TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED ROAD DEVELOPMENT AND ASSOCIATED BORROW PITS, WATER USE APPLICATION, AND TREE REMOVAL PERMIT BY ROADS AGENCY LIMPOPO SOC LTD (RAL) IN RELATION TO ROAD D5010 AND D5021 WITHIN THE LEPELLE-NKUMPI AND FETAKGOMO TUBATSE LOCAL MUNICIPALITIES, CAPRICORN AND SEKHUKHUNE DISTRICT, MUNICIPALITIES, LIMPOPO PROVINCE (RAL/T1282/2025)



This report also assesses the terrestrial biodiversity impacts associated with Borrow Pit 1, in line with the requirements of the Terrestrial Biodiversity Protocol (2020).

PRODUCED BY	APPLICANT	EAP
	ROADS AGENCY LIMPOPO	QEMS Pursuing new horizons
Cell: +27 712082364 **Tel: +27 11 052 6711** **Email:** **tshuxekanim@ntumbulukoconsulting.co.za** **5 13th Avenue, Fairlands, Randburg 2170**	Private Bag X 9554 Polokwane 0700	**7 Munnik Avenue, Sterpark,** **Polokwane, 0700** **Limpopo, South Africa**

October 2026

CONDITIONS RELATING TO THIS REPORT

DECLARATION OF INTEREST

Ntumbuluko Consulting Pty (Ltd) has no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Ntumbuluko Consulting Pty (Ltd) is not a subsidiary, legally or financially of the proponent. The study was undertaken by Mr Tshuxekani Maluleke, he is a registered Natural Scientists with the following details:

QUALIFICATIONS

SPECIALIST	QUALIFICATION
Mr Tshuxekani Maluleke (SACNASP Reg. No. 120501)	MSc Environmental Sciences (Wits University) BSc Hons Zoology (University of Limpopo) BSc Hons Animal, Plant and Environmental Sciences (Wits University)

APPROVAL

PREPARED BY:

Mr Tshuxekani Maluleke



Biodiversity Specialist

Msc. Environmental Sciences

Professional Zoologist (SACNASP)

19 October 2026

INDEMNITY

Although Ntumbuluko Consulting Pty (Ltd) exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Ntumbuluko Consulting Pty (Ltd) and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. Ntumbuluko Consulting Pty (Ltd) accepts no liability, and the client indemnifies Ntumbuluko Consulting Pty (Ltd) and its directors, managers, agents, and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly, by Ntumbuluko Consulting Pty (Ltd) and by the use of this document.

EXECUTIVE SUMMARY

Ntumbuluko Consulting (Pty) Ltd was appointed by QEMS Management and Business Solutions CC, on behalf of Roads Agency Limpopo (RAL) SOC Ltd, to undertake a Terrestrial Biodiversity Impact Assessment for the proposed Borrow Pit 1, which will provide construction material for the upgrading of Road D5010 and the construction of a new section of Road D5021 between Nkotokwane and Apel.

The assessment confirmed that Borrow Pit 1 is located within the Endangered Sekhukhune Plains Bushveld vegetation unit and an Ecological Support Area (ESA 1). The site exhibits evidence of historical disturbance, including overgrazing, bush encroachment, reduced grass cover, and the presence of the invasive Mexican Poppy (*Argemone mexicana*). Despite this disturbance, the site supports indigenous bushveld vegetation and a relatively high abundance of Shepherd's Trees (*Boscia albitrunca*), a protected species under the National Forests Act.

The primary biodiversity sensitivities associated with Borrow Pit 1 relate to the potential loss of indigenous vegetation, disturbance of protected *Boscia albitrunca* individuals, habitat degradation, and the spread of invasive species. The site is located approximately 1 km from the Olifants River riparian zone and does not directly encroach upon this high-sensitivity habitat.

Provided that appropriate mitigation measures are implemented, including the protection of *Boscia albitrunca*, invasive species management, strict footprint control, and progressive rehabilitation, the anticipated residual impacts are considered to be low to moderate. From a terrestrial biodiversity perspective, the proposed development of Borrow Pit 1 is considered acceptable subject to the implementation of the recommended mitigation measures.

TABLE OF CONTENTS

1 INTRODUCTION 1
2 BACKGROUND AND PROJECT DESCRIPTION 2
3 STUDY AREA 3
4 TERMS OF REFERENCE 6
4.1 SCOPE OF STUDY 6
4.1.1 Floral study: 6
4.1.2 Faunal study: 6
5 LEGAL FRAMEWORK 7
5.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO 107 OF 1998) (NEMA) AS AMENDED 7
5.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO 10 OF 2004) (NEM: BA) 7
5.3 THE NATIONAL BIODIVERSITY FRAMEWORK (2017-2022) 8
5.4 LIMPOPO ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 7 OF 2003) 8
5.5 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO 43 OF 1983) (CARA): 8
5.6 THE NATIONAL FOREST ACT (ACT NO 84 OF 1998) (NFA) 9
5.7 CONVENTION ON BIOLOGICAL DIVERSITY 9
5.8 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES) 9
5.9 CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS 10
5.10 THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE 10
5.11 CONVENTION ON WETLANDS (POPULARLY KNOWN AS THE RAMSAR CONVENTION) 10
5.12 WORLD HERITAGE CONVENTION (WHC) 10
5.13 INTERNATIONAL PLANT PROTECTION CONVENTION (IPPC) 11
6 SITE CHARACTERISTICS 12
6.1 GEOLOGY & SOILS 12
6.2 CLIMATE 12
6.3 VEGETATION UNIT- SEKHUKHUNE PLAINS BUSHVELD (GM 12) 13
6.3.1 SVcb 27 Sekhukhune Plains Bushveld's Conservation Status 15
6.4 2018 LIMPOPO PROVINCE MAP OF CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS 17
7 METHODOLOGY 19
7.1 SPECIES OF SPECIAL CONCERN (SSC) 19

7.2 IMPACTS ASSESSMENT 20
7.3 STUDY LIMITATIONS 26
8 RESULTS OF THE FLORA ASSESSMENT 27
8.1 HABITAT ASSESSMENT 27
8.2 VEGETATION ASSESSMENT 30
8.3 FLORA SPECIES OF SPECIAL CONCERN 33
8.3.1 Ethnobotanical plant species 35
8.3.2 Invasive Alien Species 36
9 RESULTS OF THE FAUNA ASSESSMENT 38
9.1 MAMMALS 38
9.1.1 Field Investigation Findings 39
9.2 REPTILE 39
9.2.1 Field investigation findings 40
9.3 AVIFAUNA- 40
9.3.1 Field investigation findings 41
9.4 INVERTEBRATES 41
9.4.1 Field investigation findings 42
10 IMPACT ASSESSMENT 44
10.1 LOSS OF HABITAT 45
10.1.1 Construction Phase 45
10.1.2 Operational phase 45
10.1.3 Decommissioning phase 46
10.1.4 Post-closure phase 47
10.2 LOSS OF SPECIES OF SPECIAL CONCERN 48
10.3 CUMULATIVE IMPACTS 48
11 DISCUSSION 51
12 CONCLUSION AND RECOMMENDATIONS 53
12.1 RECOMMENDATIONS 53
12.1.1 Recommendation: Permit Application for the Removal or Disturbance of Shepherd's Trees 54
13 REFERENCES 56

LIST OF FIGURES

Figure 3-1: Locality Map (Source: QEMS, 2026) 4
Figure 3-2: Locality Map in relation to the other Borrow Pits 5
Figure 6-1: Vegetation Map 16
Figure 6-2: Sensitivity Map 18
Figure 8-1:Habitat Assessment 28
Figure 8-2:Aerial image of the habitat associated with Borrow Pit 1 29
Figure 8-3: Overview of bush encroachment observed on Borrow Pit 1. 31
Figure 8-4: Overview of Borrow Pit 1, with evidence of overgrazing. 31
Figure 8-5: Overview of Borrow Pit 1 grasses and the medium density shrubs. 32
Figure 8-6: Overview of Borrow Pit 1, showing clear evidence of Dichrostachys cinerea encroachment and the presence of Shepherd's Trees (Boscia albitrunca). 32
Figure 8-7: Overview of Borrow Pit 1, showing evidence of indigenous grasses and Dichrostachys cinerea encroachment. 33
Figure 8-8: Shepherd's Trees (Boscia albitrunca) recorded across Borrow pit 1 35
Figure 8-9:Aloe's observed onsite. 36
Figure 8-10: Argemone mexicana observed on Borrow Pit 1. 37
Figure 9-1: livestock observed with borrow pit 1. 39
Figure 9-2: Bird observed onsite. 41
Figure 9-3: Invertebrate species observed onsite. 43

LIST OF TABLES

Table 3-1: Corner Coordinates of the Proposed Borrow Pit 1 Development. 3
Table 6-1: Important Taxa associated Sekhukhune Plains Bushveld (Mucina and Rutherford 2006) 14
Table 7-1: Biodiversity Impact Assessment Parameter Ratings 21
Table 7-2: Probability Consequence Matrix 25
Table 7-3: Significance Threshold Limits 25
Table 8-1: Plant Species of Special Concern 34
Table 9-1: mammals that are likely to occur onsite. 38
Table 9-2: List of Reptile Species likely to be found onsite. 39
Table 9-3: Red Data bird species potentially found within the study site. 40
Table 9-4: Butterfly species expected to occur on site. 42
Table 10-1: Mitigation hierarchy of impacts 44

Table 10-2: Loss of habitat during Construction phase 45
Table 10-3: Loss of habitat during operation phase 46
Table 10-4: Loss of habitat during decommissioning 46
Table 10-5: Loss of habitat during post-closure phase. 47
Table 10-6: Loss of species of special concern during operation phase. 48
Table 10-7: Cumulative Impact Assessment: Borrow Pit 1 50

LIST OF ABBREVIATIONS

ALARP	As Low as Reasonably Practicable
BES	Biodiversity and Ecosystem Services
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CR	Critically Endangered
ESA	Ecological Support Areas
EN	Endangered
GIS	Geographic Information System
I&APS	Interested & Affected Parties
IPPC	International Plant Protection Convention
IUCN	International Union for Conservation of Nature
LC	Least Concern
NBF	National Biodiversity Framework
NEMA	National Environmental Management Act (Act 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
PA	Protected Areas
SANBI	South African National Biodiversity Institute
SSC	Species of Special Concern
VU	Vulnerable

DEFINITIONS

Alien animal	(a) Any live vertebrate, including a bird and a reptile, but excluding a fish, belonging to a species or subspecies that is not a recognised domestic species and the natural habitat of which is not in the Republic; or (b) The egg of such vertebrate.
Biodiversity	Means the diversity of animals, plants or other organisms, including the diversity of animals, plants or other organisms found within and between— (a) Ecosystems; (b) Habitats; (c) The ecological complexes of which these systems and habitats are part; and (d) Species.
CITES	Means the Convention on International Trade in Endangered Species of Wild Fauna and Flora;
Endangered Species	Means a species is endangered when it is facing a very high risk of extinction in the wild in the near future and includes— (*a*) Any living or dead specimen of such a species; or (*b*) Any egg, skin, bone, feather, seed, flower or any other part or derivative of such a species.
Environment	Means the surroundings within which humans exist and that are made up of— (*a*) The land, water and atmosphere of the earth; (*b*) Microorganisms, plant and animal life; (*c*) Any part or combination of (*a*) and (*b*) and the interrelationships amongst and between them; and (*d*) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;
Indigenous plant	(*a*) Means any living or dead plant which is indigenous to the Republic, whether artificially propagated or in its wild state; and

	(*b*) Includes the flower, pollen, seed, cone, fruit, bulb, tuber, stem or root or any other part or derivative of such plant but does not include a plant declared a weed in terms of any legislation.
Protected area	Means— (*a*) A provincial nature reserves; (*b*) A site of ecological importance; (*c*) A protected environment; (*d*) A private nature reserves; or (*e*) A resource use area.
Protected environment	Means an area declared a Protected Environment or Private Nature Reserve in terms of section 21 (1) (*a*).

1 INTRODUCTION

Ntumbuluko Consulting (Pty) Ltd has been appointed by QEMS Management and Business Solutions CC, on behalf of the Roads Agency Limpopo (RAL) (SOC) Ltd, to undertake a Terrestrial Biodiversity Impact Assessment for the proposed borrow pit 1 associated with the upgrading of Road D5010 in Nkotokwane and the construction of a new section of Road D5021 between Nkotokwane and Apel. The borrow pit will supply construction material required for the road upgrade and is situated within the Fetakgomo Tubatse Local Municipality (Sekhukhune District Municipality) and the Lepelle-Nkumpi Local Municipality (Capricorn District Municipality), Limpopo Province.

The purpose of this assessment is to describe and characterise the terrestrial environment, habitats, and species present within the proposed borrow pit footprint. Biodiversity is defined according to the National Environmental Management: Biodiversity Act of 2004 (NEMBA), as "the variability among living organisms from all sources including, terrestrial, aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems". The NEMBA legislation upholds the country's commitment to the protection of South Africa's biological resources, and it is imperative that development takes place in a sustainable way to achieve this.

A terrestrial biodiversity survey was conducted on 09 October 2026, during the early wet season. The survey covered the full extent of the five proposed borrow pit footprint and was undertaken using a stratified sampling methodology to ensure representative coverage of all habitat types present. Habitat units and sensitive terrestrial biodiversity receptors were identified, mapped, and described across the project area, and the potential impacts associated with borrow pit development on these receptors were assessed.

In accordance with the *Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity* (GN R. 320 of 2020), a site sensitivity verification must be undertaken prior to commencing any terrestrial biodiversity specialist assessment. The Protocol requires that the current land use and the environmental sensitivity identified by the national Screening Tool be confirmed through an on-site inspection. The combined outcome of the Screening Tool and the site sensitivity verification determines the minimum reporting requirements applicable to the project.

For Borrow Pit 1, associated with the upgrading of Road D5010 and the new section of Road D5021, the Screening Tool classified the terrestrial biodiversity theme as "Very High" sensitivity. Based on this sensitivity rating, the Protocol mandates the completion of a full Terrestrial Biodiversity Specialist Assessment.

This report therefore presents the findings of the specialist assessment undertaken specifically for Borrow Pit 1. The results, together with the recommended mitigation measures, are intended to inform the Environmental Assessment Practitioner (EAP) and the competent authority in evaluating the ecological viability of establishing and operating Borrow Pit 1 within the project area.

2 BACKGROUND AND PROJECT DESCRIPTION

Roads Agency Limpopo (SOC) Ltd (RAL) is in the process of applying for Environmental Authorisation (EA) from the Limpopo Department of Economic Development, Environment and Tourism (LEDET), a water use authorisation from the Limpopo-Olifants Catchment Management Agency (LOCMA), borrow pit permits from the Department of Mineral Resources and Energy (DMRE), and a tree-cutting permit in terms of the National Forests Act. In accordance with the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), and the Environmental Impact Assessment Regulations, 2014 (as amended), RAL is undertaking a Basic Assessment Process (BA) for the proposed development.

The project entails the construction of a new bridge over the Olifants River, the upgrading of Road D5010 in Nkotokwane, and the installation of culverts and construction of a new section of Road D5021 between Nkotokwane and Apel. Both roads will be upgraded from gravel to a bituminous surfaced standard. The total length of the proposed road works is approximately 3.6 km, comprising 2.2 km for the upgrading of Road D5010 and 1.4 km for the construction of the new Road D5021.

In support of the road and bridge works, RAL is applying for authorisation to excavate Borrow Pit 1 to supply construction material required for the upgrading of Road D5010 and the new section of Road D5021. Borrow Pit 1 forms an essential component of the project and requires a dedicated terrestrial biodiversity assessment to determine its ecological suitability and to identify appropriate mitigation measures.

3 STUDY AREA

The Roads Agency Limpopo (RAL) proposes the construction of a new 1,687 m² bridge over the Olifants River, as well as the upgrading of Roads D5021 and D5010 between Apel and Nkotokwane. To facilitate the implementation of the project, RAL requires access to suitable gravel resources for construction purposes. RAL therefore proposes the establishment of Borrow Pit 1, which will serve as a designated gravel extraction site to supply material required for the road upgrading works.

Borrow Pit 1 is located within the Lepelle-Nkumpi Local Municipality, Capricorn District Municipality, Limpopo Province. The approximate centre coordinates of the proposed borrow pit are 24°25'15.46"S, 29°43'0.57"E (**Table *3-1*** and **Figure *3-1***). The proposed borrow pit will be situated on Portion 0.

Table 3-1: Corner Coordinates of the Proposed Borrow Pit 1 Development.

Coner coordinates	Latitude (S)	Longitude (E)
Corner one	24°25'11.67"S	29°42'54.15"E
Coner two	24°25'10.66"S	29°42'59.65"E
Coner three	24°25'18.99"S	29°43'6.71"E
Coner four	24°25'20.37"S	29°43'1.65"E

Disclaimer*: The Roads Agency Limpopo (RAL) is considering five potential borrow pit sites to support the proposed bridge construction and road upgrading project (**Figure 3-2**). However, this report is limited to the assessment of **Borrow Pit 1** only. The findings, conclusions and recommendations presented herein therefore relate exclusively to Borrow Pit 1 and should not be interpreted as applying to any of the other proposed borrow pit sites.*

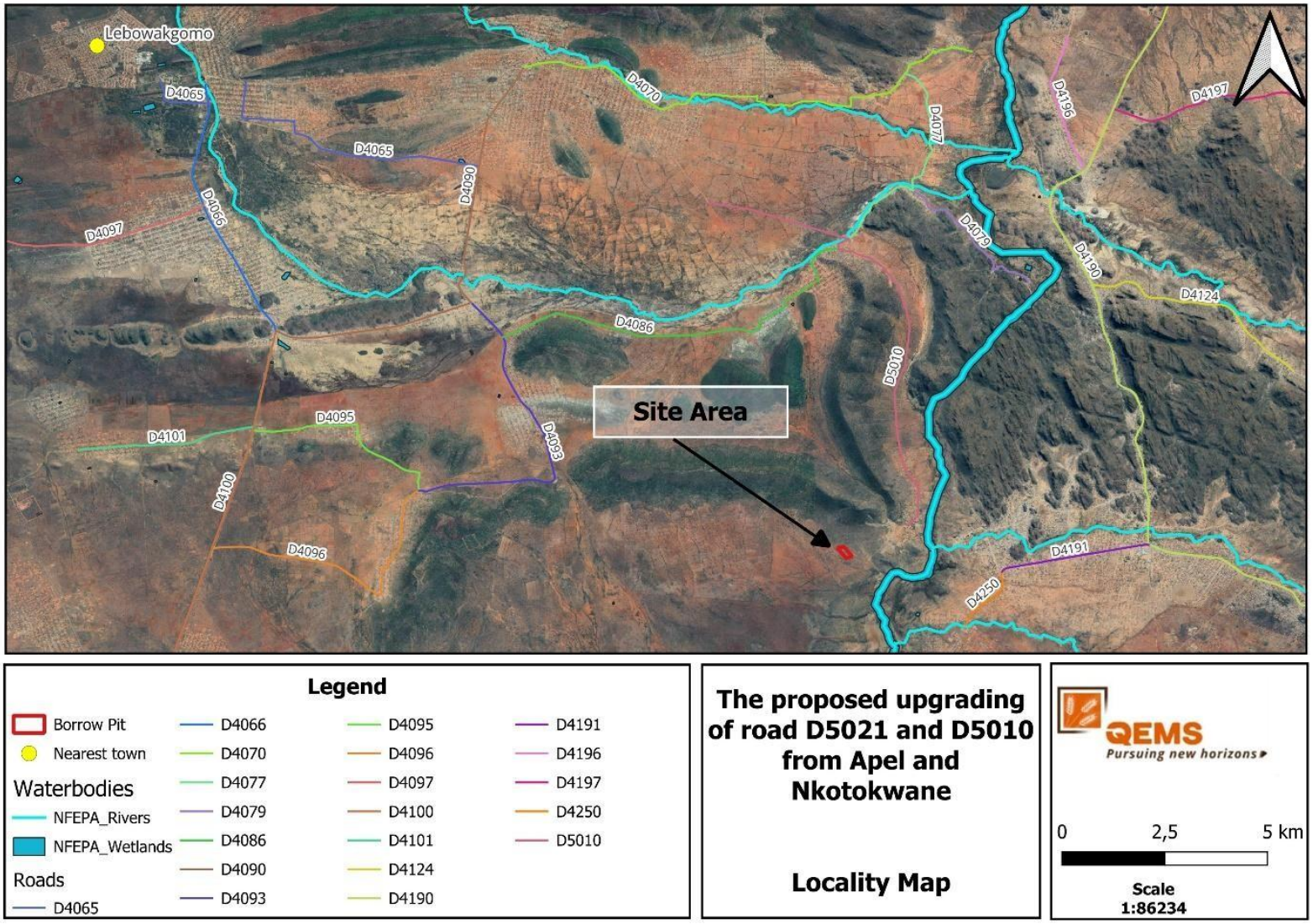


Figure 3-1: Locality Map (Source: QEMS, 2026)

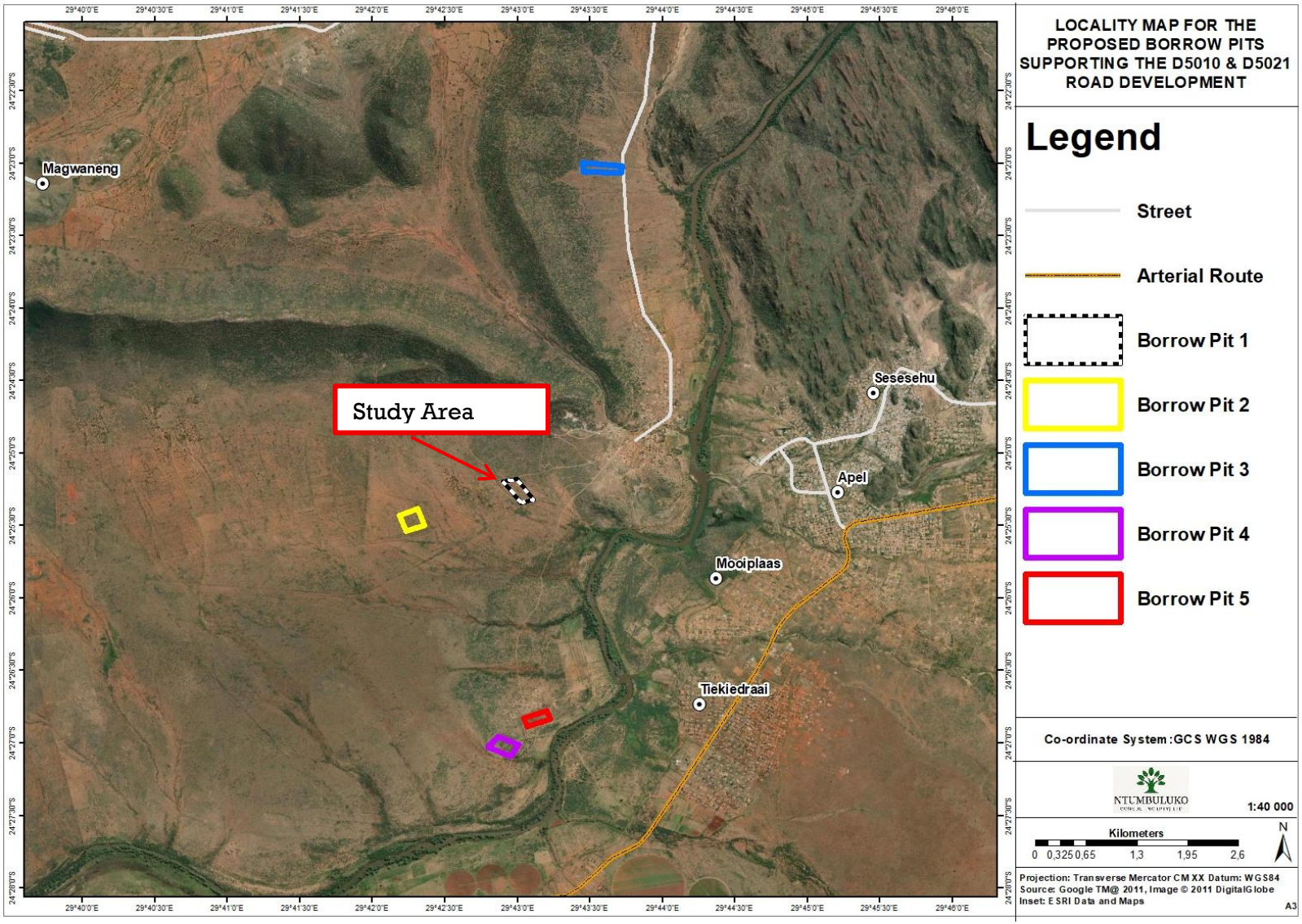


Figure 3-2: Locality Map in relation to the other Borrow Pits

4 TERMS OF REFERENCE

Ntumbuluko Consulting Pty (Ltd) has been appointed to undertake the following specialist functions:

- Assess the impacts of the proposed mining on both the fauna and flora.
- Provide mitigation measures, rehabilitation process and/or vegetation removal procedures that would reduce the potential impacts of the developments on biodiversity.

4.1 SCOPE OF STUDY

4.1.1 Floral study:

- Conduct fieldwork to locate and identify the current state of vegetation on the study sites, with emphasis on the footprint of borrow pit 1.
- Determine the species that are present onsite.
- Identify sensitive vegetation types and critical biodiversity areas on site.
- Identify Critical Biodiversity and Ecological Support Areas onsite.
- Determine whether the location of the existing development is located within the distribution range of species listed as Vulnerable, Endangered or Critically Endangered and Protected.
- Provide photographic evidence of the current state of vegetation onsite (i.e. natural or transformed, disturbed etc.) identify and describe the conservation value and conservation planning that are relevant to the site.
- Determine alien species present onsite and the recommended management actions.
- Describe the potential direct, indirect and cumulative negative and positive impacts of the proposed activity on the vegetation species during construction, operation and decommissioning phases of the project.
- Identification of issues and potential direct, indirect and cumulative biodiversity impacts.
- Provide monitoring requirements, mitigation measures and recommendations.

4.1.2 Faunal study:

- Conduct fieldwork to describe and assess the current state of terrestrial fauna in the area.

- Describe the existing micro-habitats, and the species associated with those habitats.
- Provide a description of species composition and conservation status in terms of protected, endangered or vulnerable faunal species.
    - This description will include species which are likely to occur within, traverse across or forage within the proposed project area, as well as species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development.

5 LEGAL FRAMEWORK

The following national and provincial legislative guidelines and requirements were followed as part of this study:

5.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO 107 OF 1998) (NEMA) AS AMENDED

This Act embraces all three (3) fields of environmental concern namely: resource conservation and exploitation; pollution control and waste management; and land-use planning and development. The environmental management principles include the duty of care for wetlands and special attention is given to management and planning procedures. NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

5.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO 10 OF 2004) (NEM: BA)

NEMBA was signed into law in mid-2004 and entered into effect on 1 September 2004. NEM: BA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. Certain activities, known as Restricted Activities, are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling.

5.3 THE NATIONAL BIODIVERSITY FRAMEWORK (2017-2022)

The National Biodiversity Framework (NBF) is a requirement under Section 38 of the National Environmental Management: Biodiversity Act (Act 10 of 2004, hereafter referred to as the 'Biodiversity Act'). The NBF is a short to medium-term coordination tool that shows the alignment between the strategic objectives and outcomes identified in the National Biodiversity Strategy and Action Plan (NBSAP v.2, 2015) and other key national strategies, frameworks and systems that currently guide the work of the biodiversity sector and identifies mechanisms through which this work is coordinated. It also identifies a set of interventions or "acceleration measures" that can unlock or fast-track implementation of the NBSAP and indicates the relative roles of the many agencies involved in implementing these activities. The purpose of the NBF is not to provide a comprehensive review of all work currently being undertaken in the biodiversity sector, nor to list all of the actions required to conserve and manage South Africa's biodiversity in support of sustainable development.

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

This Act makes provision with respect to the protection and conservation of the environment in the Limpopo Province. It makes provision for a wide variety of matters regarding the environment including protected areas, hunting of wild and exotic animals, the establishment of Wildlife Councils, inland fishing and the protection and aquatic systems. The Act prioritizes the protection of indigenous plants, the application of CITES, restrictions on development and environmental impact reports. The Act makes provision for the declaration and protection:

- Site of Ecological Importance;
- Protected Environments and Private Nature Reserves; and
- Mountain catchment area.

5.5 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO 43 OF 1983) (CARA):

This act regulates the utilization and protection of wetlands, soil conservation and all matters relating thereto; control and prevention of veld fires, control of weeds and invader plants, the prevention of water pollution resulting from farming practices and losses in biodiversity.

5.6 THE NATIONAL FOREST ACT (ACT NO 84 OF 1998) (NFA)

The main objective of the National Forests Act, 1998 is to promote the sustainable management and development of forests and to provide protection for certain forests and trees. This said protection is provided through the protection of all natural forests (Section 7 (1), the protection of all trees declared to be protected in terms of section 12(1) of the Act, and the regulation of certain activities in a proclaimed State Forest (Section 23(1)(a) – (k)). It should be noted that there are other environmental legislation administered by other State Departments that also regulate natural resources. The Act is responsible for:

- Promotes the sustainable management and development of forests for the benefit of all;
- Creates the conditions necessary to restructure forestry in South Africa;
- Provide special measures for the protection of certain forests and protected trees;
- Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- Promotes community forestry; and
- Promotes greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

5.7 CONVENTION ON BIOLOGICAL DIVERSITY

The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from commercial and other utilization of genetic resources. The agreement covers all ecosystems, species, and genetic resources.

5.8 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Through its three appendices, the Convention accords varying degrees of protection to more than 30,000 plant and animal species.

5.9 CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

The CMS, or the Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Parties to the CMS work together to conserve migratory species and their habitats by providing strict protection for the most endangered migratory species, by concluding regional multilateral agreements for the conservation and management of specific species or categories of species, and by undertaking co-operative research and conservation activities.

5.10 THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

The objectives of the Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. The Treaty covers all plant genetic resources for food and agriculture, while it's Multilateral System of Access and Benefit-sharing covers a specific list of 64 crops and forages. The Treaty also includes provisions on Farmers' Rights.

5.11 CONVENTION ON WETLANDS (POPULARLY KNOWN AS THE RAMSAR CONVENTION)

The Ramsar Convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention covers all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.

5.12 WORLD HERITAGE CONVENTION (WHC)

The primary mission of the WHC is to identify and conserve the world's cultural and natural heritage, by drawing up a list of sites whose outstanding values should be preserved for all humanity and to ensure their protection through a closer co-operation among nations.

5.13 INTERNATIONAL PLANT PROTECTION CONVENTION (IPPC)

The IPPC aims to protect world plant resources, including cultivated and wild plants by preventing the introduction and spread of plant pests and promoting the appropriate measures for their control. The convention provides the mechanisms to develop the International Standards for Phytosanitary Measures (ISPMs), and to help countries to implement the ISPMs and the other obligations under the IPPC, by facilitating the national capacity development, national reporting and dispute settlement. The Secretariat of the IPPC is hosted by the Food and Agriculture Organization of the United Nations (FAO).

6 SITE CHARACTERISTICS

6.1 GEOLOGY & SOILS

The study area is underlain by a complex assemblage of mafic and ultramafic intrusive rocks associated with the main to lower zones of the Rustenburg Layered Suite, forming part of the eastern lobe of the Bushveld Igneous Complex (Vaalian age). The geological architecture is characterised by concentric belts of norite, gabbro, anorthosite, and pyroxenite, reflecting the layered magmatic differentiation typical of the Rustenburg Suite.

Localised intrusions and lithological variations occur throughout the landscape, including magnetite and chromitite seams, serpentinised harzburgite, olivine diorite, and isolated pockets of shale, dolomite, and quartzite. This geological heterogeneity contributes to the unique edaphic conditions and high levels of plant endemism characteristic of the Sekhukhune region.

The soils derived from these substrates are predominantly red apedal soils, which dominate much of the plains. Deep, loamy Valsrivier soils are typical of the more level plains and valley bottoms, providing relatively fertile conditions compared to the surrounding ultramafic substrates. In contrast, shallow Glenrosa soils occur on the low-lying rocky hills and footslopes, where lithic contact is close to the surface.

Patches of erodible, black melanic structured horizons are frequently encountered around small mountains and isolated hills, often associated with colluvial deposition and localised moisture accumulation. In certain areas, Steendal soils underlain by gypsum are present, reflecting evaporitic processes linked to the region's semi-arid climate and restricted drainage. Land types within the study area are dominated by Ae, Ib, Ea and Ia, each reflecting variations in soil depth, texture, parent material, and landscape position. These land types collectively support the characteristic vegetation structure and ecological processes of the Sekhukhune Plains Bushveld.

6.2 CLIMATE

The region is characterised by a summer-rainfall climate with very dry winters, typical of the Sekhukhune Plains. The Mean Annual Precipitation (MAP) ranges between 400–600 mm, although rainfall is generally at the lower end of this range on the central plains,

increasing to approximately 500 mm on the plains situated east of the Leolo Mountains. Rainfall is strongly seasonal, with the majority of precipitation occurring between October and March, often in the form of short-duration convective thunderstorms.

Frost is very infrequent, reflecting the relatively warm winter conditions of the lower-lying plains. Temperature regimes are characterised by high summer maxima and cool winter minima, with mean monthly maximum and minimum temperatures for Tswelopele recorded at 37.3 °C in January and –0.9 °C in June, respectively. Daily temperatures vary considerably across the landscape, with higher temperatures on the western plains and lower temperatures on the elevated plateaus and foothills.

These climatic conditions correspond with the SVcb 27 Sekhukhune Plains Bushveld climate profile, which is shaped by the interplay between altitude, ultramafic geology, and the region's semi-arid rainfall regime.

6.3 VEGETATION UNIT- SEKHUKHUNE PLAINS BUSHVELD (GM 12)

Borrow pit 1 is situated within the SVcb 27 Sekhukhune Plains Bushveld vegetation unit (**Figure *6-1***), a Vulnerable ecosystem characterised by semi-arid plains, open valleys, and short thornveld typical of the broader Sekhukhune region. This vegetation unit comprises semi-arid plains and open valleys positioned between chains of hills and small mountains that run broadly parallel to the escarpment. The landscape supports a short, open to closed thornveld, with a notable abundance of Aloe species and a diverse assemblage of succulent shrubs, reflecting the influence of ultramafic substrates and the region's semi-arid climate. These substrates contribute to nutrient-poor soils and a unique floristic composition, including drought-tolerant woody species and structurally variable grass layers typical of the Sekhukhune Plains Bushveld.

Vegetation condition across the broader unit is highly variable, with extensive areas showing signs of heavy degradation due to long-term anthropogenic pressures. These include subsistence and commercial cultivation, mining activities, overgrazing, and rapid urban expansion. Both natural and anthropogenic erosion dongas are common, particularly in areas where soils contain clays enriched with heavy metals, which are prone to structural instability.

The unit is also affected by encroachment by indigenous microphyllous trees, a process driven by historical grazing patterns and altered fire regimes. Invasion by alien plant

species is widespread, further contributing to habitat transformation and reduced ecological functionality.

The Sekhukhune Plains Bushveld extends across parts of the Limpopo and Mpumalanga Provinces, occupying a broad lowland zone from Burgersfort and the lower Steelpoort River basin in the south, northwards through the plains of the Motse River basin to Jobskop and Legwareng, situated south of the Strydpoort Mountains. The vegetation unit continues northwards along the Olifants River basin to the vicinity of Tswaing, including the valleys of the Lepellane and Mohlaletsi Rivers. The altitude ranges predominantly between 700–1 100 m, with local variation influenced by the presence of foothills, low mountains, and dissected plains.

The taxa associated with the dominant veldtype onsite are summarized on **Table 6-1 below**.

Table 6-1: Important Taxa associated Sekhukhune Plains Bushveld (Mucina and Rutherford 2006)

PLANT FORM	SPECIES
Tall Trees	*Acacia erioloba, Philenoptera violacea.*
Small Trees	*Acacia mellifera subsp. detinens (d), A. nilotica (d), A. tortilis subsp. heteracantha (d), Boscia foetida subsp. rehmanniana (d), Acacia grandicornuta, Albizia anthelmintica, Balanites maughamii, Combretum imberbe, Commiphora glandulosa, Maerua angolensis, Markhamia zanzibarica, Mystroxylon aethiopicum subsp. schlechteri, Ptaeroxylon obliquum, Schotia brachypetala, Ziziphus mucronata.*
Succulent Tree	*Euphorbia tirucalli (d)*
Tall Shrubs	*Rhus engleri (d), Cadaba termitaria, Dichrostachys cinerea, Ehretia rigida subsp. rigida, Grewia bicolor, Karomia speciosa, Maerua decumbens, Rhigozum brevispinosum, R. obovatum, Tinnea rhodesiana, Triaspis glaucophylla.*
Low Shrubs	*Felicia clavipilosa subsp. transvaalensis (d), Seddera suffruticosa (d), Gnidia polycephala, Gossypium herbaceum subsp. africanum, Jamesbrittenia atropurpurea, Jatropha latifolia var. latifolia, Lantana rugosa, Melhania rehmannii, Monechma divaricatum, Myrothamnus flabellifolius, Pechuel-Loeschea leubnitziae, Plinthus rehmannii.*
Succulent Shrubs	*Aloe cryptopoda (d), Euphorbia enormis (d), Kleinia longiflora (d), Aloe castanea, A. globuligemma.*

Woody Succulent Climber	*Sarcostemma viminale.*
Herbaceous Climbers	*Coccinia rehmannii, Decorsea schlechteri.*
Graminoids	*Cenchrus ciliaris (d), Enneapogon cenchroides (d), Panicum maximum (d), Urochloa mosambicensis (d), Aristida adscensionis, A. congesta, Eragrostis barbinodis, Paspalum distichum, Schmidtia pappophoroides, Stipagrostis hirtigluma subsp. patula, Tragus berteronianus.*
Herbs	*Becium filamentosum (d), Phyllanthus maderaspatensis (d), Blepharis integrifolia, Corchorus asplenifolius, Hibiscus praeteritus, Ipomoea magnusiana.*
Geophytic Herbs	*Drimia altissima, Sansevieria pearsonii*

6.3.1 SVcb 27 Sekhukhune Plains Bushveld's Conservation Status

The Sekhukhune Plains Bushveld (SVcb 27) is classified as Vulnerable, with a national conservation target of 19%. Only ~2% of the vegetation unit is formally conserved within statutory protected areas, including Potlake Nature Reserve, Bewaarkloof Nature Reserve, and the Wolkberg Caves Nature Reserve. This limited formal protection leaves the majority of the unit exposed to ongoing and future land-use pressures.

Approximately 25% of the vegetation unit has been transformed, primarily through dry-land subsistence cultivation, which is widespread across the plains. Additional pressure arises from chrome and platinum mining activities, particularly around the ultramafic geological belts of the region. Associated urbanisation and infrastructure expansion further contribute to habitat loss and fragmentation. Given the mineral richness of the area, these pressures are expected to increase in the future, depending on commodity demand and mining expansion.

Much of the remaining natural vegetation is highly degraded due to unsustainable harvesting, overgrazing, and long-term utilisation pressures. Erosion is widespread, typically at high to very high levels, with extensive donga formation in areas where soils contain heavy-metal-rich clays that are structurally unstable when disturbed. Alien invasive species are present throughout the vegetation unit, generally in scattered but persistent populations. Common invaders include Agave spp., *Caesalpinia decapetala*, *Lantana camara*, *Melia azedarach, Nicotiana glauca*, *Opuntia* spp., *Verbesina encelioides*, and *Xanthium strumarium*. These species contribute to further degradation, reduced ecological functioning, and displacement of indigenous flora.

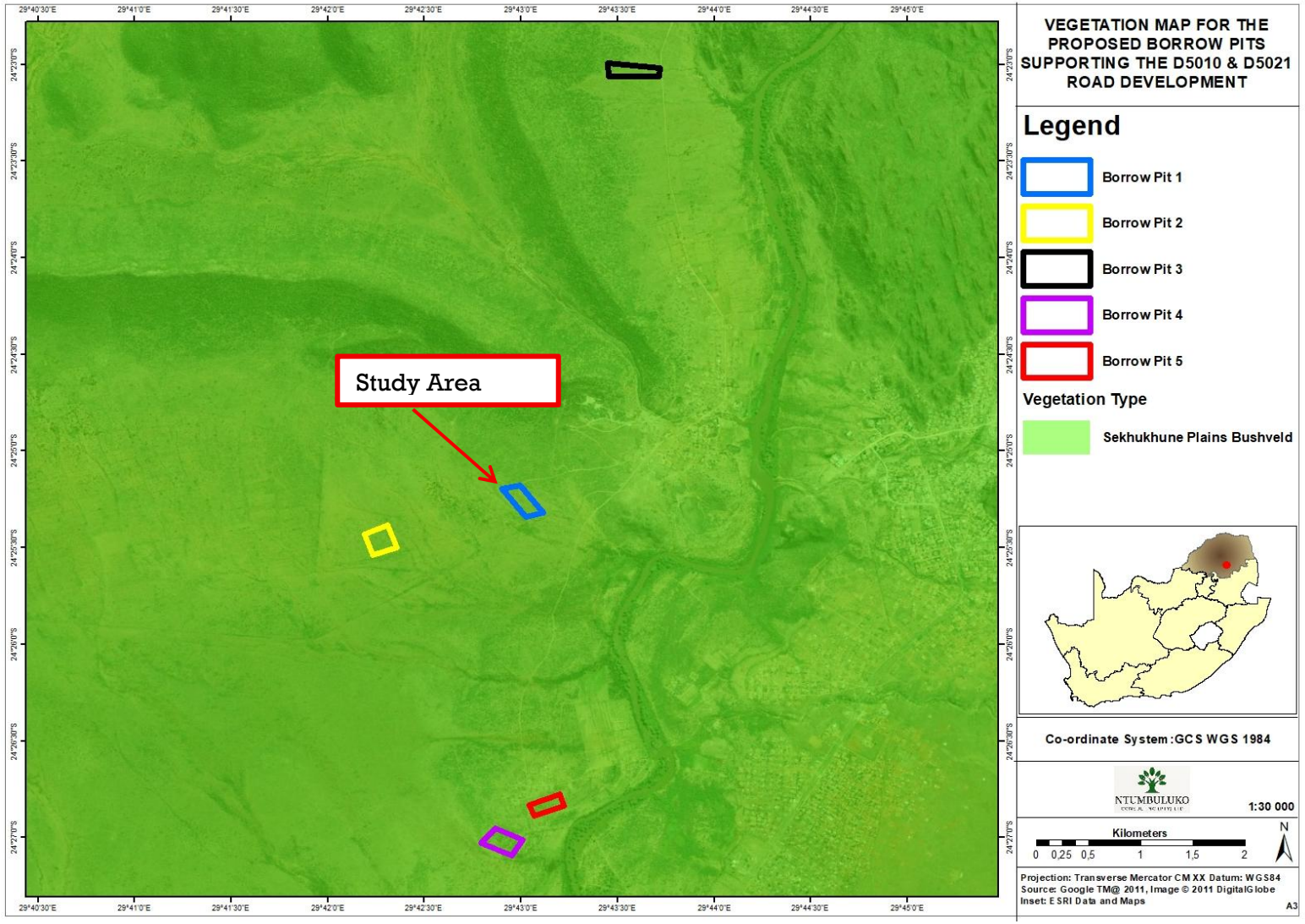


Figure 6-1: Vegetation Map

6.4 2018 LIMPOPO PROVINCE MAP OF CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

According to the Limpopo Conservation Plan (LCP v2, 2018), the five proposed borrow pit sites fall within areas of high ecological importance, although the level of conservation priority differs across the project footprint (**Figure *6-2***). These provincial biodiversity categories Critical Biodiversity Area 1 (CBA 1), Critical Biodiversity Area 2 (CBA 2), and Ecological Support Area 1 (ESA 1), indicate the degree to which each site contributes to maintaining ecological processes, species persistence, and landscape connectivity within the Sekhukhune Plains Bushveld.

Borrow Pit 1 is situated within an ESA 1, an area that plays a supporting role in sustaining the ecological functioning of adjacent CBAs (Figure 6-2). Although ESA 1 areas may exhibit moderate levels of disturbance, they remain essential for maintaining hydrological processes, vegetation cover, and ecological corridors. Extraction activities in ESA 1 must therefore be carefully managed to prevent further degradation and ensure that post-mining rehabilitation restores ecological support functions.

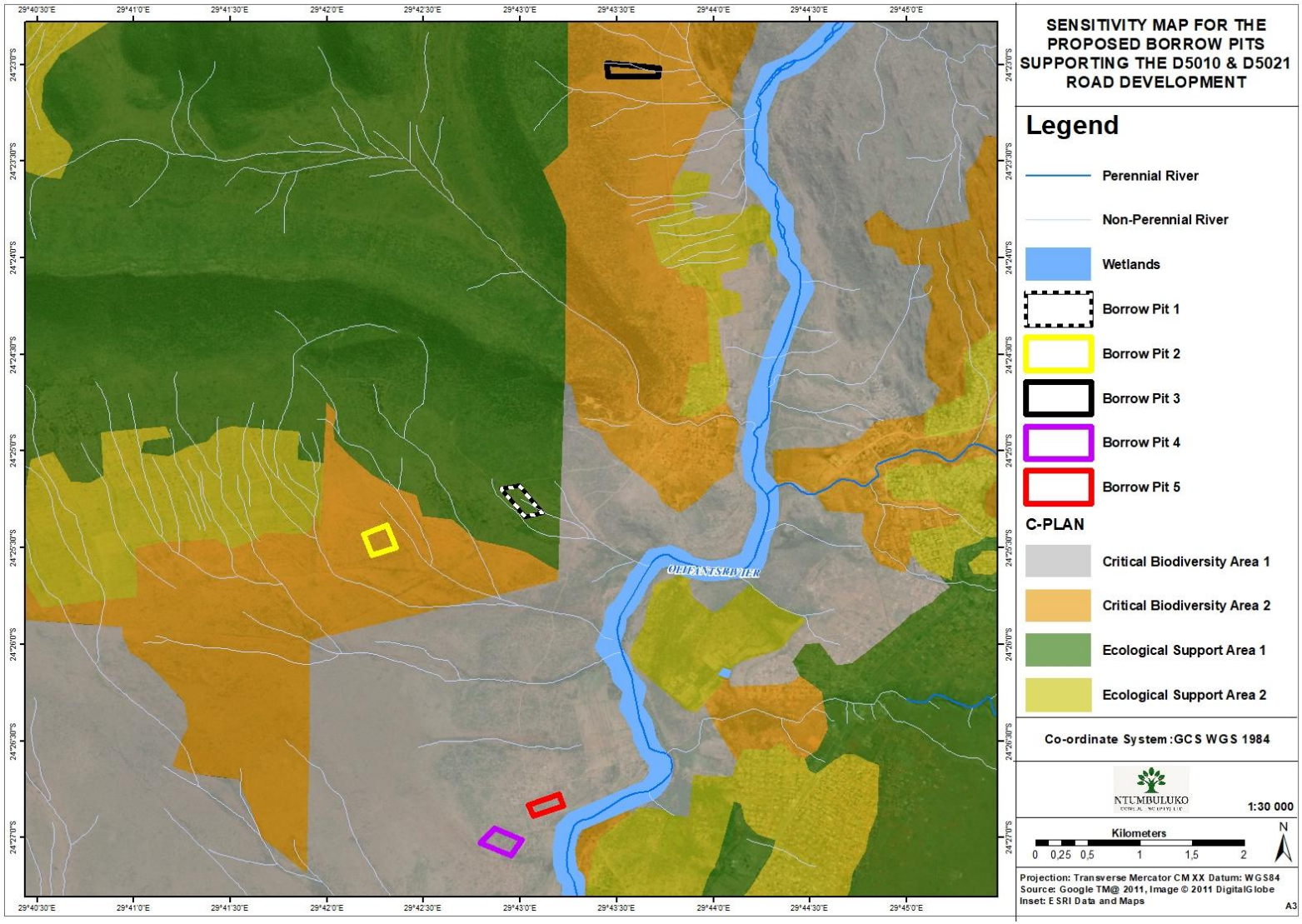


Figure 6-2: Sensitivity Map

7 METHODOLOGY

A site inspection was conducted on 09 October 2026 to assess the terrestrial ecological characteristics of the proposed borrow pit development area. The field survey involved systematically walking the entire study site, ensuring full spatial coverage of all habitat units present across the borrow pit footprint. Both floral and faunal components were investigated during the assessment, with attention given to vegetation structure, habitat condition, microhabitats, and any features of potential ecological sensitivity. This approach ensured that all terrestrial biodiversity receptors within the borrow pit footprints were adequately identified, described, and verified for sensitivity in accordance with the requirements of GN R. 320 of 2020.The primary objectives of the fieldwork were to:

- Identify and characterise the current floral and faunal assemblages occurring within the study area.
- Detect any Species of Conservation Concern (SCC), including protected, threatened, or provincially listed species that may be present on site.
- Assess habitat condition, ecological functionality, and the degree of disturbance or transformation.
- Verify the presence of sensitive features, such as protected trees, important microhabitats, movement corridors, or areas supporting high structural or compositional diversity.

The survey included active searching, habitat scanning, and targeted inspections of microhabitats such as rocky outcrops, drainage lines, termite mounds, and areas with intact vegetation structure. Observations were recorded using standard ecological field methods, and all species encountered were identified in situ where possible.

7.1 SPECIES OF SPECIAL CONCERN (SSC)

The International Union of Conservation Networks (IUCN) is the international authority for Red Data species. In South Africa, the Threatened Species Programme (TSP) undertakes this role, in collaboration with the South Africa National Biodiversity Institute (SANBI). SSC include any national Red Data, Nationally Protected, Provincially Protected or endemic species recorded on site. The Red Data listed flora and fauna species identified were classified according to the following categories:

- Extinct (EX) – No known individuals remaining;

- Extinct in the Wild (EW) – Known only to survive in captivity, or as a naturalized population outside its historic range;
- Critically Endangered (CR) – Extremely high risk of extinction in the wild;
- Endangered (EN) – High risk of extinction in the wild;
- Vulnerable (VU) – High risk of endangerment in the wild;
- Near Threatened (NT) – Likely to become endangered in the near future;
- Least Concern (LC) – Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category;
- Data Deficient (DD) – Not enough data to make an assessment of its risk of extinction; and
- Not Evaluated (NE) – Has not yet been evaluated against the criteria.

7.2 IMPACTS ASSESSMENT

The potential impacts of the proposed expansion, existing operations and the alternatives were rated using a clearly defined rating scale. The significance rating formula is as follows:

Significance = Consequence x Probability

Where

Consequence = Type of Impact x (Intensity + Spatial Scale + Duration)

And

Probability = Likelihood of an Impact Occurring

In addition, the formula for calculating consequence:

***Type of Impact** = **+1** (Positive Impact) or **-1** (Negative Impact)*

The weight assigned to the various parameters for positive and impacts to biodiversity is provided for in the formula and is presented in **Table 7-1**. The probability consequence matrix is displayed in **Table 7-2**, with the impact significance rating described in **Table 7-3**.

Table 7-1: Biodiversity Impact Assessment Parameter Ratings

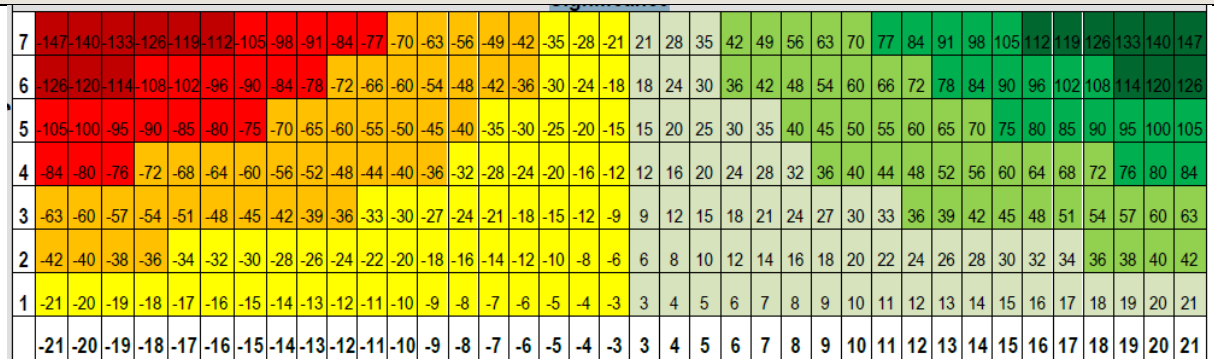
Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Noticeable, on-going social and environmental benefits which have improved the livelihoods and living standards of the local community in general and the environmental features.	International The effect will occur across international borders.	Permanent: No Mitigation The impact will remain long after the life of the Project.	Certain/ Definite. There are sound scientific reasons to expect that the impact will definitely occur.
6	Significant impact on highly valued species, habitat or ecosystem. Irreparable damage to highly valued items of cultural significance or breakdown of social order.	Great improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of a Project.	Almost certain/Highly probable It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment	On-going and widespread positive benefits to local	Province/ Region	Project Life	Likely The impact may occur.

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
	of ecosystem function that may take several years to rehabilitate. Very serious widespread social impacts. Irreparable damage to highly valued items.	communities which improves livelihoods, as well as a positive improvement to the receiving environment.	Will affect the entire province or region.	The impact will cease after the operational life span of the project	
4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense social benefits to some people. Average to intense environmental enhancements.	Municipal Area Will affect the whole municipal area.	Long term 6-15 years.	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external	Average, on-going positive benefits, not widespread but felt by some.	Local Extending across the site and to nearby settlements.	Medium term 1-5 years.	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
	specialists and can be done in less than a month. On-going social issues. Damage to items of cultural significance.				that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by very few of population.	Limited Limited to the site and its immediate surroundings.	Short term Less than 1 year.	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures.

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
1	Limited damage to minimal area of low significance that will have no impact on the environment. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level social and environmental benefits felt by very few of the population.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month.	Highly unlikely/None Expected never to happen.

Table 7-2: Probability Consequence Matrix

	Significance
Probability	
	Consequence

7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Table 7-3: Significance Threshold Limits

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	High Positive
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Medium Positive
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	Low Positive
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	Low
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment.	Medium-Low
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the	Medium-High

Score	Description	Rating
	implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	High Negative
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	Very High Negative

7.3 STUDY LIMITATIONS

The terrestrial biodiversity assessment was conducted during a single field day on **09 October 2026**. While the survey was systematically executed and provided full spatial coverage of the borrow pit footprint, single-day surveys inherently limit the detectability of certain species, particularly cryptic flora, nocturnal or crepuscular fauna, fossorial species, and seasonally active taxa. As a result, observations relied on direct sightings, spoor, calls, burrows, and habitat suitability assessments rather than extended temporal sampling. Despite this limitation, the survey effort is considered adequate for the scale and nature of the proposed borrow pit developments, and the findings reliably represent the terrestrial biodiversity features present within the project area.

8 RESULTS OF THE FLORA ASSESSMENT

8.1 HABITAT ASSESSMENT

The project area forms a clear ecological gradient, beginning with the Sekhukhune Plains Bushveld (SVcb 27), an Endangered vegetation unit that has undergone extensive transformation across its range. Within the study area, the portions of this bushveld where all five borrow pits are located represent low sensitivity bushveld habitat, shaped by long-term land-use pressures such as overgrazing, bush encroachment, and access routes. Despite these disturbances, the bushveld retains several characteristic species, most notably a dominance of Shepherd's Trees (*Boscia albitrunca*), a protected tree species under the National Forests Act. These trees persist as scattered individuals across the borrow pit landscape, providing structural diversity and ecological value even within degraded areas. Their presence elevates the conservation importance of the bushveld pockets where they occur, requiring careful avoidance and protection during borrow pit development (**Figure 8-1** and **Figure 8-2**).

Continuous livestock grazing has reduced grass cover and exposed bare soil, while the suppression of natural fire regimes has facilitated the proliferation of woody shrubs such as *Dichrostachys cinerea*. This combination of grazing-induced degradation and woody encroachment has simplified habitat structure and lowered ecological integrity, although the vegetation remains recognisable as Sekhukhune Plains Bushveld.

Moving outward from the borrow pit footprints, the bushveld transitions into degraded village-associated habitat, where daily human activities have left a more pronounced ecological imprint. Around rural settlements, natural vegetation becomes increasingly fragmented and patchy, with reduced woody cover and a dominance of pioneer grasses and ruderal herbs. Continuous livestock movement, fuelwood collection, trampling, and small-scale cultivation have transformed the bushveld into a mosaic of disturbed thornveld, homestead gardens, crop fields, and communal grazing lands. Although this habitat still supports generalist fauna, its ecological sensitivity is low, reflecting the cumulative impact of long-term human use (**Figure 8-1** and **Figure 8-2**).

The project area comprises three distinct habitat types, namely **low-density Bushveld Habitat**, degraded village-associated bushveld Habitat, and high-sensitivity riparian habitat associated with the Olifants River. Together, these habitats represent a gradient of

ecological conditions, ranging from relatively intact natural vegetation to areas that have been significantly modified by historical human activities.

Borrow Pit 1 is situated within a low-density bushveld habitat that forms part of the Endangered Sekhukhune Plains Bushveld vegetation unit. While the broader vegetation type is classified as Endangered, the borrow pit footprint is characterised by relatively sparse vegetation cover and lower habitat complexity compared to the surrounding landscape. Scattered protected Shepherd's Trees (*Boscia albitrunca*) occur within the borrow footprint.

Importantly, Borrow Pit 1 is located approximately 1 km from the Olifants River riparian zone and does not encroach upon this sensitive habitat. The spatial separation between the proposed borrow pit and the riparian ecosystem reduces the likelihood of direct impacts on riparian biodiversity and ecological functioning. This ecological gradient provides a clear framework for the assessment of potential impacts and the application of appropriate mitigation measures across the project area.

(**Figure 8-1** and **Figure 8-2**).

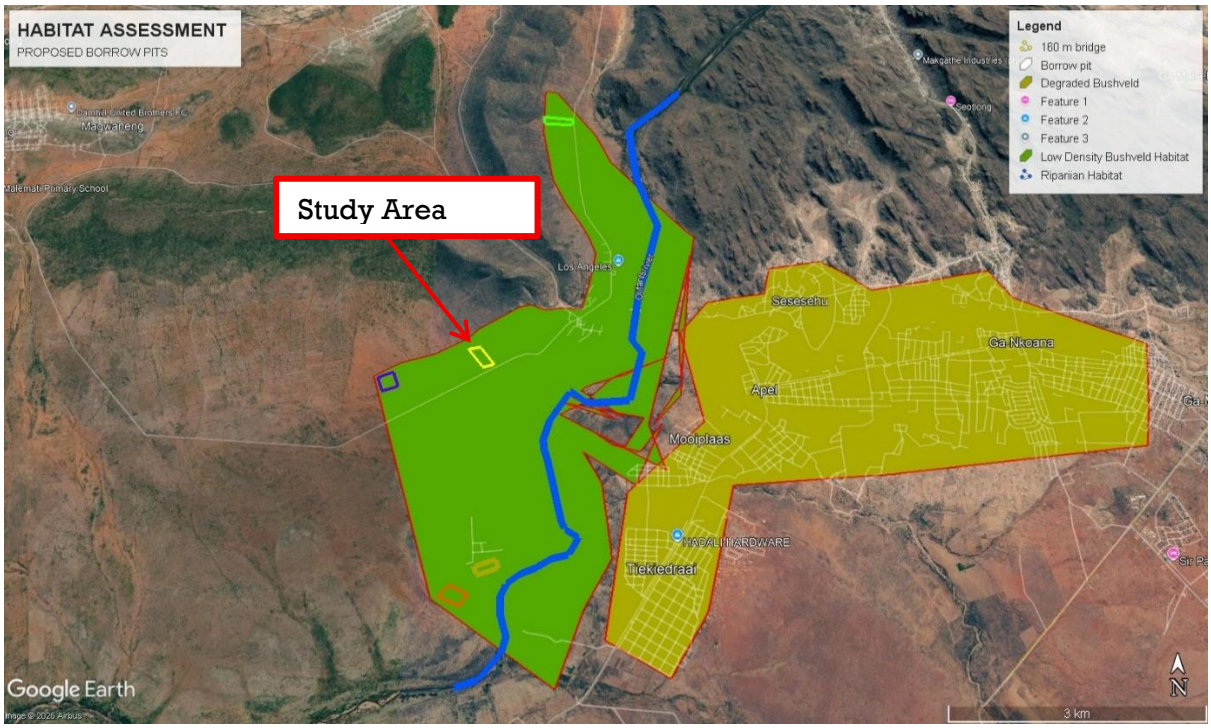


Figure 8-1:Habitat Assessment



Figure 8-2:Aerial image of the habitat associated with Borrow Pit 1

8.2 VEGETATION ASSESSMENT

The site is situated within the SVcb 27 Sekhukhune Plains Bushveld vegetation unit, a system described by Mucina and Rutherford (2006) as comprising semi-arid plains and open valleys positioned between chains of hills and small mountains that run broadly parallel to the escarpment. In its natural state, this vegetation unit supports a short, open to closed thornveld dominated by drought-tolerant woody species, a structurally variable grass layer, and a distinctive assemblage of succulent shrubs, including a notable abundance of Aloe species. The floristic composition and ecological processes of this unit are strongly influenced by ultramafic substrates, which contribute to nutrient-poor soils, high levels of endemism, and a unique suite of plant species associated with the Sekhukhune Centre of Plant Endemism.

During the inspection, it was confirmed that borrow pit 1 is dominated by indigenous shrubs, with clear evidence of overgrazing, bush encroachment, and the presence of several *Acacia* species typical of disturbed Sekhukhune Plains Bushveld. Grazing pressure has reduced grass cover and exposed bare soil, creating conditions that favour the proliferation of woody shrubs such as *Dichrostachys cinerea* and encroaching *Acacia* taxa (**Figure 8-3** to **Figure 8-7**).The site has a high concentrations of *Shepherd's Trees (Boscia albitrunca*) were also recorded (**Figure 8-3** to **Figure 8-7**). As a protected species, the presence of *Boscia albitrunca* elevates the ecological importance of this areas and requires careful avoidance and management during borrow pit development.

.



Figure 8-3: Overview of bush encroachment observed on Borrow Pit 1.



Figure 8-4: Overview of Borrow Pit 1, with evidence of overgrazing.



Figure 8-5: Overview of Borrow Pit 1 grasses and the medium density shrubs.



Figure 8-6: Overview of Borrow Pit 1, showing clear evidence of Dichrostachys cinerea encroachment and the presence of Shepherd's Trees (*Boscia albitrunca*).



Figure 8-7: Overview of Borrow Pit 1, showing evidence of indigenous grasses and Dichrostachys cinerea encroachment.

8.3 FLORA SPECIES OF SPECIAL CONCERN

South Africa has become the first country to fully assess the status of its entire flora (Domitilla and Raimondo, 2011). Major threats to the South African flora are identified in terms of the number of plant taxa Red-Listed as threatened with extinction as a result of threats like, habitat loss (e.g. infrastructure development, urban expansion, crop cultivation and mines), invasive alien plant infestation (e.g. outcompeting indigenous plant species), habitat degradation (e.g. overgrazing, inappropriate fire management etc.), unsustainable harvesting, demographic factors, pollution, loss of pollinators or dispersers, climate change and natural disasters (e.g. such as droughts and floods)[1]. South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. However, due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. As a result, SANBI uses an amended system of categories in order to highlight species that may be of low risk of extinction but are still of conservation concern (SANBI, 2015).

[1] RAIMONDO, Domitilla. The Red List of South African plants: a global first. S. Afr. j. sci., Pretoria , v. 107, n. 3-4, p. 01-02, Apr. 2011 . on 17 Aug. 2021. http://dx.doi.org/10.4102/sajs.v107i3/4.653.

The following species protected are known to be found in the area (**Table *8-1***).

Table 8-1: Plant Species of Special Concern

NO.	SPECIES NAME	Threat Status	RECORDED ONSITE (YES/NO)
1	*Combretum imberbe*	Provincially Protected	**No**
2	*Euphorbia waterbergensis*	Rare	**No**
3	*Corchorus psammophilus*	Threatened	**No**
4	*Ilex mitis (L.) Radlk. var. mitis*	Declining	**No**
5	*Ledebouria atrobrunnea S.Venter*	Vulnerable	**No**
6	*Myrothamnus flabellifolius Welw.*		**No**
7	*Acacia erioloba*	Provincially Protected	**No**
8	*Acacia haematoxylon*	Provincially Protected	**No**
9	*Boscia albitrunca*	Provincially Protected	**Yes**

As indicated above, Borrow Pit 1 supports a notable population of Shepherd's Trees (*Boscia albitrunca*), a protected species under the National Forests Act (Act 84 of 1998). Multiple individuals were recorded within the proposed borrow pit footprint and surrounding area, occurring as scattered mature trees and younger recruits within the shrub-dominated bushveld matrix (**Figure 8-8**). The presence of these trees contributes to the ecological importance of the site despite evidence of historical disturbance associated with overgrazing and bush encroachment.

Given the protected status of *Boscia albitrunca*, the presence of these individuals represents the primary biodiversity constraint associated with Borrow Pit 1. Careful planning, site layout optimisation, and the implementation of appropriate avoidance and mitigation measures will therefore be required to minimise impacts on protected trees and ensure compliance with applicable environmental and forestry legislation during borrow pit development and material extraction activities.

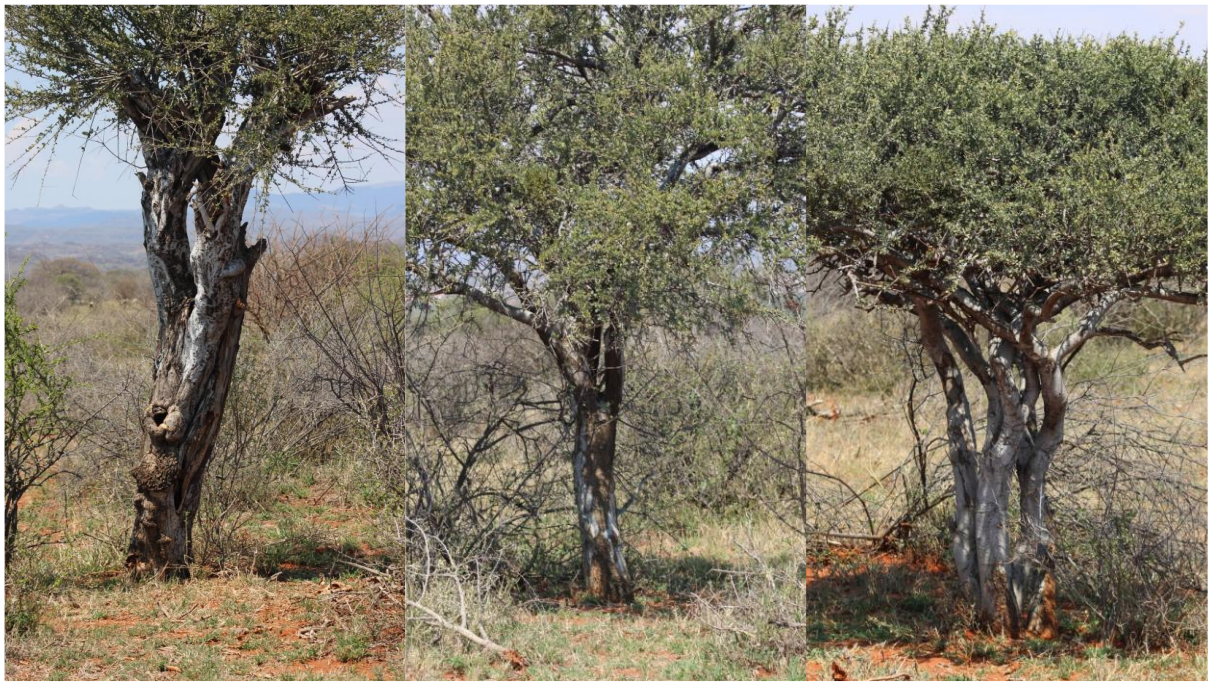


Figure 8-8: Shepherd's Trees (Boscia albitrunca) recorded across Borrow pit 1.

8.3.1 Ethnobotanical plant species

Ethnobotany/ Ethnoecology is a branch of botany that focuses on the use of plants for medicines, cultural and recreational purposes. The overexploitation of indigenous plants for ethnobotanical purposes can be detrimental to populations of those particular plant species, and the other species that depend on its existence for their survival.

South Africa has a rich diversity of medicinal plants that not only have a global significance but also have a cultural and historical role (van Wyk *et al.* 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors.

The site inspection confirmed the presence of Aloe species within Borrow Pit 1 (**Figure 8-9**), representing the most notable ethnobotanical component of the disturbed Sekhukhune Plains Bushveld habitat. Although the broader vegetation unit is known to support a diverse assemblage of succulent species, only scattered individuals of *Aloe* were recorded within the borrow pit footprint, occurring primarily in relatively less-disturbed areas. These plants possess cultural and traditional significance within the region; however, their limited and fragmented distribution is indicative of the degraded condition of the habitat, which has been influenced by historical grazing pressure and vegetation disturbance.



Figure 8-9:Aloe's observed onsite.

8.3.2 Invasive Alien Species

An "invasive species" is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

With regard to invasive species, the site inspection confirmed the presence of Mexican Poppy (*Argemone mexicana*) within the proposed Borrow Pit 1 footprint (**Figure 8-10**). This species is typically associated with disturbed environments and was recorded in areas exhibiting signs of historical disturbance, including overgrazing and exposed soils. The occurrence of *Argemone mexicana* is indicative of existing habitat degradation and disturbance within the site. Although the species was not recorded at high densities, appropriate management measures should be implemented during borrow pit establishment and operation to prevent its further spread into adjacent areas.



Figure 8-10: *Argemone mexicana* observed on Borrow Pit 1.

9 RESULTS OF THE FAUNA ASSESSMENT

9.1 MAMMALS

According to the desktop study conducted, the species listed in **Table 9-1** were identified as being possible to occur within the study area or the immediate vicinity of the proposed construction area. It must be noted that some of these species are very sensitive to habitat and in some instances; the likeliness for them to occur is minimal.

Table 9-1: mammals that are likely to occur onsite.

#	Species code	Family	Scientific name	Common name	Red list category
2	192040	Felidae	Felis nigripes	Black-footed Cat	Vulnerable (2016)
3	192800	Felidae	Leptailurus serval	Serval	Near Threatened (2016)
4	218020	Muridae	Gerbilliscus brantsii	Highveld Gerbil	Least Concern (2016)
5	147490	Muridae	Mastomys coucha	Southern African Mastomys	Least Concern (2016)
6	148270	Muridae	Mus (Nannomys) minutoides	Southern African Pygmy Mouse	Least Concern
7	151102	Muridae	Otomys auratus	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)
8	150360	Muridae	Rhabdomys pumilio	Xeric Four-striped Grass Rat	Least Concern (2016)
9	217730	Mustelidae	Hydrictis maculicollis	Spotted-necked Otter	Least Concern (IUCN 2008)
10	136620	Nesomyidae	Dendromus mystacalis	Chestnut African Climbing Mouse	Least Concern (2016)
12	161460	Soricidae	Crocidura mariquensis	Swamp Musk Shrew	Near Threatened (2016)
13	163350	Soricidae	Myosorex varius	Forest Shrew	Least Concern (2016)

9.1.1 Field Investigation Findings

None of the sensitive or conservation-important mammal species expected for the broader Sekhukhune region were observed during the site inspection. The long-term transformation of the habitat, historical clearing for agriculture, and ongoing intensive grazing have removed the structural complexity and natural cover required to support small to medium-sized mammals, particularly those that are habitat-specialists or sensitive to disturbance. The only mammals recorded on site were domestic livestock, which dominate the landscape and further contribute to habitat degradation through trampling and overgrazing (**Figure 9-1**). As a result, the site currently provides very limited ecological functionality and offers no suitable habitat for sensitive mammalian fauna.

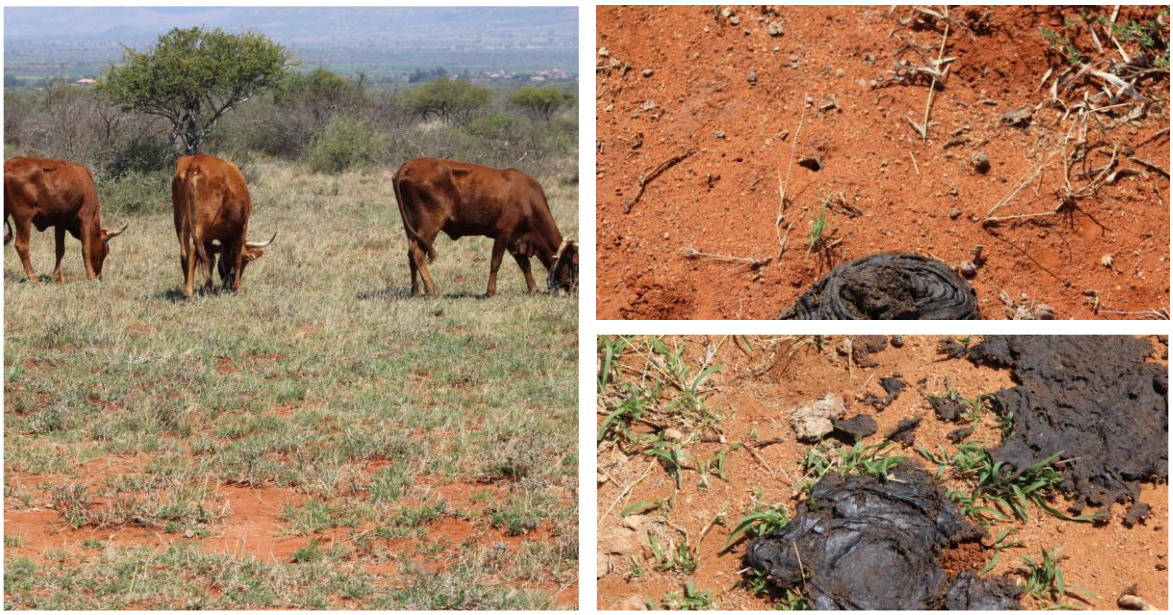


Figure 9-1: livestock observed with borrow pit 1.

9.2 REPTILE

There are no sensitive reptile species onsite. A Full list of reptile's species that are likely to be found onsite are listed on **Table 9-2**.

Table 9-2: List of Reptile Species likely to be found onsite.

Species code	Scientific name	Common name	Red list category
1	*Crotaphopeltis hotamboeia*	Red-lipped Snake	Least Concern (SARCA 2014)
2	*Naja mossambica*	Mozambique Spitting Cobra	Least Concern (SARCA 2014)
3	*Lygodactylus ocellatus*	Spotted Dwarf Gecko	Least Concern (SARCA 2014)

4	*Pachydactylus affinis*	Transvaal Gecko	Least Concern (SARCA 2014)
5	*Pachydactylus capensis*	Cape Gecko	Least Concern (SARCA 2014)
6	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
7	*Lycodonomorphus inornatus*	Olive House Snake	Least Concern (SARCA 2014)
8	*Lycodonomorphus rufulus*	Brown Water Snake	Least Concern (SARCA 2014)
9	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern (SARCA 2014)
10	*Psammophylax rhombeatus*	Spotted Grass Snake	Least Concern (SARCA 2014)
11	*Leptotyphlops sp.*		
12	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake	Least Concern (IUCN 2021, sp. level)
13	*Trachylepis capensis*	Cape Skink	Least Concern (SARCA 2014)
14	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern (SARCA 2014)
15	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern (IUCN 2022)
16	*Causus rhombeatus*	Rhombic Night Adder	Least Concern (IUCN 2021)

9.2.1 Field investigation findings

None of the expected reptiles were observed on site during the site visit.

9.3 AVIFAUNA-

Birds are generally regarded as good ecological indicators, because their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological conditions are directly linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. **All birds that could be present within the vicinity of the study area are listed in (Table 9-3).**

Table 9-3: Red Data bird species potentially found within the study site.

Scientific Name	Common Name	IUCN Status
Geronticus calvus	Southern Bald Ibis	VU
Sagittarius serpentarius	Secretary bird	NT
Gyps coprotheres	Cape Vulture	VU
Stephanoaetus coronatus	African Crowned Eagle	NT
Circus ranivorus	African Marsh-Harrier	VU
Circus maurus	Black Harrier	NT

Scientific Name	Common Name	IUCN Status
Falco biarmicus	Lanner Falcon	LC
Alcedo semitorquata	Half Collared Kingfisher	CR
Bugeranus carunculatus	Wattled Crane	VU
Anthropoides paradiseus	Blue Crane	VU
Balearica regulorum	Grey Crowned Crane	VU
Eupodotis senegalensis	White-bellied Korhaan	VU

9.3.1 Field investigation findings

A few avifaunal species were spotted onsite during the site inspection (**Figure 9-2**). The proposed construction operations may generate noise pollution which serves as a deterrent to birds.



Figure 9-2: Bird observed onsite.

9.4 INVERTEBRATES

Butterflies are a good indication of the habitats available in a specific region (Woodhall 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope or endemic species (specific habitat requirements with populations concentrated in a small area) which may

be very specialised (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch and therefore identify. A list of butterflies that are likely to be observed on the study site and the surrounding areas are summarised in **Table 9-4**.

Table 9-4: Butterfly species expected to occur on site.

Scientific Name	Common Name
Melanitis leda Helena	Evening Brown
Acraea anemosa	Broad-bordered Acraea
Acreae neobule	Wandering Acraea
Danaus chrysippus	African Monarch butterfly
Junonia hierta cebrene	Yellow Pansy butterfly
Danays chrysippus	Southern Milkweed
Charaxes jasius	Koppie Emperor
Cyclyrius pirithous	Common Blue
Hyalites esebria	Dusky Acrea butterfly
Phalantha aethiopica	Poplar Leopard
Alaena amazoula	Yellow Zulu
Catacroptera cloanthe	Pirate butterfly
Charaxes achaemenses	Bushveld Emperor
Pinacopteryx eriphia	Zebra White butterfly
Eurema brigitta	Broad-bordered yellow
Vanessa cardui	Painted Lady
Papilio demodocus	Citrus Swallowtail butterfly

9.4.1 Field investigation findings

Invertebrate activity within Borrow Pit 1 was low, with only occasional spider webs recorded during the site inspection. No live molluscs or specialised invertebrate taxa were observed. The low diversity and abundance of invertebrates are consistent with the disturbed nature of the habitat and its limited ecological complexity.



Figure 9-3: Invertebrate species observed onsite.

10 IMPACT ASSESSMENT

The impact assessment is aimed predicting potential impacts of the proposed project. Impact assessment strives to avoid damage, loss of ecosystems services, and where they cannot be avoided, to reduce and mitigate these impacts (DEA, 2013). Offsets to compensate for loss of habitat are regarded as a last resort, after all efforts have been made to avoid, reduce and mitigate. The mitigation hierarchy is represented in **Table 10-1**.

Table 10-1: Mitigation hierarchy of impacts

	Avoid or Prevent	Refers to considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts, construction should not take place. In such cases, it is unlikely to be possible or appropriate to rely on the other steps in the mitigation.
	Minimise	Refers to considering alternatives in the project location, sitting, scale, layout, technology and phasing that would minimise impacts on biodiversity, associated ecosystem services. In cases where there are environmental constraints, every effort should be made to minimise impacts.
	Rehabilitate	Refers to rehabilitation of areas where impacts are unavoidable, and measures are provided to return impacted areas to near natural state or an agreed land use after mine closure. Rehabilitation can, however, fall short of replicating the diversity and complexity of natural systems.
	Offset	Refers to measures over and above rehabilitation to compensate for the residual negative impacts on biodiversity after every effort has been made to minimise and then rehabilitate the impacts. Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity.

The entire disturbed property is expected to be disturbed by the proposed mining activities. This intervention will likely result in habitat loss, affecting both floral and faunal communities within the impacted area.

10.1 LOSS OF HABITAT

The study site still has areas that have vegetation regarded as disturbed, with scattered indigenous species, as a result of this, the impacts of the proposed construction activities, although limited in extent are regarded as Medium-High. Due to disturbance of the soil and removal of vegetation, it is likely that alien plants will continue establish on site.

Alien plants often reduce the diversity of an area due to their invasive habit. Invasive plants grow prolifically and out-compete native species. Loss of vegetation will be irreversible and although rehabilitation can be aimed at reinstating the land to some form of land-use, restoration of the natural habitat on site cannot be achieved. This is particularly significant in an area where some plant species remain undescribed. Many species in this habitat are adapted to specific soil composition and structure and the natural species composition cannot be restored after disturbance to the soil (Victor et al. 2005). The impacts attributed with the loss of habitat are listed below in the phase they occur.

10.1.1 Construction Phase

Table 10-2: Loss of habitat during Construction phase

Loss of habitat					
Phase	**Construction**				
Criteria	**Details / Discussion**				
Description of impact	• Removal of vegetation • Disturbance of the soil • Vehicle operation				
Mitigation required	• Minimise the impacted area and clear only what is required • Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation • Employ stormwater management measures				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

10.1.2 Operational phase

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur. In addition, vehicular transport through the site may increase the risk of roadkill of fauna species that occur.

Table 10-3: Loss of habitat during operation phase

Loss of habitat					
Phase	**Operational**				
Criteria	**Details / Discussion**				
Description of impact	• Establishment of alien plant species in disturbed areas				
Mitigation required	• Manage alien invasive species establishment continually through chemical or mechanical removal • Reinstate vegetation cover through concurrent rehabilitation • Erect signage to control the speed limit for trucks and other vehicles moving through the site				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

10.1.3 Decommissioning phase

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur as vehicles and machinery move throughout the site and disturb the soil.

Table 10-4: Loss of habitat during decommissioning

Loss of habitat	
Phase	**Decommissioning**
Criteria	**Details / Discussion**
Description of impact	• Removal infrastructure and equipment • Disturbance of the soil • Vehicle operation
Mitigation required	• Minimise the impacted area and revegetate with indigenous where disturbed

	• Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation • Employ stormwater management measures				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

10.1.4 Post-closure phase

No direct loss of habitat is expected during this phase of the project. Alien plant invasion should be monitored for up to three years after closure.

Table 10-5: Loss of habitat during post-closure phase.

Loss of habitat					
Phase	**Post-closure**				
Criteria	**Details / Discussion**				
Description of impact	• On-going establishment of alien plant species in disturbed areas				
Mitigation required	• Manage alien invasive species establishment continually through chemical or mechanical removal. • Revegetation of the site where previously disturbed.				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

10.2 LOSS OF SPECIES OF SPECIAL CONCERN

Table 10-6: Loss of species of special concern during operation phase.

Loss of habitat					
Phase	**Operational**				
Criteria	**Details / Discussion**				
Description of impact	Potential disturbance or accidental removal of individual Species of Conservation Concern (SCC) occurring within or adjacent to operational areas.				
Mitigation required	• Clearly demarcate all SCC individuals prior to operational activities • Maintain a no-go buffer around SCC trees and plants, ensuring zero disturbance. • Train site personnel on SCC identification and protection requirements. • Monitor SCC individuals annually to confirm no operational impacts. • Report any accidental damage immediately and implement corrective measures.				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)

10.3 CUMULATIVE IMPACTS

While this assessment focuses exclusively on Borrow Pit 1, the development of the borrow pit will contribute to the broader cumulative transformation of habitat within the Sekhukhune Plains Bushveld vegetation unit. Potential cumulative impacts include incremental habitat loss, vegetation disturbance and reduced ecological functioning. However, given the relatively small footprint of Borrow Pit 1 and its location within an already disturbed landscape, the contribution to cumulative biodiversity impacts is expected to be limited, provided that appropriate mitigation and rehabilitation measures are implemented.

Historical and ongoing disturbance within **Borrow Pit 1** has resulted in several ecological changes, including:

- A reduction in the natural vegetation structure, particularly within the grass layer.

- Increased susceptibility to the establishment and spread of invasive species, including **Mexican Poppy (*Argemone mexicana*)**.
- Bush encroachment, resulting in reduced habitat quality and ecological functionality.
- A decline in habitat heterogeneity, limiting the availability of suitable microhabitats for faunal species.
- Potential pressure on species of conservation concern, particularly the protected **Shepherd's Tree (*Boscia albitrunca*)**, which occurs within the proposed borrow pit footprint.

Although the footprint of Borrow Pit 1 is relatively limited, the proposed development will contribute to the cumulative transformation of the surrounding Sekhukhune Plains Bushveld landscape. Continued habitat disturbance, vegetation clearing and material extraction can incrementally reduce habitat integrity and ecological functioning if not adequately managed. Potential cumulative effects include localised reductions in species diversity, changes in vegetation composition, and an increased dominance of disturbance-tolerant and invasive species.

Appropriate mitigation measures should therefore be implemented throughout the planning, operational and rehabilitation phases of Borrow Pit 1. These measures should include effective invasive species control, the protection of Species of Conservation Concern, particularly Shepherd's Trees (Boscia albitrunca), progressive rehabilitation of disturbed areas, and ongoing environmental management to minimise long-term impacts on the receiving environment. Such measures will assist in maintaining ecological functioning and preventing further degradation of the surrounding landscape.

Table 10-7: Cumulative Impact Assessment: Borrow Pit 1.

Impact	Intensity	Spatial Scale	Duration	Probability	Significance Pre-Mitigation	Significance Post-Mitigation
Habitat Degradation	Pre: High (6) Post: Moderate (3)	Pre: Local (3) Post: Site (1)	Pre: Long-term (5) Post: Medium-term (4)	Pre: Likely (6) Post: Possible (4)	**Moderate (Negative) (72)**	**Minor (Negative) (24)**
Impact on Shepherd's Trees (*Boscia albitrunca*)	Pre: High (6) Post: Low (2)	Pre: Local (3) Post: Site (1)	Pre: Long-term (5) Post: Short-term (3)	Pre: Likely (6) Post: Unlikely (3)	**Moderate (Negative) (72)**	**Minor (Negative) (18)**
Spread of Alien Invasive Species (*Argemone mexicana*)	Pre: Moderate (4) Post: Low (2)	Pre: Local (3) Post: Site (1)	Pre: Medium-term (4) Post: Short-term (3)	Pre: Possible (4) Post: Unlikely (3)	**Minor to Moderate (Negative) (48)**	**Minor (Negative) (18)**

11 DISCUSSION

Ntumbuluko Consulting (Pty) Ltd was appointed by QEMS Management and Business Solutions CC, on behalf of the Roads Agency Limpopo (RAL) SOC Ltd, to undertake a Terrestrial Biodiversity Impact Assessment for the proposed Borrow Pit 1, which is intended to supply construction material for the upgrading of Road D5010 in Nkotokwane and the construction of a new section of Road D5021 between Nkotokwane and Apel. The proposed borrow pit is located within the Lepelle-Nkumpi Local Municipality, Capricorn District Municipality, Limpopo Province.

A terrestrial biodiversity survey was undertaken on 09 October 2026 during the early wet season. The survey assessed the entire Borrow Pit 1 footprint and identified habitat characteristics, biodiversity sensitivities, species of conservation concern, and potential ecological constraints associated with the proposed development.

Borrow Pit 1 is situated within the Sekhukhune Plains Bushveld (SVcb 27) vegetation unit, which is classified as Endangered in terms of the National List of Ecosystems that are Threatened and in Need of Protection. Although the vegetation has been subject to historical disturbance, it remains recognisable as Sekhukhune Plains Bushveld and continues to support characteristic indigenous species. The site exhibits evidence of prolonged grazing pressure, bush encroachment, exposed soils and reduced grass cover. Woody species such as Dichrostachys cinerea and several Acacia species are prominent, reflecting a disturbed and altered vegetation structure.

Despite these disturbances, Borrow Pit 1 retains ecological value due to the presence of Shepherd's Trees (Boscia albitrunca), a protected species under the National Forests Act (Act 84 of 1998). Numerous mature individuals and younger recruits were recorded within and adjacent to the proposed borrow pit footprint. The occurrence of this protected species represents the primary biodiversity constraint associated with the proposed development and necessitates the implementation of strict avoidance, demarcation and protection measures during all phases of the project.

The site inspection also confirmed the presence of scattered Aloe species, which represent the most prominent ethnobotanical component within the borrow pit footprint. Although the broader vegetation unit is recognised for its succulent diversity, only isolated individuals were recorded, primarily within relatively undisturbed portions of the site. Invasive plant species were limited, with Mexican Poppy (Argemone mexicana) recorded within disturbed portions of the proposed borrow pit area. The presence of this species

reflects existing habitat degradation and highlights the need for ongoing invasive species management.

Invertebrate diversity within Borrow Pit 1 was low. Only occasional spider webs were observed during the site inspection, and no specialised invertebrate taxa or live molluscs were recorded. The low abundance and diversity of invertebrates are considered indicative of the disturbed nature of the habitat and its reduced ecological complexity.

According to the Limpopo Conservation Plan Version 2 (2018), Borrow Pit 1 is situated within an Ecological Support Area (ESA 1). Ecological Support Areas are important for maintaining ecological processes, landscape connectivity and the functioning of neighbouring biodiversity priority areas. While the proposed borrow pit does not occur within a Critical Biodiversity Area, its location within an ESA highlights the need for careful environmental management and rehabilitation.

The broader landscape presents a clear ecological gradient. The least sensitive habitats are associated with nearby village and communal land-use areas that have been transformed through long-term human activities, including livestock grazing, fuelwood collection and settlement expansion. At the opposite end of the sensitivity spectrum, the riparian habitat associated with the Olifants River represents the most ecologically important feature within the region. However, Borrow Pit 1 is located approximately 1 km from the Olifants River riparian zone and does not directly encroach upon this high-sensitivity habitat.

Overall, Borrow Pit 1 is considered to occur within a moderately sensitive bushveld habitat that has been affected by historical disturbance but continues to support protected tree species and indigenous vegetation characteristic of the Endangered Sekhukhune Plains Bushveld vegetation unit. The principal biodiversity risks associated with the proposed development relate to vegetation loss, disturbance of protected Boscia albitrunca individuals, habitat degradation and the potential spread of invasive species. Provided that appropriate mitigation measures are implemented, including the protection of Shepherd's Trees, invasive species control, footprint management and progressive rehabilitation, the residual biodiversity impacts associated with Borrow Pit 1 are expected to be of low to moderate significance..

12 CONCLUSION AND RECOMMENDATIONS

Borrow Pit 1 is located within the Endangered Sekhukhune Plains Bushveld vegetation unit and supports indigenous bushveld vegetation despite evidence of historical disturbance associated with overgrazing, bush encroachment and invasive species. The site also supports a notable population of Shepherd's Trees (Boscia albitrunca), a protected species under the National Forests Act, which represents the primary biodiversity constraint within the proposed footprint.

Although the development of Borrow Pit 1 will result in localised vegetation loss and habitat disturbance, the impacts are considered manageable through the implementation of appropriate mitigation measures, including the protection of Boscia albitrunca individuals, invasive species control, footprint management and progressive rehabilitation. Subject to the implementation of these measures, the residual terrestrial biodiversity impacts are anticipated to be of low to moderate significance, and the proposed development is considered acceptable from a terrestrial biodiversity perspective.

12.1 RECOMMENDATIONS

To ensure that borrow pit development does not compromise the ecological functioning of the Sekhukhune Plains Bushveld or the biodiversity targets identified in the Limpopo Conservation Plan, the following recommendations are made:

1. **Strict Footprint Control** Limit all borrow pit activities to the approved footprints, with no expansion into surrounding bushveld, particularly within CBA 1 and CBA 2 areas.
2. **Protection of *Boscia albitrunca*** Demarcate all Shepherd's Trees within and adjacent to borrow pit footprints. No disturbance, root-zone compaction, or stockpiling may occur within their buffer zones.
3. **Avoidance of Sensitive Habitat Features** Maintain clear no-go areas around protected trees, intact bushveld pockets, and any microhabitats supporting ecological processes.
4. **Invasive Species Management** Implement coordinated control of *Opuntia ficus-indica* and other alien species across all borrow pits. Prevent movement of contaminated soil and rehabilitate disturbed areas promptly.

5. **Progressive Rehabilitation** Rehabilitate disturbed areas during operations rather than waiting for closure. Use locally indigenous species and restore vegetation structure to support ecological recovery.

6. **Minimise Soil Disturbance and Erosion** Apply erosion-control measures on slopes and stockpiles, especially in areas contributing to downstream hydrological processes.

7. **Environmental Awareness Training** Train all personnel on protected species, no-go areas, and biodiversity sensitivities to reduce accidental disturbance.

8. **Monitoring and Compliance** Conduct seasonal monitoring of SCC individuals, invasive species, and rehabilitation progress. Adjust management actions based on monitoring outcomes.

9. **Maintain Connectivity and Ecological Function** Ensure that borrow pit operations do not obstruct ecological corridors linking bushveld patches to the Olifants River riparian zone.

10. **Post-Closure Restoration** Implement a final rehabilitation plan that restores ecological support functions, stabilises soils, and promotes long-term vegetation recovery.

12.1.1 Recommendation: Permit Application for the Removal or Disturbance of Shepherd's Trees

Because Boscia albitrunca is a protected tree species under the National Forests Act (Act 84 of 1998), any activity that may result in its removal, damage, pruning, relocation, or disturbance of the root zone requires a formal Protected Tree Permit issued by the Department of Forestry, Fisheries and the Environment (DFFE). It is therefore recommended that the proponent:

- Apply for a Protected Tree Permit prior to any borrow pit development that may affect Shepherd's Trees within or adjacent to the approved footprints.
- Submit a detailed tree inventory (locations, sizes, condition, and number of individuals potentially affected) as part of the permit application.
- Motivate the need for removal or disturbance, demonstrating that avoidance has been considered and that impacts cannot be prevented through redesign or micro-siting.

- Include mitigation and rehabilitation commitments in the permit application, such as demarcation of retained individuals, root-zone protection, and post-disturbance restoration.
- Await formal written approval from DFFE before undertaking any clearing, excavation, or earthworks that may affect protected trees.

Securing the required permit ensures legal compliance and provides a regulated framework for managing impacts on Boscia albitrunca during borrow pit development.

13 REFERENCES

Acocks, J.P.H. 1953. Veld types of South Africa. Mem. Bot. Surv. S. Afr. 28: 1-192.

Branch, B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Struik Publishers, Cape Town.

Desmet, P. G., Holness, S., Skowno, A. & Egan, V.T. (2013) Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS.

Desmet, P. G., Holness, S., Skowno, A. & Egan, V.T. (2013) Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS.

Du Preez V. and Carruthers L. 2009. A Complete guide to the frogs of Southern Africa.

Germihuizen, G. and Meyer, N.L. (eds) 2003. Plants of southern Africa: an annotated checklist. Strelitzia 14.

Institute of Natural Resources 2003. Indigenous medicinal plant trade: Sector analysis. Investigation report: no. 248.

LepiMAP 2014. Accessed at: http://lepimap.adu.org.za/ on 2014-09-12.

Maria Luisa Bárcenas-Argüello, Ma. del Carmen Gutiérrez- Castorena and Teresa Terrazas. 2013. The Role of Soil Properties in Plant Endemism – A Revision of Conservation Strategies. Soil trends and current trends in quality assessment.

Mpumalanga Tourism and Parks Agency and Department of Agriculture and Land Administration. 2007. Mpumalanga Biodiversity Conservation Handbook.

Mucina L. and Rutherford M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

SARCA 2014. Southern African Reptile Conservation Assessment. Accessed at: 9:05am on 2014-04-29. Accessed at: http://vmus.adu.org.za/vm_sp_list.php.

Schmidt E., Lotter M. and McCleland W. 2004. Trees and shrubs of Mpumalanga and the Kruger National Park. Jacana Publishers: 683 pp.

Van Wyk B., van Oudtshoorn B. and Gericke N. 2009. Medicinal Plants of South Africa. Briza Publications: 330 pp.

Victor J.E., Siebert S.J., van Wyk A.E.B. and Hoare D. 2005. Sekhukhuneland grasslands: a treasure house of biodiversity. www.fao.org.