Concern	-	-	Protected	-	Well drained gravel slopes.	Recorded - North Shaft Access Road site.
Asphodelaceae	<i>Aloe wickensii</i>	Near Threatened	-	-	-	-	Flat and gentle dolomite slopes in savanna.	Possible – suitable habitat present at both the South Shaft and North Shaft Access Road sites.
Commelinaceae	<i>Aneilema longirrhizum</i>	Near Threatened	-	-	-	Endemic	Well drained gravel slopes.	Probable – suitable habitat present at both the South Shaft and North Shaft Access Road sites.
Asparagaceae	<i>Asparagus fourei</i>	Vulnerable	-	-	-	Endemic	Mixed bushveld on rocky dolomite outcrops.	Probable – suitable habitat present at the South Shaft Access Road site.
Asparagaceae	<i>Asparagus sekukuniensis</i>	Endangered	-	-	-	Endemic	Bushveld on rocky slopes.	Probable – suitable habitat present at the South Shaft Access Road site.

Family	Species Name	National Red List Status (2020-1)	NEMBA ToPS Status (2007)	National Forest Act (1998)	Limpopo Protected Status	Sekhukhune Endemic	Habitat Preferences	Probability of Occurrence
Brassicaceae	<i>Boscia albitrunca</i>	Least Concern	-	Protected	-	-	Range of savanna types.	Possible – suitable habitat present at the South Shaft Access Road site.
Combretaceae	<i>Combretum petrophilum</i>	Rare	-	-	Protected	-	Rocky outcrops in mountain bushveld.	Probable – suitable habitat present at the South Shaft Access Road site.
Acanthaceae	<i>Dicliptera fruticosa</i>	Near Threatened	-	-	-	Endemic	Shady areas of rocky magnetite and dolomite slopes. In savanna	Possible – suitable habitat present at the South Shaft Access Road site.
Celastraceae	<i>Elaeodendron transvaalense</i>	Near Threatened	-	Protected	-	-	Range of savanna types – from open woodland to thickets.	Recorded - South Shaft Access Road site
Fabaceae	<i>Elephantorrhiza praetermissa</i>	Least Concern	-	-	Protected	Endemic		Recorded – North Shaft and South Shaft Access Road site.
Iridaceae	<i>Gladiolus sekukuniensis</i>	Vulnerable	-	-	-	Endemic	Banded ironstone in calcrete laden soils and on norite.	Probable – suitable habitat present at the South Shaft Access Road site.

Family	Species Name	National Red List Status (2020-1)	NEMBA ToPS Status (2007)	National Forest Act (1998)	Limpopo Protected Status	Sekhukhune Endemic	Habitat Preferences	Probability of Occurrence
Malvaceae	<i>Hibiscus barnardii</i>	Least Concern	-	-	Protected	Endemic	Course-grained soils amongst boulders on hillsides	Possible – suitable habitat present at the South Shaft Access Road site.
Scrophulariaceae	<i>Jamesbrittenia macrantha</i>	Near Threatened	-	-	-	Endemic	Grass slopes on norite.	Recorded - North Shaft Access Road site.
Celastraceae	<i>Lydenburgia cassinoides</i>	Near Threatened	-	Protected	-	Endemic	Exposed norite bedrock and dolomite.	Recorded - North and South Shaft Access Road sites.
Scrophylariaceae	<i>Nemesia zimbabwensis</i>	Endangered	-	-	-	-	Moist ledges of rocky outcrops in forest.	Unlikely – limited suitable habitat present.
Lamiaceae	<i>Plectranthus porcatus</i>	Vulnerable	-	-	-	Endemic	Dry savanna, among boulders on norite slopes.	Possible – suitable habitat present at the South Shaft Access Road site.
Lamiaceae	<i>Plectranthus venteri</i>	Vulnerable	-	-	-	Endemic	Norite boulders, in shallow soil and rock pockets.	Possible – suitable habitat present at the South Shaft Access Road site.
Polygalaceae	<i>Polygala sekhukhuniensis</i>	Vulnerable	-	-	-	Endemic	Sparsely vegetated lower slopes and valley bottoms on highly eroded soils.	Recorded – North Shaft Access Road site.

Family	Species Name	National Red List Status (2020-1)	NEMBA ToPS Status (2007)	National Forest Act (1998)	Limpopo Protected Status	Sekhukhune Endemic	Habitat Preferences	Probability of Occurrence
Anacardiaceae	<i>Sclerocarya birrea subsp. caffra</i>	Least Concern	-	Protected	-	-	Range of savanna types.	Recorded- North Shaft and South Shaft Access Road sites.
Anacardiaceae	<i>Searsia batophylla</i>	Vulnerable	-	-	Protected	Endemic	Dry bushveld, along water courses	Recorded - observed in drainage features adjacent to the proposed Project sites.
Anacardiaceae	<i>Searsia sekhukhuniensis</i>	Rare	-	-		Endemic	Rocky hillsides in savanna.	Recorded – North Shaft and South Shaft Access Road sites.
-	<i>Sensitive Species 1033</i>	Endangered	-	-	-	Endemic	Savanna and closed woodland on rocky slopes on norite outcrops.	Possible – suitable habitat present at the South Shaft Access Road site.
-	<i>Sensitive Species 1252</i>	Vulnerable	-	-	-	-	Woodland, specifically moist bushveld areas.	Unlikely – limited suitable habitat present.
-	<i>Sensitive species 587</i>	Rare	-	-	-	Endemic	Wooded grassland and thicket in shallow norite soils.	Probable – suitable habitat present at the South Shaft Access Road site.

Family	Species Name	National Red List Status (2020-1)	NEMBA ToPS Status (2007)	National Forest Act (1998)	Limpopo Protected Status	Sekhukhune Endemic	Habitat Preferences	Probability of Occurrence
-	<i>Sensitive species 587</i>	Vulnerable	Vulnerable	-	-	Endemic	Grassland on norite outcrops and cliffs in Leolo Mountains.	Possible – suitable habitat present at the South Shaft Access Road site.
Fabaceae	<i>Vachellia ormocarpoides</i>	Near Threatened	-	-	-	Endemic	Sandy or loamy soils between norite boulders.	Probable – suitable habitat present at both the South Shaft and North Shaft Access Road sites.
Fabaceae	<i>Vachellia sekhukhuniensis</i>	Critically Endangered	-	-	-	Endemic	Open woodlands and grassland on quartzite ridges.	Unlikely – known from only one location to north of Bugersfort.
Araceae	<i>Zantedeschia pentlandii</i>	Vulnerable	-	-	-	Endemic	Rocky hillsides in montane bushveld and grassland.	Probable – suitable habitat present at the South Shaft Access Road site.

Source: Habitat preferences as per species accounts presented in SANBI (2022).

### 5.5.5 Alien Invasive Species

Four declared alien invasive species were recorded in and adjacent to the proposed road routes during the field visit, namely *Argemone ochroleuca* subsp. *ochroleuca*, *Ricinus communis*, *Senna occidentalis* and *Xanthium spinosum*. These are all listed as NEMBA Category 1b invasive species (Table 7). Apart from *Senna occidentalis*, which was fairly abundant at the base of the Southern Access Road footprint, these taxa mostly occurred as scattered individual plants at disturbed sites.

SAS (2015) recorded an additional five alien invasive species during their study at Modikwa. These are also listed in Table 7, along with their NEMBA and CARA invasive category.

**Table 7: Declared alien invasive flora species recorded at Modikwa Platinum Mine.**

Scientific Name	Common Name	NEMBA Category	CARA Category
<i>Agave americana</i>	Century Plant	-	X2
<i>Agave sisalana</i>	Sisal hemp	2	2
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	Mexican Poppy	1b	1
<i>Melia azedarach</i>	Syringa	1b	3
<i>Opuntia imbricata</i>	Imbricata Prickly Pear	-	1
<i>Ricinus communis</i>	Castor-oil Plant	1b	2
<i>Senna occidentalis</i>	Stinking Weed	1b	-
<i>Xanthium spinosum</i>	Spiny Cocklebur	1b	1
<i>Xanthium strumarium</i>	Large Cocklebur	1b	1

Source: SAS (2015) and 2022 field visit.

### 5.5.6 Flora of Medicinal Value

Twelve flora species recorded during the 2022 field visit have medicinal value, as described by Van Wyk *et al.*, (2009). These are listed in Table 8, along with a brief description of their medicinal utility.

**Table 8: Flora species with medicinal value recorded in the study area during the 2022 field visit.**

Scientific Name	Medicinal use
<i>Asparagus species</i>	Rhizomes and fleshy roots are used to treat a variety of ailments, including tuberculosis, kidney complaints and rheumatism.
<i>Dichrostachys cinerea</i>	Root infusions are used to treat body pain, toothache, as well as syphilis and leprosy amongst other ailments.
<i>Dodonaea viscosa</i>	A decoction of the leaves is used as a remedy for fever, colds, influenza, sore throats and stomach cramps. It is also used to treat arthritis.
<i>Dombeya rotundifolia</i>	Oral and rectal infusions are used to treat internal ulcers, diarrhoea, piles and other stomach issues.
<i>Elaeodendron transvaalense</i>	A bark infusion is used to cleanse the stomach, and as an enema for stomach ache and fever.
<i>Heteromorpha arborescens</i>	Plants is used to treat tuberculosis, headaches, fever and breathing afflictions.

Scientific Name	Medicinal use
<i>Pellaea calomelanos</i>	Leaves are smoked as a treatment for head- and chest colds and asthma, while rhizomes are used to treat boils and abscesses.
<i>Ricinus communis</i>	Leaf infusions are used to treat stomach ache, skin wounds, sores and boils.
<i>Sclerocarya birrea subsp. caffra</i>	Bark, roots and leaves are used to treat stomach and digestive ailments, such as diarrhoea and dysentery. Also used as a remedy for fever and malaria.
<i>Vachellia karroo</i>	Bark and leaves are used as a remedy for diarrhoea and dysentery. Gum is used to treat oral thrush.
<i>Xerophyta retinervis</i>	Dried roots are smoked as a cure for asthma.
<i>Ziziphus mucronata</i>	Bark and leaves are used as an expectorant in coughs and chest ailments, while roots extracts are used to treat diarrhoea and dysentery.
Source: Uses as described by Van Wyk et al. (2009).	

## 5.6 Fauna Assessment

### 5.6.1 Mammals

Six mammal species were recorded by SAS at Modikwa in 2015, including two small antelope - Klipspringer (*Oreotragus oreotragus*) and Common Duiker (*Sylvicapra grimmia*), two primates - Chacma Baboon (*Papio ursinus*) and Vervet Monkey (*Chlorocebus pygerythrus*), as well as the Small-spotted Genet (*Genetta genetta*) and Porcupine (*Hystrix africaeaustralis*). During the 2022 field visit, evidence of Klipspringer (tracks) and Red Rock Rabbit (*Pronolagus* sp.) (scat) were observed while traversing the South Shaft Access Road route.

Based on a review of historic distribution maps in Stuart & Stuart (2007), a total of additional 89 mammal species potentially occur in the region, and considering the extent of surrounding natural habitat, the documented mammal species richness for Modikwa is likely a small subset of the overall species assemblage. It is suspected that additional focused mammal surveys may result in several more mammal taxa being recorded. This notwithstanding, it is also noted that considering the close proximity of numerous residential villages and their attendant anthropogenic pressures and disturbances (e.g., subsistence hunting, persecution of predators, etc.), it is likely that many of the larger mammal taxa that historically occurred in the area are likely to be locally absent.

One species recorded at Modikwa is considered to be of conservation concern; Klipspringer (*Oreotragus oreotragus*). This species is not listed as threatened, but it is protected in Limpopo Province, according to the Limpopo Environmental Management Act (Act No. 7 of 2003). The environmental screening report for the proposed Project highlighted the Robust Golden Mole (*Amblysomus villosus*), Rough-haired golden mole *Chrysospalax villosus*, Maquassie Musk Shrew (*Crocidura maquassiensis*) and Robert's Marsh Rat (*Dasymys robertsii*) as sensitive features. The conservation status, habitat preferences and a probability of occurrence of these taxa are discussed in Table 9 along with an additional 21 mammal species of conservation concern that potentially occur the area, based on historic distribution ranges.

**Table 9: Mammal species of conservation concern occurring and potentially occurring at Modikwa Platinum Mine.**

Family	Species Name	Common Name	National Red List Status (2016)	NEMBA ToPS Status (2007)	Provincial Protected Status	Habitat Preferences	Probability of Occurrence
Bovidae	<i>Redunca fulvorufula</i>	Mountain Reedbuck	Endangered	-	Protected	Grassland and scrub habitats in hills and mountains.	Possible - suitable habitat present.
Bovidae	<i>Ourebia ourebi</i>	Oribi	Endangered	Endangered	Protected	Short open grassland, with nearby taller patches.	Unlikely – limited suitable habitat present.
Bovidae	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern	-	Protected	Rocky habitat, in mountainous and hilly areas.	Recorded
Bovidae	<i>Raphicerus campestris</i>	Steenbok	Least Concern	-	Protected	Range of habitat including savanna and grassland.	Probable - suitable habitat present.
Bovidae	<i>Raphicerus sharpei</i>	Sharpe's Grysbok	Least Concern	Protected	Specially Protected	Low thicket and rocky hillsides.	Possible - suitable habitat present.
Chrysochloridae	<i>Amblysomus robustus</i>	Robust Golden Mole	Vulnerable	Endangered	-	Marshy habitats in montane grassland. Avoids rocky areas.	Unlikely – no suitable habitat present.
Chrysochloridae	<i>Amblysomus villosus</i>	Robust Golden Mole	Vulnerable	Critically Endangered	-	Sandy soils in grassland and along the edges of marshes.	Unlikely – no suitable habitat present.
Chrysochloridae	<i>Chrysospalax villosus*</i>	Robust Golden Mole	Vulnerable	Critically Endangered	-	Sandy soils in grassland and along the edges of marshes.	Unlikely – no suitable habitat present.
Erinaceidae	<i>Atelerix frontalis</i>	Hedgehog	Near Threatened	Protected	Protected	Savanna and grassland habitats.	Possible - suitable habitat present.



Family	Species Name	Common Name	National Red List Status (2016)	NEMBA ToPS Status (2007)	Provincial Protected Status	Habitat Preferences	Probability of Occurrence
Felidae	<i>Leptailurus serval</i>	Serval	Near Threatened	Protected	Protected	Range of habitats, including savanna and woodland	Probable - suitable habitat present.
Felidae	<i>Felis lybica</i>	African Wild Cat	Least Concern	-	Protected	Range of habitats including savanna, grassland and deserts.	Probable - suitable habitat present.
Felidae	<i>Panthera pardus</i>	Leopard	Vulnerable	Vulnerable	Protected	Range of habitats including savanna, grassland and deserts.	Possible - suitable habitat present, but a rare species.
Hyaenidae	<i>Parahyaena brunnea</i>	Brown Hyaena	Near Threatened	Protected	Protected	Savanna and desert habitats.	Possible - suitable habitat present, but a rare species.
Hyaenidae	<i>Proteles cristata</i>	Aardwolf	Least Concern	-	Protected	Open grassy plains and arid savannas.	Unlikely - no suitable habitat present.
Manidae	<i>Smutsia temminckii</i>	Ground Pangolin	Vulnerable	Vulnerable	Specially Protected	Savanna habitats	Unlikely – suitable habitat present, but a very rare species that is threatened by illegal hunting/trade.
Muridae	<i>Dasymys robertsii</i> *	Robert's Marsh Rat	Vulnerable	-	-	Intact wetlands in a range of habitats including forest, savanna and grassland.	Possible - suitable habitat present.
Mustelidae	<i>Aonyx capensis</i>	Cape Clawless Otter	Near Threatened	Protected	Protected	Range of riparian habitats, including rivers and streams.	Unlikely – No suitable habitat present.

Family	Species Name	Common Name	National Red List Status (2016)	NEMBA ToPS Status (2007)	Provincial Protected Status	Habitat Preferences	Probability of Occurrence
Mustelidae	<i>Hydrictis maculicollis</i> *	Spotted-necked Otter	Vulnerable	-	-	Favours large open water bodies, such as dams and large rivers.	Unlikely – No suitable habitat present.
Mustelidae	<i>Mellivora capensis</i>	Honey Badger	Least Concern	-	Protected	Savanna and grassland habitats	Probable - suitable habitat present.
Orycteropodidae	<i>Orycteropus afer</i>	Aardvark	Least Concern	-	Specially Protected	Range of habitats, including savanna and woodland.	Possible - suitable habitat present.
Rhinolophidae	<i>Rhinolophus blasii</i>	Peak-saddled Horseshoe Bat	Near Threatened	-	-	Savanna and woodlands, with nearby caves and mine adits for roosting.	Probable - suitable habitat present.
Soricidae	<i>Crocidura maquassiensis</i> *	Maquassie Musk Shrew	Vulnerable	-	-	Dense matted vegetation of wetlands and moist grasslands.	Unlikely – Limited suitable habitat present.
Viverridae	<i>Civettictis civetta</i>	Civet	Least Concern	-	Protected	Range of savanna, woodlands and grassland habitats.	Probable - suitable habitat present.

Source: Habitat preferences as per Skinner and Smithers (1990) and Stuart and Stuart (2007).

\*Specie recorded by the Environmental screening tool

## 5.6.2 Birds

Thirty bird species were recorded at Modikwa by SAS in 2015, with an additional 15 species added to the species list based on observations made during the 2022 field visit. All recorded bird species are common and widespread in savanna habitats. Refer to APPENDIX D for the list of bird species recorded at Modikwa.

Based on available SABAP2 records, a total of 136 bird species have previously been recorded in the 2435\_3005 and 2435\_3000 pentads in which the Modikwa is located. Of these, two species are of conservation concern - the White-backed Vulture (*Gyps africana*) is listed as Vulnerable on the regional Red List of threatened birds, while Verreaux's Eagle (*Aquila verreauxii*) is listed as Critically Endangered.

The environmental screening report highlighted the potential presence of Verreaux's Eagle and Secretarybird (*Sagittarius serpentarius*) as sensitive features with respect to the proposed Project. The probability of occurrence assessments of these two species, coupled with that of the White-backed Vulture and an additional 12 bird species of conservation concern that are known from the area, are presented in Table 10.

**Table 10: Bird species of conservation concern with potential to occur at Modikwe Platinum Mine.**

Family	Species Name	Common Name	National Red List Status (2015)	NEMBA ToPS Status (2007)	Provincial Protected Status	Habitat Preferences*	Probability of Occurrence
Accipitridae	<i>Aquila verreauxii</i>	Verreaux's Eagle	Vulnerable	-	-	Mountainous and rocky areas, with cliffs.	Probable – suitable habitat present and previously recorded in pentads.
Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	Endangered	Vulnerable	-	Savanna habitats	Possible – suitable habitat present.
Accipitridae	<i>Terathopius ecaudatus</i>	Bateleur	Endangered	Vulnerable	Specially Protected	Savanna habitats	Probable – suitable habitat present.
Accipitridae	<i>Gyps coprotheres</i>	Cape Vulture	Endangered	Endangered	Specially Protected	Savanna and grassland habitats	Possible – suitable habitat present.
Accipitridae	<i>Torgos tracheliotus</i>	Lappet-faced Vulture	Endangered	Endangered	-	Range of habitats, including savanna	Possible – suitable habitat present.
Accipitridae	<i>Gyps africanus</i>	White-backed Vulture	Critically Endangered	Endangered	-	Savanna habitats	Possible – suitable habitat present and previously recorded in pentad
Accipitridae	<i>Polemaetus bellicosus</i>	Martial Eagle	Endangered	Vulnerable	Specially Protected	Range of habitats, including savanna	Possible – suitable habitat present.
Accipitridae	<i>Circus ranivorus</i>	African Marsh Harrier	Endangered	Protected	-	Wetlands and moist grasslands	Unlikely – no suitable habitat present.
Alcedinidae	<i>Alcedo semitorquata</i>	Half-collared Kingfisher	Near Threatened	-	-	Well-vegetated rivers and streams.	Unlikely – no suitable habitat present.
Ciconiidae	<i>Ciconia abdimii</i>	Abdim's Stork	Near Threatened	-	-	Range of habitats, including savanna.	Possible – suitable habitat present

Family	Species Name	Common Name	National Red List Status (2015)	NEMBA ToPS Status (2007)	Provincial Protected Status	Habitat Preferences*	Probability of Occurrence
Ciconiidae	<i>Ciconia nigra</i>	Black Stork	Vulnerable	Vulnerable	-	Riparian and wetland habitats – typically in mountainous regions.	Unlikely – no suitable habitat present.
Coraciiformes	<i>Coracias garrulus</i>	European Roller	Near Threatened	-	-	Savanna habitats	Probable – suitable habitat present.
Falconidae	<i>Falco biarmicus</i>	Lanner Falcon	Vulnerable	-	-	Range of habitats, including savanna	Probable – suitable habitat present.
Heliornithidae	<i>Podica senegalensis</i>	African Finfoot	Vulnerable	-	-	Favours slow flowing streams, with overhanging vegetation	Unlikely – no suitable habitat present.
Sagittariidae	<i>Sagittarius serpentarius</i>	Secretarybird	Vulnerable	-	-	Grassland and savanna habitats.	Possible – suitable habitat present.
<p>#According to the Limpopo Environmental Management Act (2003), all bird species, excluding those listed as Specially Protected (Schedule 2) and those listed as common species (Schedule 3), are Protected in Limpopo Province.</p> <p>*Habitat preferences as per Roberts VII Multimedia.</p> <p>**Species recorded in the Environmental Screening Tool</p>							

### 5.6.3 Herpetofauna

No amphibians were recorded during the SAS (2015) study and during the 2022 field visit. However, FrogMAP records indicate that 13 species have previously been recorded in the 2430CA QDS (refer to APPENDIX E). These are all fairly common species, with widespread distributions.

Two reptile species were recorded by SAS (2015), namely the Limpopo Girdled Lizard (*Cordylus jonesii*) and Rough-scaled Lizard (*Ichnotropis* sp.), while a Skink species (*Trachylepis* sp.) was observed during the 2022 field visit. According to ReptileMAP, at least 22 reptile species have been recorded in 2430CA QDS (APPENDIX E).

It is noted that none of the amphibian or reptile species recorded in the 2430CA QDS, based on available records, are of conservation concern. The environmental screening report highlighted Sensitive Species 1<sup>1</sup> and Sensitive Species 12 as sensitive features for the proposed Project. It is noted that Sensitive Species 1 requires large, open water or riparian habitats, which are not present at Modikwa. It is therefore unlikely that this species is present. Sensitive Species 12 favours a range of habitats, including rocky hillsides in mixed *Acacia* and *Combretum* savanna. Savanna habitats are present at Modikwa and it is therefore possible that this species is present.

### 5.6.4 Arthropods

Previous field surveys conducted at Modikwa (SAS, 2015) recorded several invertebrate species including six Lepidoptera (butterflies), two Orthoptera (grasshoppers, crickets & locusts), three Hymenoptera & Isoptera (ants, bees, termites and wasps), five Coleoptera (beetles), one Phasmatodea (stick insect) and one Spirostreptida (millipede). These authors also paid special attention to the potential presence of suitable habitat for Mygalomorph spiders and scorpions. Mygalomorph spiders are burrow-dwelling spiders, such as the trapdoor and baboon spiders. These have been highlighted as species of conservation value at a national level.

No scorpions or Mygalomorph spider burrows were observed by SAS (2015) during their field work. Similarly, during the 2022 field visit of the proposed Project sites, no spider burrows or scorpions were observed. It is noted however, that data extracted from ScorpionMAP and SpiderMAP indicated that although no scorpions have been recorded on the database for the 2430CA QDS, one *Brachionopus* spider species from the Theraphosidae family (baboon spiders) has previously been recorded in the QDS. It is thus possible that Mygalomorph taxa are present at Modikwa.

The environmental screening report highlighted *Aroegas fuscus* as a sensitive feature for the proposed Project. *Aroegas fuscus* is a member of the Tettigoniidae family (katydids, bush crickets, long-horned grass hoppers) and is listed as Endangered. This species is known from only two locations in Limpopo and Mpumalanga Provinces, where it favours Mesic Highveld Grassland. This habitat type is not present at either Project site, and it is therefore considered unlikely that this species is present.

## 6.0 KEY ECOLOGICAL ATTRIBUTES

### 6.1 Habitat Linkages and Corridors

Despite large areas of transformation associated with mine facilities and nearby rural villages, and the presence of linear infrastructure (such as roads and fences), connectivity across the landscape surrounding Modikwa remains high. It is noted that the mountain chain to the west of the mine, coupled with the mountain network to the east and the numerous drainage channels in the landscape, are key features of this landscape-scale

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<sup>1</sup> Whilst Sensitive Species lists are provided by the relevant conservation department on request, these are not listed in publicly available reports to minimize the risk of further poaching/capture attempts.

connectivity. These provide tracts of natural, often well-wooded habitat that act as highly functional and important ecological corridors, linking similar habitat patches across the broader landscape.

## **6.2 Processes and Drivers of Change**

### **6.2.1 Soil Erosion**

Soil erosion is the loss of soil at a rate exceeding the average rate of soil formation (Scholes, 2009). The proposed North Shaft Access Road footprint and the surrounding land are characterised by severe gully and sheet erosion, and it is evident from aerial imagery that extensive areas of erosion are also present across the broader Modikwa landscape. The cause of the erosion is likely a combination of historic overgrazing and trampling by livestock along drainage areas that are dominated by highly erodible clay/mineral rich soils.

In severe cases, soil erosion and attendant nutrient depletion are significant drivers of ecosystem degradation, reducing land productivity and biodiversity. Considering their current condition and their position in the landscape, both road access sites are susceptible to further erosion. Erosion is therefore considered a potentially significant driver of change at both proposed Project sites.

### **6.2.2 Fire**

Fire is considered a natural, albeit often human initiated, disturbance agent in both savanna and grassland ecosystems across Africa. Through the large-scale and periodic removal of plant material, fire influences tree-grass ratios and plant species mixes (fire tolerant vs fire intolerant species), and therefore plays a key role defining vegetation structure, composition and function.

Fire is unlikely to be a frequent occurrence in the North Shaft Access Road landscape, due to the area's low grass productivity. Fire is therefore not considered an important driver of change at this site. The South Shaft Access Road landscape is characterised by an abundance of woody plants and a generally low-moderate level of grass productivity. It is thus probable that occasional, low intensity fires do occur at this site. The potential for fire to cause significant changes in vegetation dynamics is likely attenuated by inherently low fuel loads.

### **6.2.3 Alien Invasive Species Colonisation**

Four declared alien invasive species were observed during the 2022 field visit, while an additional five species have previously been recorded at Modikwa (SAS, 2015). These generally occur at low abundances and are confined to sites that have been disturbed by earth works and vegetation clearing, or along drainage channels in the landscape.

It is noted that several of the documented species have the potential to increase substantially in response to disturbances, and it is possible that they may spread into adjacent undisturbed areas in response to disturbance. Alien invasive species colonisation is therefore considered a potentially significant driver of change at both access road sites.

## 7.0 ASSESSMENT OF SITE ECOLOGICAL IMPORTANCE

The ecological importance of affected habitat units, as per the SANBI (2020) protocol (refer to Section 4.8 and APPENDIX B), is summarised in Table 7 and described in the sections that follow. A map of ecological importance is shown in Figure 23 and Figure 24.

**Table 11: Summary of ecological importance matrix**

Site and Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Ecological Importance
North Shaft Access Road – Eroded Open Shrubland	High	Low	Medium	Medium	Medium
North Shaft Access Road – Drainage Line Vegetation	High	High	High	Low	High
South Shaft Access Road - Sekhukhune Mountains Bushveld	High	High	High	Medium	High



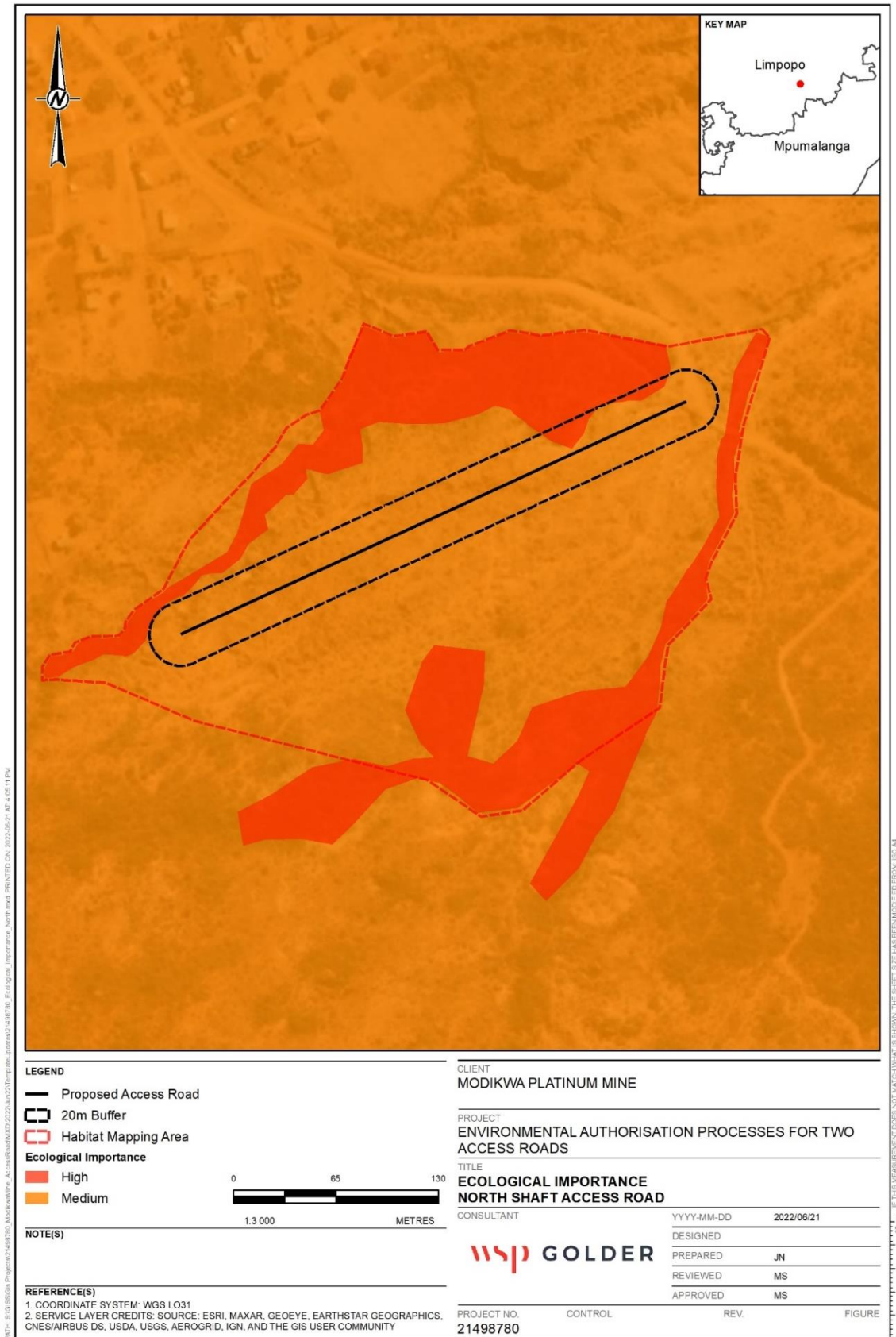


Figure 23: Ecological importance of habitats- North Shaft



Figure 24: Ecological importance of habitats- South Shaft

## 7.1 North Shaft Access Road

The proposed route of the North Shaft Access Road is highly degraded as a result of gully and sheet erosion and is sparsely vegetated with open shrubland. In line with the SANBI's (2020) evaluation protocol, its functional integrity is rated low. It does however contain flora species of conservation concern, and accordingly its conservation importance community is rated high, while its receptor resilience is rated medium. The conservation importance and functional integrity of the drainage line habitat adjacent to the proposed access road route are both rated high, while receptor resilience is rated low.

## 7.2 South Shaft Access Road

Vegetation at the South Shaft Access Road site is aligned to Sekhukhune Mountains Bushveld and is characterised by relatively low levels of anthropogenic disturbance. Several flora species of conservation concern were recorded at this site and it is possible that a number of regional threatened flora are also present. The site forms part of a large area of mountainous natural habitat that is delineated as CBA 2 in the Limpopo Conservation Plan, which is consistent with its on-site character. Both conservation importance and functional integrity are rated high, while receptor resilience is rated medium (Table 11).

## 8.0 IMPACT ASSESSMENT

The construction and operation of the proposed North- and South Shaft Access Road is anticipated to result in the following key impacts on terrestrial biodiversity:

- 1) Direct impacts through clearing of land and resultant loss of biodiversity (flora and fauna SCC).
- 2) Establishment and spread of alien and invasive species.
- 3) Loss and fragmentation of faunal habitats.
- 4) Injury and mortality of faunal species of conservation concern
- 5) Disturbance and loss of ecological connectivity.
- 6) Increased dust deposition into the environment

The outcomes of the impact assessment are summarised in Table 12 and described in detail in the following sections.

### 8.1 Construction Phase

Construction phase impacts largely arise as a result of direct impacts on the receiving environment due to clearing of land in advance of project development, and resultant loss of biodiversity. The earthworks and activities involved during the construction phase of the Project can potentially exert negative impacts on sensitive ecosystems, and flora and fauna species. Potential impacts primarily relate to vegetation clearing, direct loss/mortalities, sensory disturbance, and general anthropogenic influences associated with the construction of the proposed access roads. The specific predicted construction phase impacts are discussed in the sections that follow. Due to the nature of the two proposed access roads, the construction phase impacts have been assessed separately.

#### 8.1.1 Direct loss and disturbance of natural habitat and associated flora SCC

Although the Project area is highly fragmented, 29 flora species of conservation concern have been recorded to occur in the Modikwa area, with nine confirmed to occur in the Project area. The removal of vegetation during the construction of the access roads, will have a direct loss and disturbance of the available natural habitat as well as associated species of conservation concern.

### **North Shaft Access Road**

Before mitigation, the magnitude of the potential impact is considered moderate, and having a permanent impact significance with a definite likelihood of occurrence. The spatial extent of the loss of flora SoCC due to construction activities is site based, with approximately 2,464 m<sup>2</sup> of flora SoCC expected to be lost. Prior to mitigation the loss and disturbance of natural habitat and associated SoCC within the North Shaft Access Road is assessed as having Moderate impact significance.

### **South Shaft Access Road**

Before mitigation, the magnitude of the potential impact is considered low, considering that the site is degraded and located next to the Merensky Shaft. The duration of this impact can be permanent, with the impact only extending to site only, where the road is to be constructed, resulting in approximately 1,586 m<sup>2</sup> of flora SoCC loss to vegetation clearing during construction. The impact significance is assessed at Moderate impact significance.

*With the implementation of the recommended active control and monitoring measures (refer to mitigation measures section) throughout the construction phase, the impact at both sites can be reduced to a low magnitude, the spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. Following successful mitigation, this impact is considered to be of 'low' significance*

## **8.1.2 Establishment and spread of alien and invasive species**

Disturbances caused by vegetation clearing and earth works during construction will exacerbate the establishment and spread of alien invasive vegetation. Alien plant infestations can spread exponentially, suppressing, or replacing indigenous vegetation. This may result in a breakdown of ecosystem functioning and a loss of biodiversity.

### **North Shaft Access Road**

Before mitigation, the magnitude of the potential impact is considered moderate and having a long-term impact duration. The spatial extent of the potential spread of alien invasive species due to construction activities is local, with a high likelihood of occurrence. Prior to mitigation, the establishment and spread of alien invasive species is rated as an impact of Moderate significance.

### **South Shaft Access Road**

Before mitigation, the magnitude of the potential impact is considered high, as the site is already highly infested by alien vegetation such as *Senna occidentalis* and *Xanthium spinosum*. The duration of this impact can be long term with a definite likelihood of occurrence. Alien invasive species can spread beyond the site footprint into local extent. Prior to mitigation the establishment and spread of alien invasive species will have a Moderate impact significance.

*With the implementation of the recommended active control and monitoring measures throughout the construction phase, the impact at both sites can be reduced to a low magnitude, the spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. Following successful mitigation, this impact is considered to be of 'low' significance.*

## **8.1.3 Injury and mortality of faunal species of conservation concern**

Based on the Environmental screening Web-based tool, the study area is of medium sensitivity in terms of animal species theme on account of potential presence of nine threatened fauna species. Although none of these species have been confirmed on site, some fauna species of conservation concern could potentially occur (Table 9 and Table 10). Therefore, the construction activities have the potential to injure/kill faunal species of concern, especially ground-dwelling and relatively slow-moving herpetofauna.

### **North Shaft Access Road**

The magnitude of the potential impact of site clearance activities and movement of construction vehicles/equipment on fauna SoCC, particularly herpetofauna, could potentially be moderate, with the impact occurring throughout the construction phase. The impact scale would be site based. Prior to mitigation the impact significance is considered Moderate.

### **South Shaft Access Road**

The magnitude of the potential impact on fauna SoCC is expected to be low considering that the proposed access road is in close proximity to an active Modikwa operation the “Merensky Shaft”. The impact would occur throughout the construction phase, occur at a site level and is considered moderately probable, resulting in an impact of Low significance on fauna SCC, prior to mitigation.

*The application of the recommended mitigation measure to avoid/minimise the loss of natural habitats, and limit site clearance to the project footprint reduces the potential magnitude and the probability of the impact occurring as predicted, resulting in a residual impact of low significance for fauna SCC.*

## **8.2 Operational Phase**

Operational phase impacts relate to the possible exacerbation of the current impacts of dust deposition on nearby habitats, ongoing risk of spread of the alien and invasive plant species that were present at baseline and may have been spread into new areas during the construction phase, loss of ecological connectivity/barrier to movement of fauna; and the risk of injury/mortality presented to fauna by vehicular traffic and infrastructure.

### **8.2.1 Spread of alien and invasive species**

The potential establishment of alien invasive species in, and along the proposed access roads footprint will continue to be an impact of concern during the operational phase. Before mitigation, the impact magnitude is moderate, duration will be long-term, and the impact has a high probability of occurrence at a local extent. Prior to mitigation, the continued spread of alien invasive species throughout the operational phase is assessed to be of ‘moderate’ significance.

With the continued implementation of an active alien species control programme during the operational phase this impact can be reduced to a low magnitude, with a long-term duration. Spatial extent will be reduced to the site only, and the probability of the impact occurring will be reduced to low. The residual impact is considered to be of Low significance.

### **8.2.2 Loss of Ecological Connectivity habitat fragmentation**

Although the study area is fragmented, the landscape of the study area is characterised by mountains and drainage lines which make up a key feature for ecological connectivity. Loss of ecological connectivity is one of the likely impacts of the presence of an access road in an area. Disruption of ecological connectivity may adversely affect ground-moving herpetofauna SoCC. The presence of the two access roads may also cause some ground-moving species to change their movement patterns, which may increase their vulnerability to predation.

The magnitude of this impact on fauna SoCC is assessed as being moderate, as potential changes in their natural movement patterns as a result avoidance of the access roads is considered likely. The extent of impacts would be local, and Long-term, ceasing only after site closure. The impact prior to mitigation is therefore considered to be of Medium significance.

*With the application of the recommended mitigation measures, the intensity and extent of the impact may be reduced, resulting in a residual impact of Low significance.*

### **8.2.3 Injury and mortality of faunal species of conservation concern**

Increased vehicular traffic in the study area during the operation phase may pose a risk of injury and mortality of fauna species of conservation concern (and non-SCC). The magnitude of the potential impact on fauna during the operational phase is expected to be low given the existing movement of mine vehicles in the study area, particularly in the South Shaft Access Road location and the effect of the preceding construction works. The impact would occur throughout the operation phase, affect fauna at a local scale and is considered moderately probable, resulting in an impact of 'moderate' significance prior to mitigation.

*The application of the recommended mitigation measures reduces both the potential magnitude and the probability of the impact occurring as predicted, resulting in a residual impact of Low significance.*

### **8.2.4 Increased dust deposition into the environment**

The operation of the two proposed access road relates to the effects of dust deposition on terrestrial ecosystems and biodiversity. The impact magnitude is assessed as moderate, considering the existing mining activities and the presence of gravel access roads in the study area that may be contributing the emission of dust in the study area. The duration of the impact can be long term in the absence of any mitigation and/or monitoring measures in place and may have an impact on a local scale resulting in a moderate impact significance prior to mitigation measures.

*With the implementation of mitigation measures such as the implementation of dust suppression methods, the impact significance can be reduced to Low.*

**Table 12: Terrestrial Biodiversity Impact summary**

ACTIVITY	POTENTIAL IMPACT	PHASE In which impact is anticipated	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation
<b>North Shaft Access Road</b>														
Clearance of indigenous vegetation	Direct Loss and disturbance of natural habitat and associated flora SCC	Construction	6	4	1	5	55	Moderate	4	3	1	3	24	Low
	Establishment and spread of AIS	Construction	6	4	2	4	48	Moderate	4	3	1	3	24	Low
Vehicle and use of equipment/machinery	Injury and mortality of fauna SCC	Construction	6	3	1	3	30	Moderate	4	2	1	3	21	Low
<b>South Shaft Access Road</b>														
Clearance of indigenous vegetation	Direct Loss and disturbance of natural habitat and associated flora SCC	Construction	4	4	1	5	45	Moderate	4	3	1	3	24	Low
	Establishment and spread of AIS	Construction	8	4	2	5	70	High	4	3	1	3	24	Low

ACTIVITY	POTENTIAL IMPACT	PHASE In which impact is anticipated	Magnitude	Duration	Scale	Probability	Significance	Significance without Mitigation	Magnitude	Duration	Scale	Probability	Significance	Significance with Mitigation
Vehicle and use of equipment/machinery	Injury and mortality of fauna SCC	Construction	4	3	2	3	27	Low	2	2	1	3	15	Low
<b>Operational phase at both North and South Access Road</b>														
Vehicle movement	Spread of AIS	Operation	6	4	2	3	36	Moderate	4	2	1	3	21	Low
On-site traffic	Injury and mortality of fauna SCC	Operation	4	6	2	3	36	Moderate	2	6	1	2	18	Low
Presence the access road	Loss of Ecological connectivity	Operation	6	5	2	3	39	Moderate	4	1	1	2	12	Low
Vehicle movement	Increased dust deposition	Operation	6	4	2	4	48	Moderate	2	3	1	3	18	Low



## 8.3 Mitigation Measures

Mitigation measures that are designed to avoid and minimise the loss and degradation of the ecological resources on the site are summarised in the sections that follow.

### 8.3.1 Loss and disturbance of natural habitat

- Vegetation clearing should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas;
- The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of this area;
- A search and rescue survey for all flora SCC (see Appendix C) should then be conducted within these marked footprints prior to the commencement of construction to determine the number of potentially impacted plant species of conservation concern. Based on the findings of the survey, clearing and/or relocation permits should be obtained from the relevant authority to clear or rescue and relocate potentially impacted plant SCC; and
- Exposed soils along the road servitude should be seeded with indigenous grasses, to promote revegetation of disturbed areas, once construction is complete;

### 8.3.2 Alien invasive species control

- An alien invasive species control programme must be developed (or any existing AIS management programmes expanded), to include the active control of alien invasive species that may establish/spread as a result of proposed Project activities
- Alien and invasive species management to be prioritised for the following alien and invasive species control areas:
  - Areas where vegetation cover is disturbed.
  - Areas where soils imported from external sources are applied.
  - All rehabilitated areas.
  - Areas within the development area that are already invaded by alien species.
  - Road fringes.

### 8.3.3 Injury and mortality of fauna species of concern

- An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any necessary movement/relocations of fauna SoCC, should they be encountered. The ECO should be trained in *inter alia*, snake handling and species identification;
- A low-speed limit (recommended 20 km/h in areas of highest risk e.g. where roads traverse woodland or riparian/wetland habitat) should be enforced on site to reduce wildlife collisions;
- A search and rescue survey for herpetofauna species should be done immediately in advance of site clearance activities. Any observed individuals should be relocated to nearby areas of natural habitats. Where snakes require relocation, this should be done by a certified snake handler for health and safety reasons;
- The handling, poisoning or killing of on-site fauna by mine workers and contractors must be strictly prohibited; and

- Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.

#### **8.3.4 Loss and fragmentation of fauna habitat**

- Vegetation clearing should be restricted to the proposed infrastructure footprints only, with no clearing permitted outside of this area;
- Maintain, as far as possible, natural habitat corridors and connectivity; and
- Movement across the Project area should be facilitated by providing suitably sized gaps in fencing and/or culverts/passageways under conveyors and roads for fauna.

#### **8.3.5 Loss of ecological connectivity**

- Habitat restoration through active revegetation should be undertaken to restore habitat connectivity where possible;
- Adopt reduced impact clearing and construction techniques and time;
- Rehabilitation through planting of appropriate plant community will enhance connectivity and prevent potential invasion of pioneer invasive species;
- Rehabilitation of such areas should emphasize the use of species of the characteristic flora community; and
- Site clearing should be done in the winter months when it is less vulnerable.

#### **8.3.6 Dust deposition**

- Excavation activities should be done during calm weather conditions. This will reduce the extent of spread of the particulate matter in the project footprint;
- Dust suppression methods such as use of the water bowser should be implemented in and around the construction site regularly, particularly during the dry season;
- Speed limits of < 20 km/hour should be communicated via appropriate signage and enforced on all access roads to proposed new infrastructure locations;

;Avoid dust generating works during the most windy conditions; and

- Frequent wetting of the access roads.

### **8.4 Monitoring Requirements**

The following monitoring requirements are proposed:

- The presence of alien and invasive flora species should be documented prior to the commencement of the development of the infrastructure and rehabilitation activities, and the baseline case used as a benchmark against which the spread of these species can be monitored. Annual monitoring inspections should identify target areas for clearing and subsequent rehabilitation/re-vegetation programmes.
- A record of fauna mortalities/injury as a result of fauna crossing the proposed access roads should be kept on site and regularly reviewed to inform the need for implementation of any additional mitigation measures.

## **9.0 CONCLUSION**

The proposed North Shaft and South Shaft Access Road sites are located in Mucina & Rutherford's (2011) Sekhukhune Plains Bushveld, with the field visit indicating that the latter site contains many of the floristic

elements that are characteristic of Sekhukhune Mountains Bushveld. Neither vegetation type is listed as threatened on the NEMBA Threatened Ecosystems (2011), however Sekhukhune Plains Bushveld is considered Vulnerable at a provincial level by Desmet *et al.*, (2013).

According to the Limpopo Conservation Plan (2013), the proposed North Shaft Access Road site is located in an area designated Ecological Support Area 1 (ESA1), while the proposed North Shaft Access Road site is located on land designated Critical Biodiversity Area 2 (CBA2). Based on this, the Terrestrial Biodiversity Theme for the project, as per the National Web-based Environmental Screening Tool is rated very high sensitivity – a rating that is supported the findings of this study, which indicated that the traversed vegetation communities are of some importance in terms of support of flora SCC, although the site is highly modified by gully and sheet erosion.

The proposed South Shaft Access Road is set against a hillside, adjacent to the Merensky Shaft Complex. Vegetation at this site is mostly undisturbed and also comprises mostly indigenous species, with several flora species of conservation concern present.

Although only a small number of fauna taxa have previously been recorded at Modikwe, considering the extent of undisturbed mountainous savanna habitat in close proximity to both proposed Project sites, it is anticipated that fauna species richness is appreciably higher than that described in this report, and it is possible that a number of species of conservation concern may be present in the landscape.

The proposed Project development footprints coincide with some areas of natural/indigenous vegetation that are considered to be of high sensitivity due to their support of species and habitats of conservation concern, and designation as CBAs. It is therefore important that measures are strictly implemented to avoid and minimise negative impacts on natural vegetation and flora species of conservation that may result as a consequence of the proposed Project activities.

Provided that the mitigation measures set out in Section 8.3 of this document are endorsed by the relevant authorities, and strictly implemented within the required timeframes, the Project may be authorised from a Terrestrial Biodiversity perspective. The recommended mitigation and monitoring measures should be included as conditions to any authorisation, and incorporated into the Project's authorised Environmental Management Programme (EMP).

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**APPENDIX A**

# Document Limitations

## DOCUMENT LIMITATIONS

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- v) Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
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**GOLDER ASSOCIATES AFRICA (PTY) LTD**

**APPENDIX B**

**Rating Criteria for Conservation  
Importance, Functional Integrity  
and Receptor Resilience and  
Scoring Matrices, as per (SANBI,  
2020)**



The ecological sensitivity of habitats in the study area was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI’s Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

**Conservation Importance** is defined 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 ecosystems types, through predominantly natural processes” (SANBI, 2020).

**Functional Integrity** is defined as “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” (SANBI, 2020).

**Receptor Resilience** is defined 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” (SANBI, 2020).

**Conservation Importance (CI) criteria.**

Conservation Importance (CI)	Fulfilling Criteria
<b>Very High</b>	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10km <sup>2</sup> ;  Any area of natural habitat of a CR ecosystem type or large area (>0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type; and  Globally significant populations of congregatory species (>10% of global population).
<b>High</b>	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10km <sup>2</sup> , IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed 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).

Conservation Importance (CI)	Fulfilling Criteria
<b>Medium</b>	<p>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;</p> <p>Any area of natural habitat of threatened ecosystem type with status of VU;</p> <p>Presence of range-restricted species; and</p> <p>&gt;50% of receptor contains natural habitat to support SCC.</p>
<b>Low</b>	<p>No confirmed or highly likely populations of SCC;</p> <p>No confirmed or highly likely populations of range-restricted species; and</p> <p>&lt;50% of receptor contains natural habitat with limited potential to support SCC.</p>
<b>Very Low</b>	<p>No confirmed and highly unlikely populations of SCC;</p> <p>No confirmed and highly unlikely populations of range-restricted species; and</p> <p>No natural habitat remaining.</p>

#### Functional Integrity (FI) criteria.

Functional Integrity (FI)	Fulfilling Criteria
<b>Very High</b>	<p>Very large (&gt;100 ha) intact area for any conservation status of ecosystem type or &gt;5a ha for CR ecosystem type;</p> <p>High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches;</p> <p>No or minimal current negative ecological impacts with no signs of major disturbance (e.g., ploughing)</p>
<b>High</b>	<p>Large (&gt;5 ha but &lt; 100 ha) intact area for any conservation status ecosystem types;</p> <p>Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches; and</p> <p>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.</p>
<b>Medium</b>	<p>Medium (&gt;5ha but&lt; 20 ha) semi-intact area for any conservation status ecosystem type or &gt;20 ha for VU ecosystem type;</p>

Functional Integrity (FI)	Fulfilling Criteria
	<p>Only narrow corridors of good connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches;</p> <p>Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.</p>
<b>Low</b>	<p>Small (&gt; 1 ha but &lt;5ha) area;</p> <p>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; and</p> <p>Several minor and major current negative ecological impacts.</p>
<b>Very Low</b>	<p>Very small (&lt;1 ha) area;</p> <p>No habitat connectivity except for flying species or flora with wind-dispersed seeds;</p> <p>Several major current negative ecological impacts.</p>

$$BI = CI + FI$$

**Biodiversity Importance (BI) Rating Matrix**

Biodiversity Importance (BI)		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

**Receptor Resilience criteria (RR)**

Resilience	Fulfilling Criteria
<b>Very High</b>	<p>Habitat that can recover rapidly (~less than 5 years) to restore &gt;75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.</p>

Resilience	Fulfilling Criteria
<b>High</b>	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 impacts occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
<b>Medium</b>	Habitat that can 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 impacts occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
<b>Low</b>	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 impacts occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
<b>Very Low</b>	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.

$$SEI = BI + RR$$

**Site Ecological Importance (SEI) Rating Matrix**

Site Ecological Importance		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very Low	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

**Guidelines for interpreting SEI in the context of the proposed development activities.**

Site Ecological Importance	Interpretation in relation to proposed development activities
<b>Very High</b>	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.
<b>High</b>	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
<b>Medium</b>	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
<b>Low</b>	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
<b>Very Low</b>	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

**APPENDIX C**

List of Flora species recorded  
during the 2022 field visit

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Amaranthaceae	<i>Alternanthera pungens</i> *	Herb	Alien	NE	-	-		x
Amaranthaceae	<i>Chenopodium carinatum</i> *	Herb	Alien	NE	-	-	x	
Amaranthaceae	<i>Gomphrena celosioides</i> *	Herb	Alien	NE	-	-	x	
Amaryllidaceae	<i>Scadoxus multiflorus</i> subsp. <i>multiflorus</i>	Geophyte	Indigenous	LC	-	-	x	
Anacardiaceae	<i>Ozoroa paniculosa</i> var. <i>paniculosa</i>	Tree	Indigenous	LC	-	-	x	x
Anacardiaceae	<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	Tree	Indigenous	LC	Protected	-	x	x
Anacardiaceae	<i>Searsia batophylla</i>	Tree	Indigenous	VU	-	Protected		
Anacardiaceae	<i>Searsia engleri</i>	Tree	Indigenous	LC	-	-		x
Anacardiaceae	<i>Searsia keetii</i>	Tree	Indigenous	LC	-	-		x
Anacardiaceae	<i>Searsia sekhukhuniensis</i>	Tree	Indigenous	Rare	-	-	x	x
Apiaceae	<i>Heteromorpha arborescens</i>	Tree	Indigenous	LC	-	-	x	
Araceae	<i>Stylochaeton natalensis</i>	Herb	Indigenous	LC	-	-	x	x
Araliaceae	<i>Cussonia transvaalensis</i>	Tree	Indigenous	LC	-	-	x	
Asphodelaceae	<i>Aloe marlothii</i>	Succulent	Indigenous	LC	-	Protected		
Asphodelaceae	<i>Aloe</i> sp. ( <i>maculata</i> )	Succulent	Indigenous	-	-	-	x	
Asteraceae	<i>Brachylaena ilicifolia</i>	Tree	Indigenous	LC	-	-	x	

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Asteraceae	Dicoma anomala	Herb	Indigenous	LC	-	-		x
Asteraceae	Kleinia longiflora	Succulent	Indigenous	LC	-	-		x
Asteraceae	Psiadia punctulata	Tree	Indigenous	LC	-	-	x	x
Asteraceae	Schkuhria pinnata*	Herb	Alien	LC	-	-	x	x
Asteraceae	Tarchonanthus parvicapitulatus	Tree	Indigenous	LC	-	-	x	
Asteraceae	Xanthium spinosum*	Herb	Alien (NEMBA Category 1b)	NE	-	-	x	
Bignoniaceae	Rhigozum zambesiicum	Tree	Indigenous	LC	-	-	x	
Celastraceae	Elaeodendron transvaalense	Tree	Indigenous	NT	Protected	-	x	
Celastraceae	Gymnosporia buxifolia	Tree	Indigenous	LC	-	-	x	
Celastraceae	Lydenburgia cassinoides	Tree	Indigenous	NT	Protected	-	x	
Combretaceae	Combretum nelsonii	Tree	Indigenous	LC	-	-	x	x
Combretaceae	Combretum hereroense	Tree	Indigenous	LC	-	-	x	x
Combretaceae	Combretum molle	Tree	Indigenous	LC	-	-	x	
Commelinaceae	Commelina africana	Herb	Indigenous	LC			x	
Convolvulaceae	Convolvulus cf. sagittatus	Herb	Indigenous	LC	-	-		x
Crassulaceae	Kalanchoe rotundifolia	Succulent	Indigenous	LC	-	-	x	



Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Cyperaceae	Cyperus esculentus*	Graminoid	Alien	LC	-	-	x	
Ebenaceae	Diospyros lycioides subsp. nitens	Tree	Indigenous	LC	-	-	x	x
Ebenaceae	Euclea crispa	Tree	Indigenous	LC	-	-	x	x
Ebenaceae	Euclea linearis	Tree	Indigenous	LC	-	-		x
Fabaceae	Albizia harveyi	Tree	Indigenous	LC	-	-		x
Fabaceae	Bauhinia tomentosa	Tree	Indigenous	LC	-	-	x	
Fabaceae	Bolusanthus speciosus	Tree	Indigenous	LC	-	-	x	
Fabaceae	Dichrostachys cinerea	Tree	Indigenous	LC	-	-	x	x
Fabaceae	Elephantorrhiza praetermissa	Tree	Indigenous	LC	-	Protected	x	x
Fabaceae	Mundulea sericea	Tree	Indigenous	LC	-	-	x	x
Fabaceae	Peltophorum africana	Tree	Indigenous	LC	-	-	x	
Fabaceae	Rhynchosia nitens	Tree	Indigenous	LC	-	-	x	
Fabaceae	Senegalia caffra	Tree	Indigenous	LC	-	-	x	
Fabaceae	Senna occidentalis*	Herb	Alien (NEMBA Category 1b)	NE	-	-	x	
Fabaceae	Vachellia karroo	Tree	Indigenous	LC	-	-		x
Fabaceae	Vachellia nilotica	Tree	Indigenous	LC	-	-	x	x
Fabaceae	Vachellia tortilis	Tree	Indigenous	LC	-	-		x
Hyacinthaceae	Ledebouria sp.	Geophyte	Indigenous		-	-	x	

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Hypoxidaceae	Hypoxis sp.	Geophyte	Indigenous	LC	-	-	x	
Iridaceae	Gladiolus sp. (no flowers)	Herb	Indigenous	-	-	-		x
Kirkiaceae	Kirkia wilmsii	Tree	Indigenous	LC	-	-	x	
Lamiaceae	Syncolostemon albiflora	Herb	Indigenous	LC	-	-	x	
Lamiaceae	Tinnea rhodesiana	Tree	Indigenous	LC	-	-	x	
Lamiaceae	Vitex obovata subsp. wilmsii	Tree	Indigenous	LC	-	-	x	x
Malvaceae	Dombeya rotundifolia	Tree	Indigenous	LC	-	-	x	
Malpighiaceae	Triaspis glaucophylla	Tree	Indigenous	LC	-	-	x	
Malvaceae	Grewia vernicosa	Tree	Indigenous	LC	-	-	x	x
Malvaceae	Waltheria indica	Herb	Indigenous	LC	-	-	x	
Olacaceae	Ximenia americana	Tree	Indigenous	LC	-	-		x
Papaveraceae	Argemone ochroleuca subsp. ochroleuca*	Herb	Alien (NEMBA Category 1b)	NE	-	-		x
Poaceae	Aristida adscensionis	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	Aristida aequiglumis	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	Asparagus sp.	Tree	Indigenous	-	-	-	x	x
Poaceae	Bothriochloa insculpta	Graminoid	Indigenous	LC	-	-	x	
Poaceae	Cymbopogon pospischilii	Graminoid	Indigenous	LC	-	-	x	

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Poaceae	<i>Cynodon dactylon</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Digitaria tricholaenoides</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Diheteropogon amplexens</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Eleusine coracana</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Enneapogon scoparius</i>	Graminoid	Indigenous	LC	-	-	x	
Poaceae	<i>Eragrostis</i> sp.	Graminoid	Indigenous	LC	-	-	x	
Poaceae	<i>Eragrostis superba</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Heteropogon contortus</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Hyparrhenia hirta</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Hyparrhenia</i> sp.	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Loudetia simplex</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Melinis repens</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Panicum maximum</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Panicum</i> sp.	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Setaria sphacelata</i>	Graminoid	Indigenous	LC			x	
Poaceae	<i>Themeda triandra</i>	Graminoid	Indigenous	LC	-	-	x	x
Poaceae	<i>Triraphis andropogonoides</i>	Graminoid	Indigenous	LC	-	-		x
Poaceae	<i>Urochloa panicoides</i>	Graminoid	Indigenous	LC	-	-	x	

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Polygalaceae	<i>Polygala sekhukhuniensis</i>	Herb	Indigenous	VU	-	-		x
Proteaceae	<i>Faurea cf. saligna</i>	Tree	Indigenous	LC	-	-		x
Pteridaceae	<i>Pellaea calomelanos</i> var. <i>calomelanos</i>	Fern	Indigenous	LC	-	-	x	
Phyllanthaceae	<i>Flueggea virosa</i>	Tree	Indigenous	LC	-	-	x	x
Rhamnaceae	<i>Berchemia zeyheri</i>	Tree	Indigenous	LC	Protected	-	x	
Rhamnaceae	<i>Ziziphus mucronata</i>	Tree	Indigenous	LC	-	-	x	
Rubiaceae	<i>Pavetta zeyheri</i> subsp. <i>zeyheri</i>	Tree	Indigenous	LC	-	-	x	x
Rubiaceae	<i>Vangueria madagascariensis</i>	Tree	Indigenous	LC	-	-	x	x
Santalaceae	<i>Thesium</i> sp.	Herb	Indigenous		-	-		x
Santalaceae	<i>Viscum rotundifolium</i>	Parasitic herb	Indigenous	LC	-	-		x
Sapindaceae	<i>Dodonaea angustifolia</i>	Tree	Indigenous	LC	-	-		x
Sapindaceae	<i>Hippobromus pauciflorus</i>	Tree	Indigenous	LC	-	-	x	x
Sapotaceae	<i>Mimusops cf. zeyheri</i>	Tree	Indigenous	LC	-	-		x
Scrophulariaceae	<i>Jamesbrittenia macrantha</i>	Herb	Indigenous	NT	-	-		x
Stilbaceae	<i>Nuxia gracilis</i>	Tree	Indigenous	LC	-	-		x
Thymelaeaceae	<i>Gnidia burchellii</i>	Tree	Indigenous	LC	-	-		x

Family	Species Name	Growth Form	Origin	Conservation Status			Proposed Project Component	
				Regional Red List (2021)	National Forest Act (1998)	Limpopo Protected Status	South Shaft Access Road	North Shaft Access Road
Velloziaceae	Xerophyta retinervis	Herb	Indigenous	LC	-	-	x	
Verbenaceae	Lantana rugosa	Herb	Indigenous	LC	-	-	x	
Vitaceae	Rhoicissus sekhukhuniensis	Tree	Indigenous	LC	-	-	x	
	Unidentified sp. A	Herb	Indigenous				x	
	Unidentified sp. B (no flowers)	Herb	Indigenous					x
	Unidentified sp. C	Herb	Indigenous				x	
IUCN Categories NE = Not Evaluated LC = Least Concern NT = Near Threatened VU = Vulnerable								
*Indicates alien species								

**APPENDIX D**

**Bird species recorded at Modikwe  
Platinum Mine (SAS, 2015 and  
2022 field visit).**

<b>Scientific Name</b>	<b>Common Name</b>
<b>Acridotheres tristis</b>	Common Myna
<b>Anthus cinnamomeus</b>	African Pipit
<b>Anthus leucophrys</b>	Plain-backed Pipit
<b>Batis molitor</b>	Chinspot Batis
<b>Bubulcus ibis</b>	Cattle Egret
<b>Buteo vulpinus</b>	Common Buzzard
<b>Circaetus pectoralis</b>	Black-chested Snake Eagle
<b>Cisticola aberrans</b>	Lazy Cisticola
<b>Colius striatus</b>	Speckled Mousebird
<b>Corvus albus</b>	Pied Crow
<b>Corvus capensis</b>	Cape Crow
<b>Elanus axillaris</b>	Black Winged Kite
<b>Euplectes albonotatus</b>	White-winged Widowbird
<b>Eurocephalus anguitimens</b>	Southern White-crowned Shrike
<b>Hirundo rustica</b>	Barn Swallow
<b>Indicator minor</b>	Lesser Honeyguide
<b>Lagonosticta rubricata</b>	African Firefinch
<b>Lamprotornis nitens</b>	Cape Starling
<b>Laniarius ferrugineus</b>	Southern Bou Bou
<b>Lanius collaris</b>	Southern Fiscal
<b>Lanius collurio</b>	Red-backed Shrike
<b>Lanius minor</b>	Lesser Grey Shrike
<b>Milvus aegyptius</b>	Yellow-billed Kite
<b>Mirafraba sabota</b>	Sabota Lark
<b>Numida meleagris</b>	Helmeted Guineafowl
<b>Oena capensis</b>	Namaqua Dove
<b>Passer domesticus</b>	House Sparrow
<b>Plocepasser mahali</b>	White-browed Sparrow-Weaver
<b>Ploceus velatus</b>	Southern Masked Weaver
<b>Prinia flavicans</b>	Black-chested Prinia
<b>Prinia subflava</b>	Tawny flanked Prinia
<b>Pternistis swainsonii</b>	Swainson's Spurfowl
<b>Pterocles bicinctus</b>	Double-banded Sandgrouse
<b>Quelea quelea</b>	Red-billed Quelea

<b>Scientific Name</b>	<b>Common Name</b>
<b>Spilopelia senegalensis</b>	Laughing Dove
<b>Sporopipes squamifrons</b>	Scaly Feathered Finch
<b>Streptopelia capicola</b>	Ringed-necked dove
<b>Streptopelia senegalensis</b>	Laughing dove
<b>Tchagra senegalus</b>	Black-crowned Tchagra
<b>Uraeginthus angolensis</b>	Blue Waxbill
<b>Urocolius indicus</b>	Red-faced Mousebird
<b>Vanellus coronatus</b>	Crowned Lapwing
<b>Vidua macroura</b>	Pin-tailed Whydah
<b>Vidua regia</b>	Shaft-tailed Whydah
<b>Source: SAS (2015) and 2022 field trip.</b>	



**APPENDIX E**

**Herpetofauna species recorded in  
the 2430CA QDS according to  
FrogMAP and ReptileMAP.**

Family	Scientific Name	Common Name
<b>Brevicipitidae</b>	<i>Breviceps adpersus</i>	Bushveld Rain Frog
<b>Bufonidae</b>	<i>Schismaderma carens</i>	Red Toad
<b>Bufonidae</b>	<i>Sclerophrys capensis</i>	Raucous Toad
<b>Bufonidae</b>	<i>Sclerophrys gutturalis</i>	Guttural Toad
<b>Bufonidae</b>	<i>Sclerophrys pusilla</i>	Flatbacked Toad
<b>Hyperoliidae</b>	<i>Hyperolius marmoratus</i>	Painted Reed Frog
<b>Hyperoliidae</b>	<i>Kassina senegalensis</i>	Bubbling Kassina
<b>Phrynobatrachidae</b>	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog
<b>Ptychadenidae</b>	<i>Ptychadena anchietae</i>	Plain Grass Frog
<b>Ptychadenidae</b>	<i>Ptychadena mossambica</i>	Broadbanded Grass Frog
<b>Pyxicephalidae</b>	<i>Amietia delalandii</i>	Delalande's River Frog
<b>Pyxicephalidae</b>	<i>Strongylopus grayii</i>	Clicking Stream Frog
<b>Pyxicephalidae</b>	<i>Tomopterna natalensis</i>	Natal Sand Frog
<b>Source: FrogMAP (FitzPatrick Institute of African Ornithology, 2022)</b>		

Family	Scientific Name	Common Name
<b>Agamidae</b>	<i>Agama aculeata distanti</i>	Distant's Ground Agama
<b>Agamidae</b>	<i>Agama atra</i>	Southern Rock Agama
<b>Colubridae</b>	<i>Dasypeltis scabra</i>	Rhombic Egg-eater
<b>Colubridae</b>	<i>Thelotornis capensis capensis</i>	Southern Twig Snake
<b>Cordylidae</b>	<i>Platysaurus orientalis orientalis</i>	Sekhukhune Flat Lizard
<b>Cordylidae</b>	<i>Smaug vandami</i>	Van Dam's Girdled Lizard
<b>Elapidae</b>	<i>Dendroaspis polylepis</i>	Black Mamba
<b>Gekkonidae</b>	<i>Afroedura leoloensis</i>	Sekhukhuneland Flat Gecko
<b>Gekkonidae</b>	<i>Hemidactylus mabouia</i>	Common Tropical House Gecko
<b>Gekkonidae</b>	<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko
<b>Gekkonidae</b>	<i>Lygodactylus nigropunctatus</i>	Black-spotted Dwarf Gecko
<b>Gekkonidae</b>	<i>Lygodactylus ocellatus</i>	Spotted Dwarf Gecko
<b>Gekkonidae</b>	<i>Pachydactylus affinis</i>	Transvaal Gecko
<b>Gekkonidae</b>	<i>Pachydactylus capensis</i>	Cape Gecko
<b>Lamprophiidae</b>	<i>Lamprophis guttatus</i>	Spotted House Snake
<b>Lamprophiidae</b>	<i>Psammophis mossambicus</i>	Olive Grass Snake

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
<b>Scincidae</b>	<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink
<b>Scincidae</b>	<i>Trachylepis margaritifera</i>	Rainbow Skink
<b>Scincidae</b>	<i>Trachylepis</i> sp. (Transvaal varia)	Skink sp. 1
<b>Scincidae</b>	<i>Trachylepis varia sensu lato</i>	Common Variable Skink Complex
<b>Viperidae</b>	<i>Bitis arietans arietans</i>	Puff Adder
<b>Viperidae</b>	<i>Causus rhombeatus</i>	Rhombic Night Adder
<b>Source: ReptileMAP (FitzPatrick Institute of African Ornithology, 2022)</b>		

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