THE TERRESTRIAL BIODIVERSITY SECTION 24G ASSESSMENT AND COMPLIANCE STATEMENT FOR THE CLOVER ALLOYS RUSTENBURG CHROME MINE RIETFONTEIN BENEFICIATION PLANT PROJECT

Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province, South Africa

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Report Name	**THE TERRESTRIAL BIODIVERSITY SECTION 24G ASSESSMENT AND COMPLIANCE STATEMENT FOR THE CLOVER ALLOYS RUSTENBURG CHROME MINE RIETFONTEIN BENEFICIATION PLANT PROJECT**
Specialist Theme	Terrestrial Biodiversity
Project Reference	Clover Alloys RCM Rietfontein S24G
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Environmental Assessment Practitioner	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
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Reviewer	Leigh-Ann de Wet (SACNASP 400233/12) 
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company (TBC) was appointed to conduct a terrestrial biodiversity assessment to form part of a compliance statement for the proposed Environmental Authorisation rectification as per Section 24G of NEMA (National Environmental Management Act, 1998 (Act No. 107 of 1998), for the clearance of indigenous vegetation.

The assessment was conducted for the Clover Alloys Rustenburg Chrome Mine (RCM) Rietfontein Beneficiation Plant S24G Project. The project site is located approximately 12 km east of the town of Rustenburg. The site is located in the North West Province. The project is found within the Rustenburg Local Municipality and the Bojanala Platinum District Municipality. A 50 m buffer was assigned to the plant surface boundary and proposed pipeline which is referred to as the PAOI of Influence (PAOI) for reporting purposes. A map presenting the PAOI can be seen in Figure 1-1 and a map presenting the regional context of the PAOI can be seen in Figure 1-2. An approximation of the areas of unauthorised clearing based on Google Earth (2025) historical satellite imagery can be seen presented in Figure 1-3. Table 1-1 provides a breakdown of the ecologically important features that were impacted by the unauthorised vegetation clearing.

Table 1-1 Table presenting the ecologically important features that were impacted by the unauthorised vegetation clearing

Ecologically Important Feature	Area lost to unauthorised vegetation clearing (ha)
CBA 2	6.74
ESA 1	0.18
NPAES	2.61
EN Marikana Thornveld	6.03

In terms of the Environmental Impact Assessment Regulations, 2014 published in Government Notices R 982, 983, 984 and 985 of 4 December 2014 (as amended April 2017), the aforementioned activities require Environmental Authorisation as listed activities in Listing Notice 1 (GNR 327 0f 07 April 2017) are triggered.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (No. 326, 7 April 2017) of the NEMA (Act No. 107 of 1998). The approach has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity for the PAOI as ‘Very High’ sensitivity.

The purpose of the specialist study is to provide relevant input into the Section 24G Application process. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the retrospective ecological viability of the project and the impacts that its development has had on the natural environment.

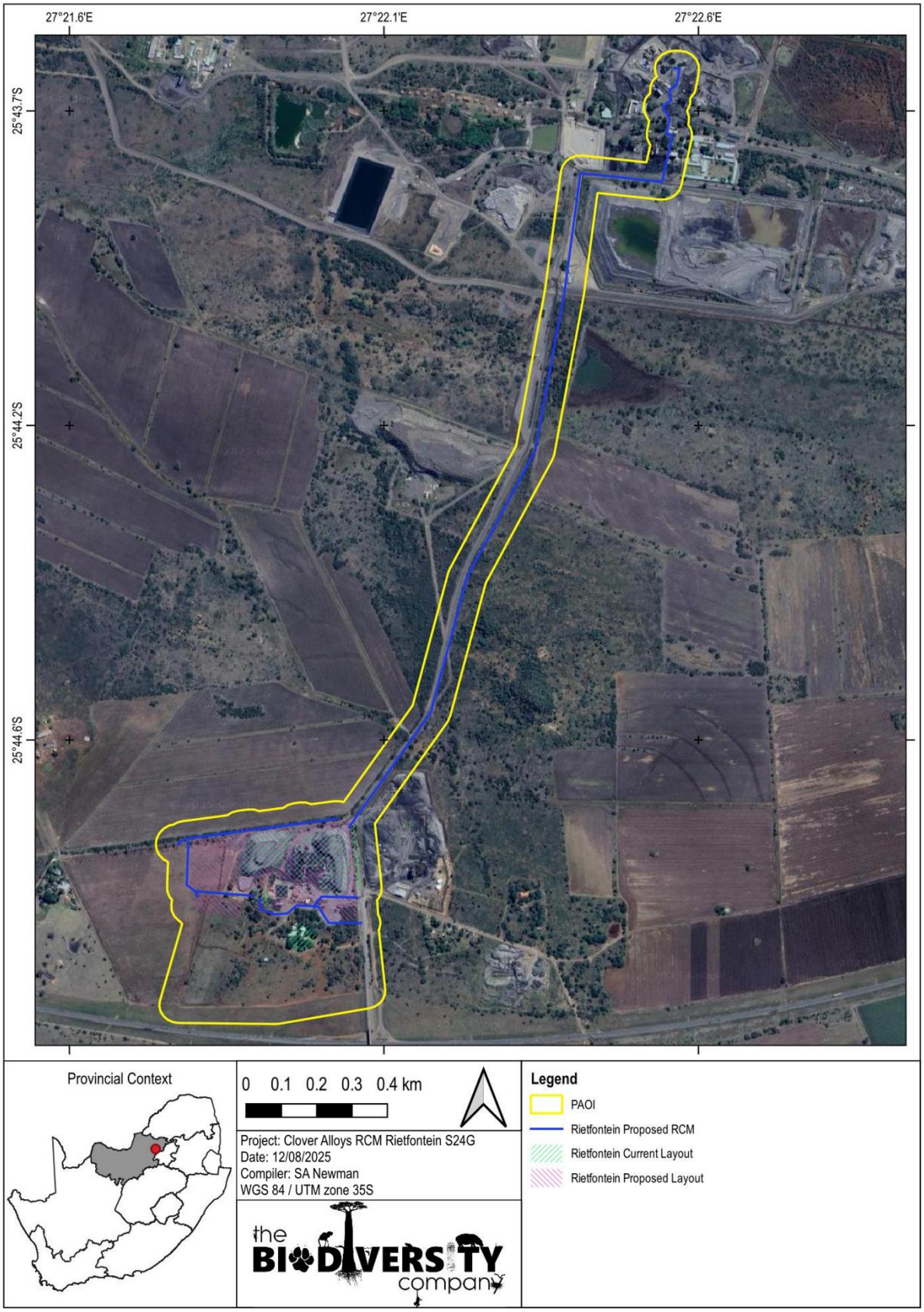


Figure 1-1 Map illustrating the PAOI

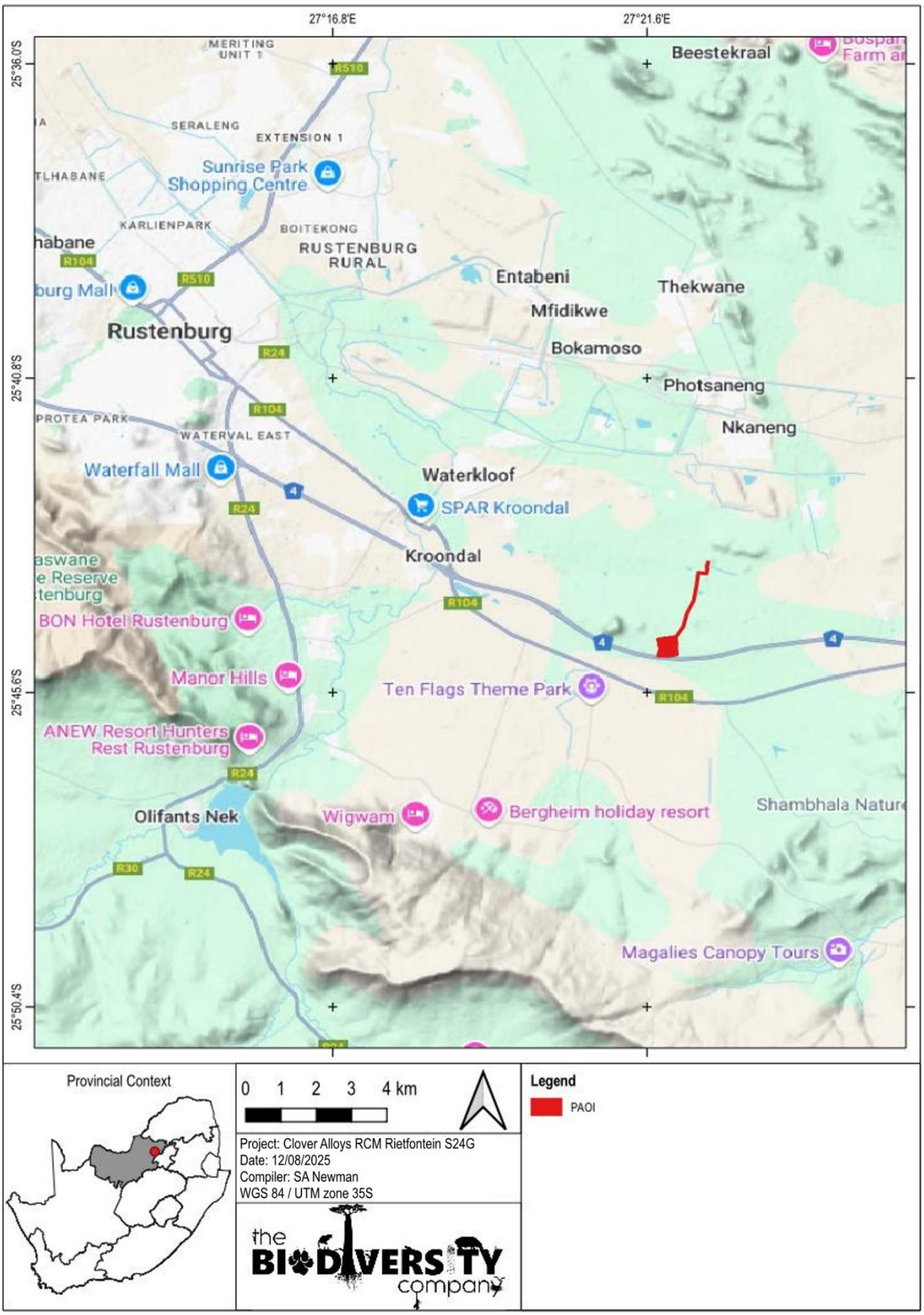


Figure 1-2 Map illustrating the regional context of the PAOI

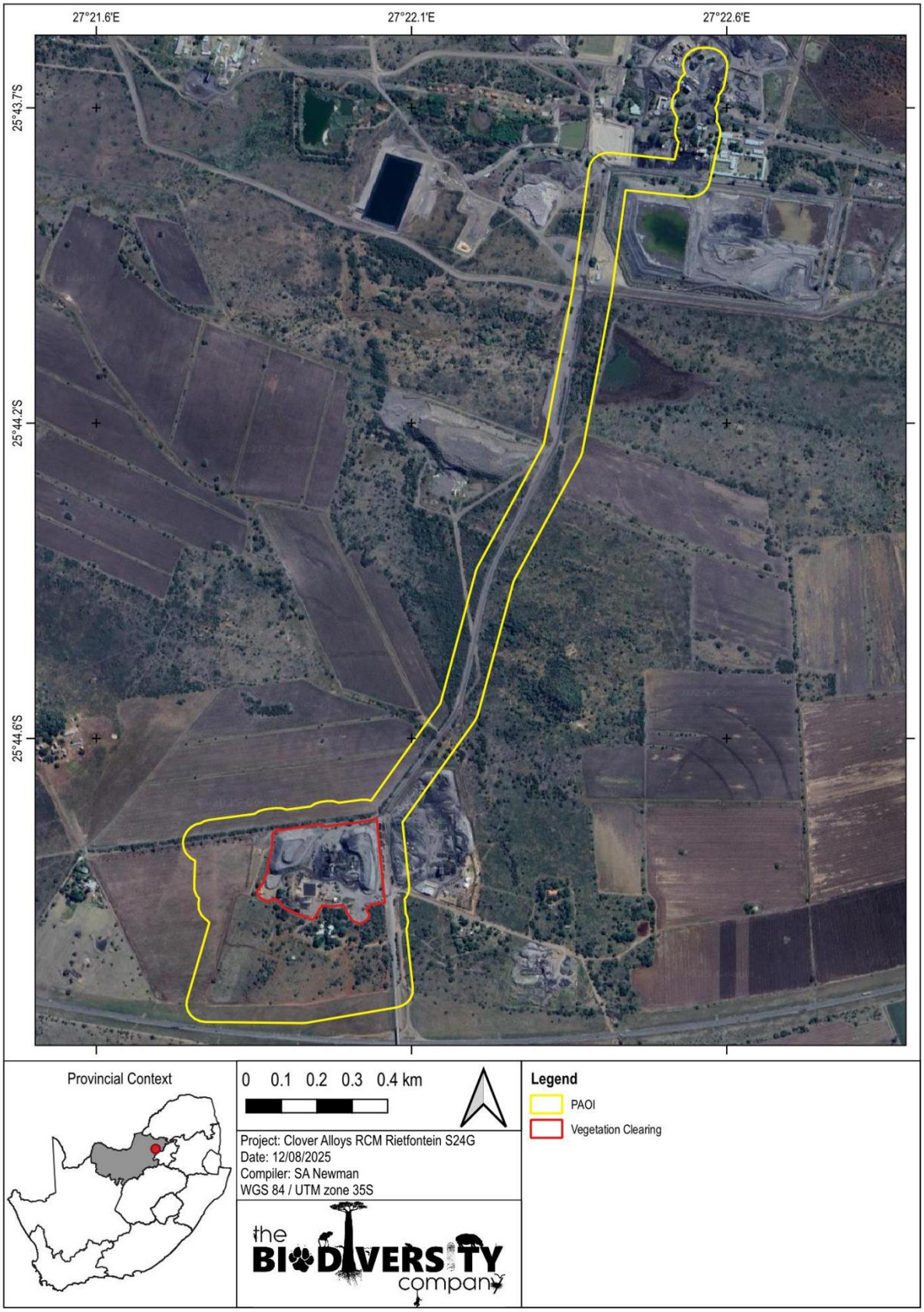


Figure 1-3 ***Map illustrating the areas of indigenous vegetation within the PAOI which were cleared without environmental authorisation based on historical Google satellite imagery (Google Earth, 2024)***

1.1.1 Project Description

Rustenburg Chrome Mining (Pty) Ltd (the applicant) operates a chrome processing facility in the North West Province. Rustenburg Chrome Mining is undertaking steps to ensure compliance with environmental legislation following the development of infrastructure without prior environmental authorisation.

The existing infrastructure at the Rietfontein plant includes two stockpile areas, a chrome wash plant, drying pads, weighbridges, a sump, as well as site offices and staff accommodation. These facilities support the processing, storage, and operational activities associated with chrome beneficiation.

In an effort to regularise its operations and address past non-compliance, the applicant is submitting an application in terms of Section 24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998). This application seeks to obtain retrospective environmental authorisation for existing infrastructure and approval for planned developments.

The proposed infrastructure includes:

- The expansion of one of the existing stockpile areas;
- The construction of dirty water channels and culverts to manage contaminated surface runoff;
- The installation of a clean water channel to divert uncontaminated stormwater away from operational areas;
- A Pollution Control Dam (PCD) with a design capacity of 8 000 m³, which will receive all dirty water collected on site; and
- A proposed pipeline approximately 2.5 km in length, to be constructed between the Rietfontein plant and the main mine, facilitating the transfer of materials or water as part of integrated operations.

This Section 24G application is being submitted in response to a compliance notice issued by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) in October 2024, under reference number 18/2024ER. The applicant wishes to rectify unauthorised activities and obtain the necessary environmental approvals for both current and future infrastructure components.

Through this application, the applicant seeks to achieve full environmental compliance, strengthen site water management practices, and continue operating the Rietfontein plant in a sustainable and responsible manner as part of its broader chrome mining operations.

The proposed project is located on Portion 23 and Portion 24 of the farm Rietfontein 338 JQ, within the Rustenburg Local Municipality, North West Province. The site is approximately 15km southeast of Rustenburg, along the N4. The centre point of the site is 25°44'54.40"S 27°21'52.69"E. Please refer to attached project locality map.

1.2 Terms of Reference

The aim of the assessment was to adequately assess the current state of the terrestrial biodiversity to compare it to the assessed potential conditions prior to vegetation clearing, allowing the specialist to identify modification extent and severity to the surrounding environment. To achieve this the following were conducted:

- Assessment of the development's potential impacts on the terrestrial ecology;
- Recommendation of mitigation measures to reduce or minimise existing impacts from the development either on terrestrial habitat or ecology directly;
- Describe the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (terrestrial biodiversity) that occur in the PAOI, and the manner in which these sensitive receptors have been and continue to be affected by the activity;
- Identification of significant ecological and botanical features within the proposed PAOI;
- Identification of conservation significant habitats around the PAOI which might be impacted;
- Screening to identify any critical issues (potential fatal flaws) that may result in a rejection of the application; and
- Provision of a map to identify sensitive receptors in the PAOI, based on available maps and database information.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The Global Positioning System (GPS) used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by up to 5 m;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- The PAOI has been modified from its original state due to the nature of the development. Field data collected is thus considered to be distorted and the specialist may only make educated assumptions as to the pre-developmental ecological conditions;
- Assumptions were guided in part by the current habitat surrounding the PAOI;
- Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists);
- This assessment was conducted from a terrestrial perspective only and must be considered in conjunction with the accompanying freshwater and soil reports (TBC, 2025); and

- The TBC fieldwork component of the assessment comprised a one one-day survey in the early dry season (14th of April 2025), which is considered sufficient under the circumstances.

1.4 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-2 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-2 A list of key legislative requirements relevant to biodiversity and conservation in Free State Province

Region	Legislation / Guideline	Comment
National	NEMA	Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017), Appendix 6 requirements
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), Threatened or Protected Species Regulations	The protection of species and ecosystems that warrant protection
	Assessment Protocol (March 2020)	The minimum criteria for reporting.
	Assessment Protocol (October 2020)	Protocol for the specialist assessment and minimum report content requirements.
	NEMWA;	The regulation of waste management to protect the environment.
	NWA	The regulation of water uses.
	GN 1003 of GG 43726 of 18 Sept 2020	The regulation and management of alien invasive species.
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	To provide for control over the utilisation of the natural agricultural resources, including the vegetation and the combating of weeds and invader plants.
Provincial	North-West Environmental Management Framework (2017)	To provide for the management and conservation of the Province's biophysical environment and protected areas. To inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management.
	North-West Biodiversity Management Act (Act No. 4 of 2016) and the Biodiversity Management Amendment Bill, 2017	
	North-West Biodiversity Sector Plan (2015)	

2 Fieldwork

2.1 Biodiversity Field Assessment

One (1) early dry season field survey was undertaken for the project on the 14th of April 2025 to confirm the presence of Species of Conservation Concern (SCC), as well as any sensitive habitat features. These observations pertain largely to the current state of the area, which has been affected by the recent land clearing. Effort was made to cover all the different habitat types within the limits of time and access. During the survey the floral communities surrounding the project development footprint were assessed and photographs were captured. The field survey tracks can be seen presented in Figure 2-1.

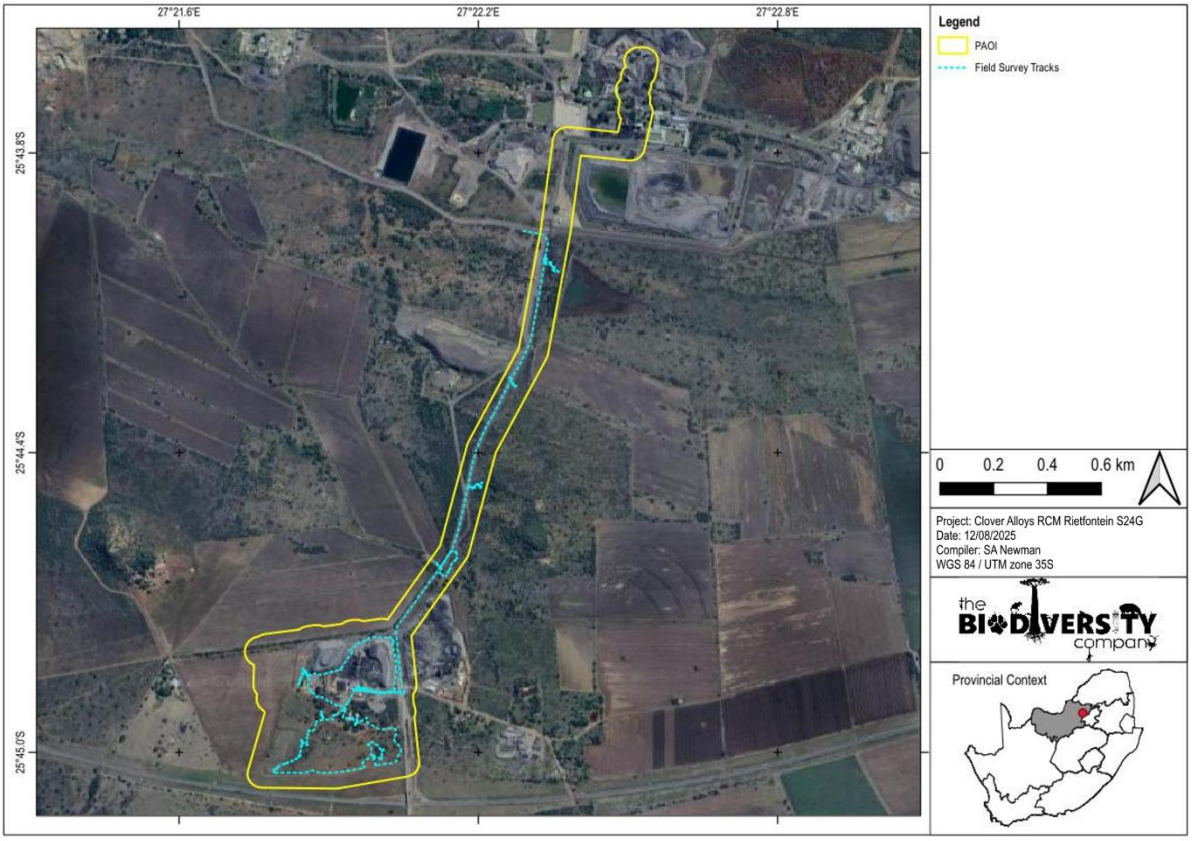


Figure 2-1 Map illustrating the field survey tracks

3 Results

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The relevance of the proposed development to ecologically important landscape features are summarised in Table 3-1.

Table 3-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevance	Reasoning	Section
Ecosystem Threat Status	Relevant	Overlaps with an Endangered (EN) ecosystem (RLE, 2021)	3.1.1.1
Ecosystem Protection Level	Relevant	Overlaps with a Poorly Protected (PP) Ecosystem (NBA, 2018)	3.1.1.2
Provincial Conservation Plan	Relevant	Overlaps with a Critical Biodiversity Area (CBA) 2, Ecological Support Area (ESA) 1 and ESA 2 (READ, 2015)	3.1.1.3
National Protected Areas Expansion Strategy (NPAES)	Relevant	Overlaps with NPAES Priority Focus Areas (NPAES, 2018).	3.1.1.4
Key Biodiversity Areas (KBA)	Relevant	Falls within ~4.6 km of the Magaliesberg KBA (2024).	3.1.1.5
South African Protected and Conservation Areas Databases (SAPAD & SACAD)	Relevant	Falls within the Magaliesberg Biosphere Reserve Transition Zone (SAPAD & SACAD, 2024).	3.1.1.6
National Freshwater Ecosystem Priority Area (NFEPA)	Relevant	Overlaps with a non-priority FEPA wetland (NFEPA, 2011).	3.1.1.7
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Irrelevant	Does not overlap with any SAIIAE systems (NBA, 2018).	-
Strategic Water Source Area (SWSA)	Relevant	Overlaps with the Kroondal/Marikana Groundwater Strategic Water Source Area (SWSA, 2018).	3.1.1.8
Mining and Biodiversity Guidelines	Relevant	The PAOI is of high Biodiversity Importance (BI), therefore, there is a correlating high risk for mining (Mining & Biodiversity Guidelines, 2013).	3.1.1.9

3.1.1.1 Red List of Ecosystems

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the Red List of Ecosystems dataset (Skowno & Monyeki, 2021) the PAOI overlaps with an EN ecosystem (Figure 3-1).

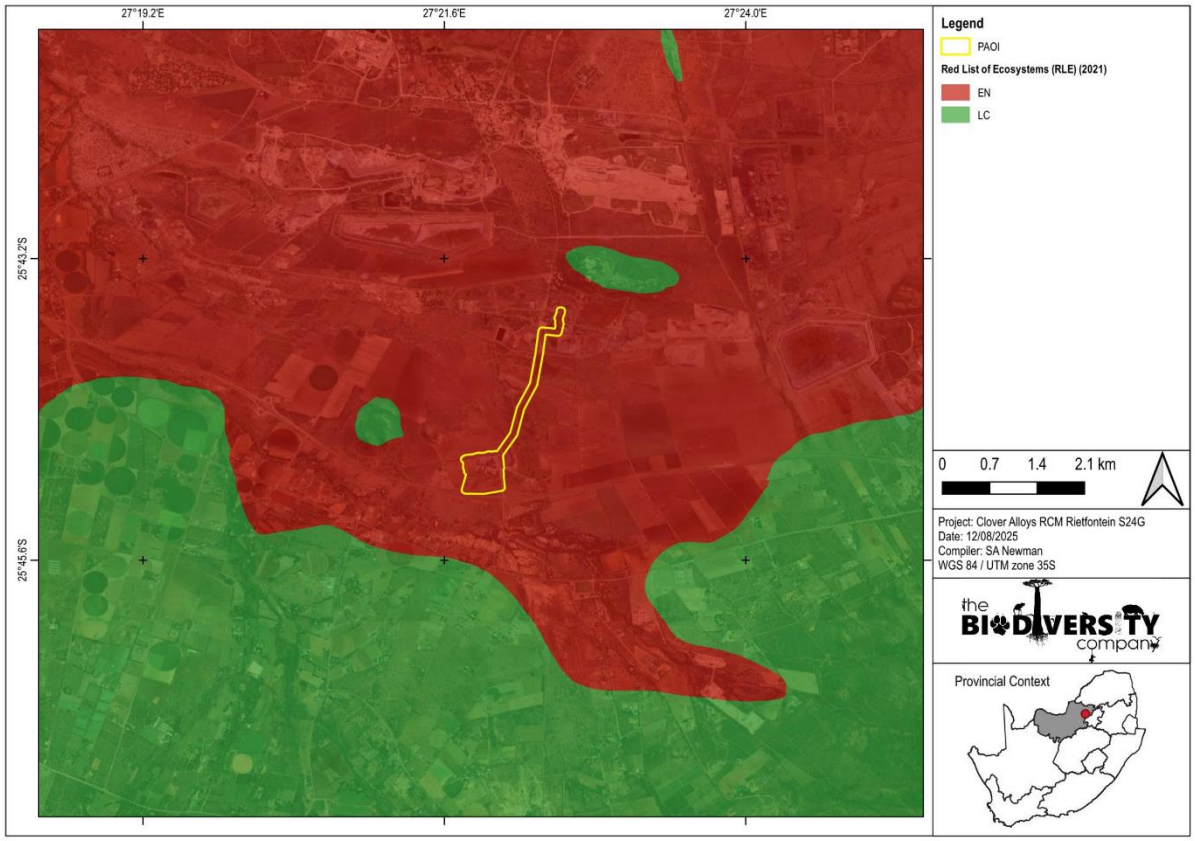


Figure 3-1 Map illustrating the Red List of Ecosystems (2021) dataset in relation to the PAOI

3.1.1.2 Ecosystem Protection Level

Indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The PAOI overlaps with a PP ecosystem (Figure 3-2).

Figure 3-2 Map illustrating the ecosystem protection level associated with the PAOI

3.1.1.3 Provincial Conservation Plan

The North-West Department of Rural, Environment, and Agricultural Development (READ), as custodian of the environment in the North West, is the primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ, 2015).

According to the North West Biodiversity Sector Plan, the PAOI overlaps with CBA 2, ESA 1 and ESA 2 areas (Figure 3-3).

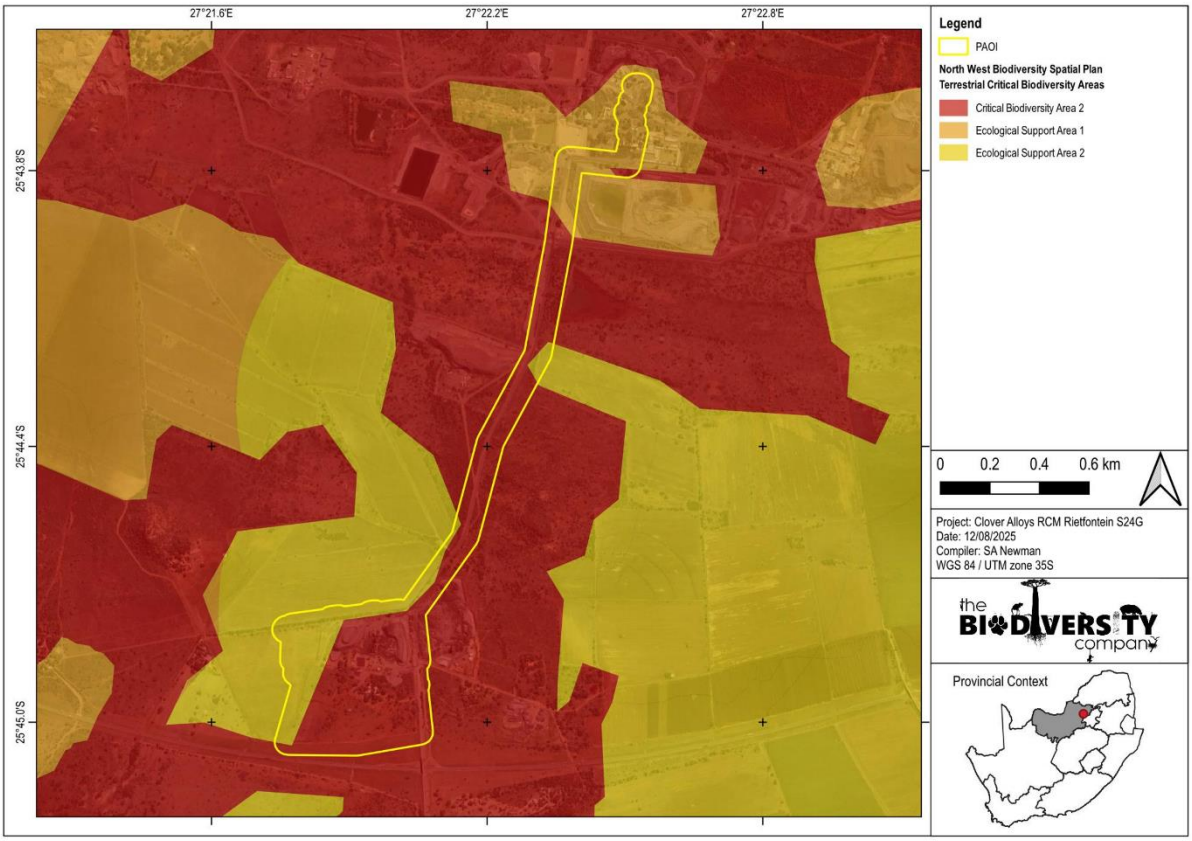


Figure 3-3 Map illustrating the PAOI in relation to the North West Biodiversity Sector Plan

3.1.1.4 National Protected Areas Expansion Strategy

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009 (Department of Forestry, Fisheries and the Environment (DFFE), 2021b).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion, thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are, therefore, of high importance for biodiversity, climate resilience and freshwater protection (DFFE, 2021b). The PAOI overlaps with NPAES Priority Focus Areas (Figure 3-4).

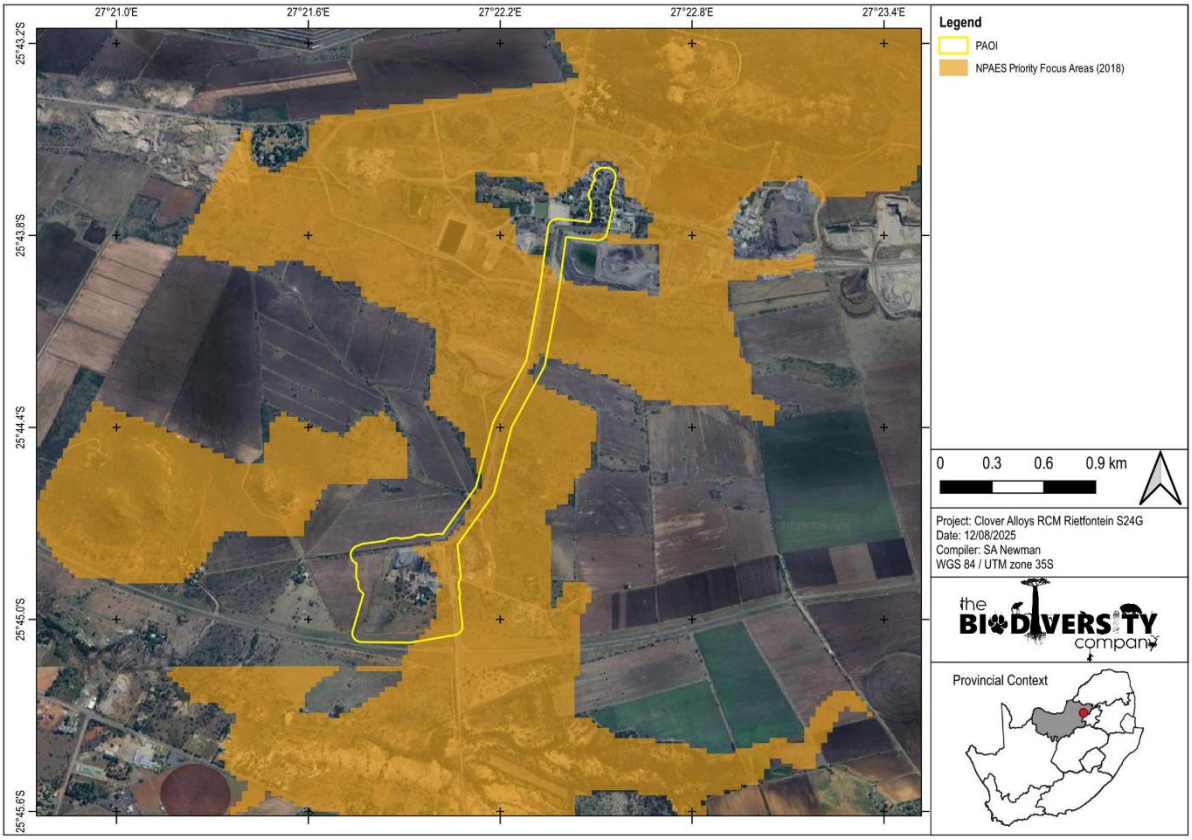


Figure 3-4 Map illustrating the PAOI in relation to the NPAES (2018) dataset

3.1.1.5 Key Biodiversity Areas

A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives.

Unlike the Important Bird Areas (IBAs), which primarily focus on birds, the KBA framework encompasses a broader spectrum of biodiversity, including mammals, amphibians, plants, and other taxa. BirdLife South Africa (BLSA), in consultation with the KBA National Coordination Group, has opted to retire IBAs and integrate KBAs into its conservation strategy. This strategic shift acknowledges the necessity of investing resources effectively to protect avian and other macroecological elements at the site level within a comprehensive framework of biodiversity conservation (KBA NCG, 2024).

The PAOI is located ~4.6 km northwest of the Magaliesberg KBA (Figure 3-5).

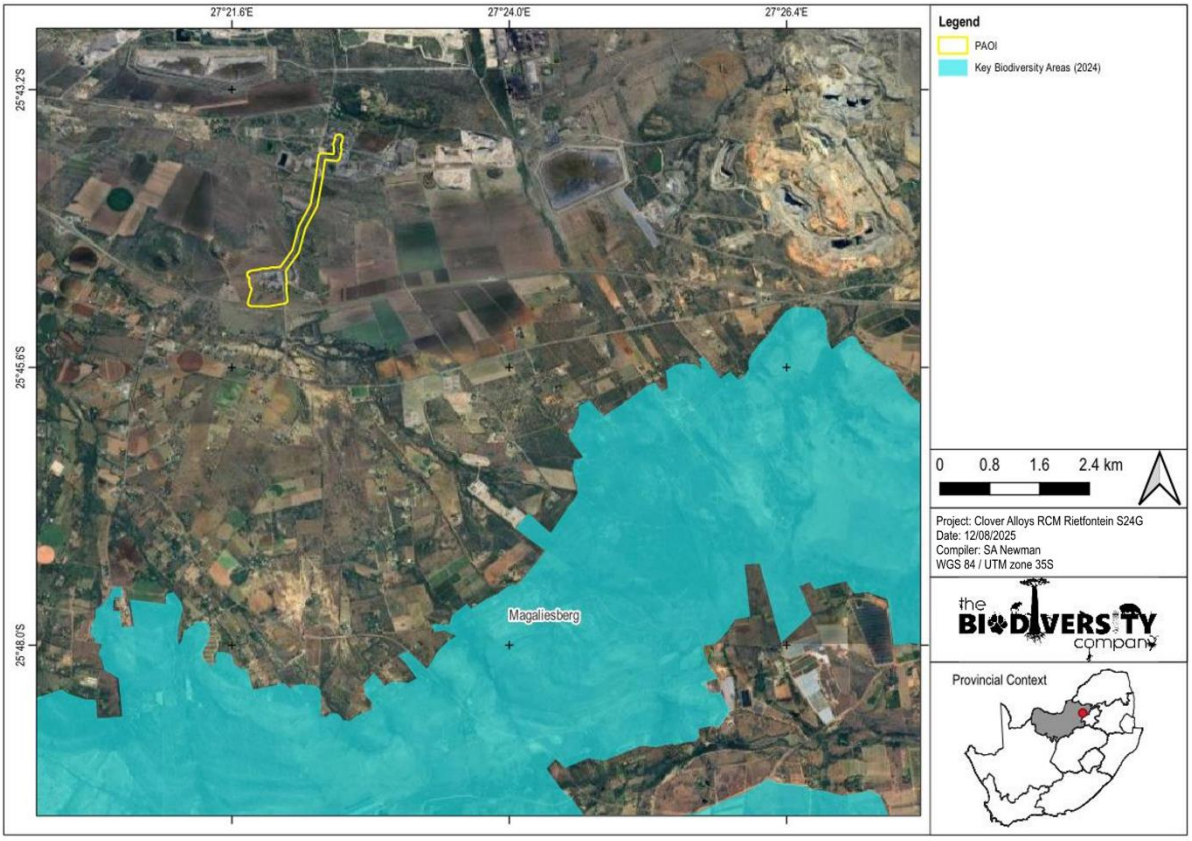


Figure 3-5 Map presenting the PAOI in relation to the Key Biodiversity Areas dataset

3.1.1.6 Protected Areas

According to the protected area spatial datasets from SACAD (DFFE, 2024), the PAOI falls within the transition zone of the Magaliesberg Biosphere Reserve (Figure 3-6).

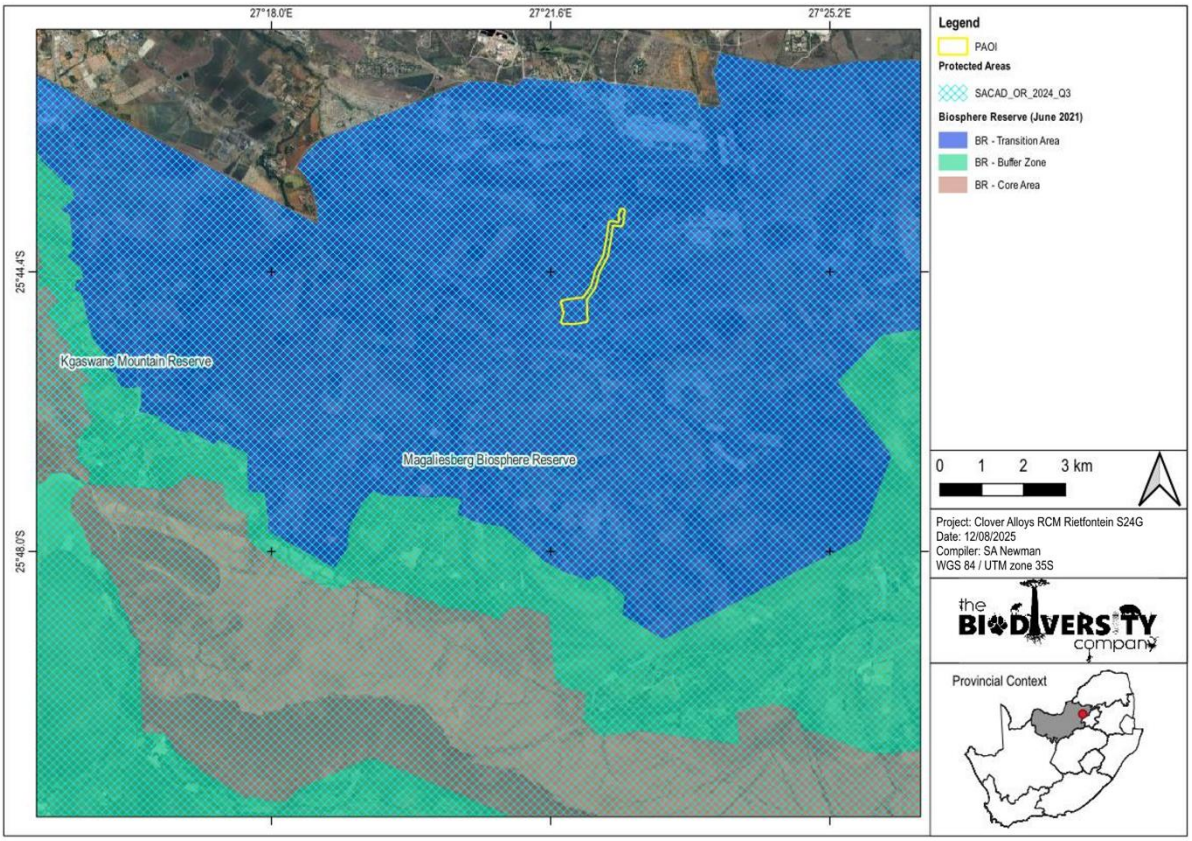


Figure 3-6 Map illustrating the location of protected areas proximal to the PAOI

3.1.1.7 National Freshwater Ecosystem Priority Area Status

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel *et al.*, 2011). The PAOI overlaps with a non-priority wetland (Figure 3-7).

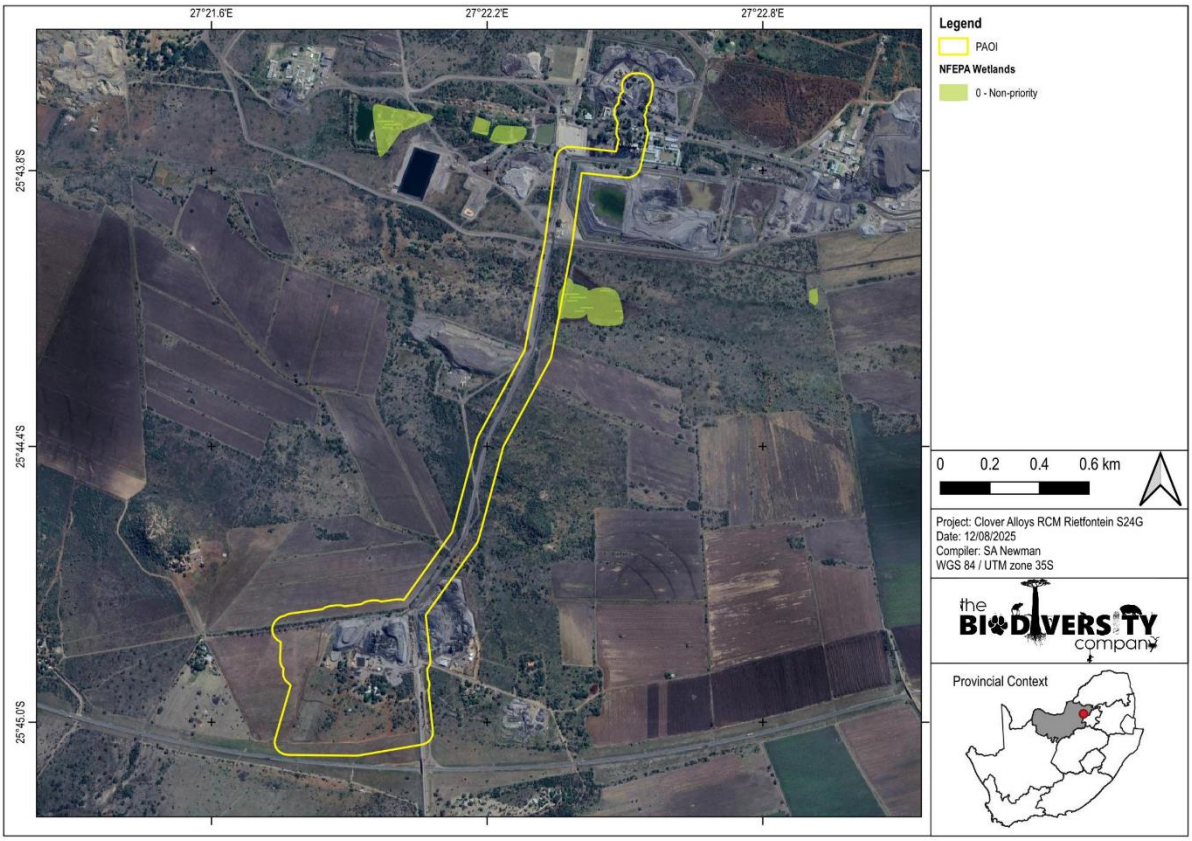


Figure 3-7 Map illustrating the PAOI in relation to the National Freshwater Ecosystem Priority Status dataset

3.1.1.8 Strategic Water Source Areas

Strategic Water Source Areas (SWSAs) are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels.

The PAOI overlaps with the Kroondal / Marikana Groundwater SWSA (Figure 3-8).

Figure 3-8 Map illustrating the PAOI in relation to the Strategic Water Source Areas dataset

3.1.1.9 Mining and Biodiversity Guidelines

According to the Mining and Biodiversity Guidelines spatial dataset (2013), the PAOI is of high BI and there is therefore a correlating high risk for mining (Figure 3-9).

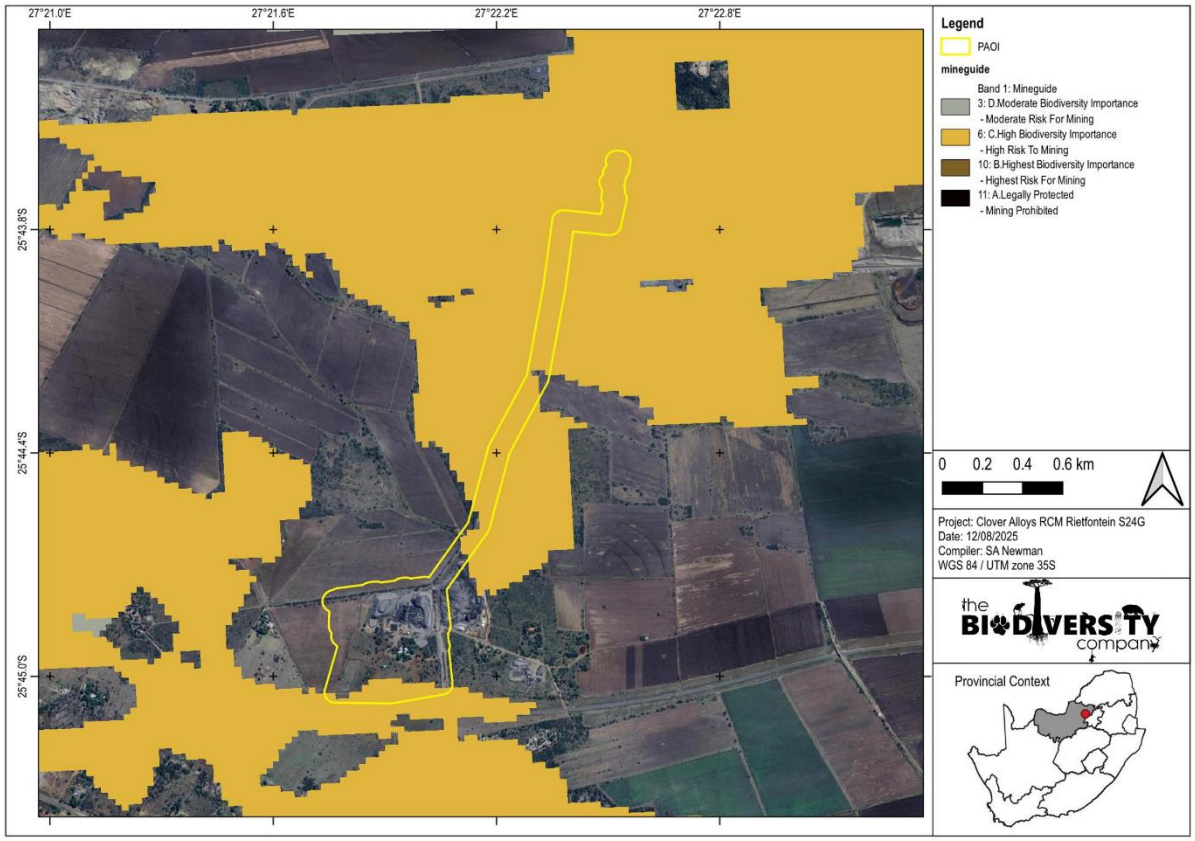


Figure 3-9 The PAOI in relation to the Mining and Biodiversity Guidelines

3.1.2 Flora Assessment

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

3.1.2.1 Vegetation Type

The PAOI is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include a seasonal precipitation and a sub-tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer (Mucina & Rutherford, 2006). At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Vachellia* and *Albizia*) and a generally dense herbaceous layer (Scholes & Walker, 1993).

The PAOI is situated in the Marikana Thornveld vegetation type according to SANBI (2018) (Figure 3-10), which is a member of the Central Bushveld Bioregion.

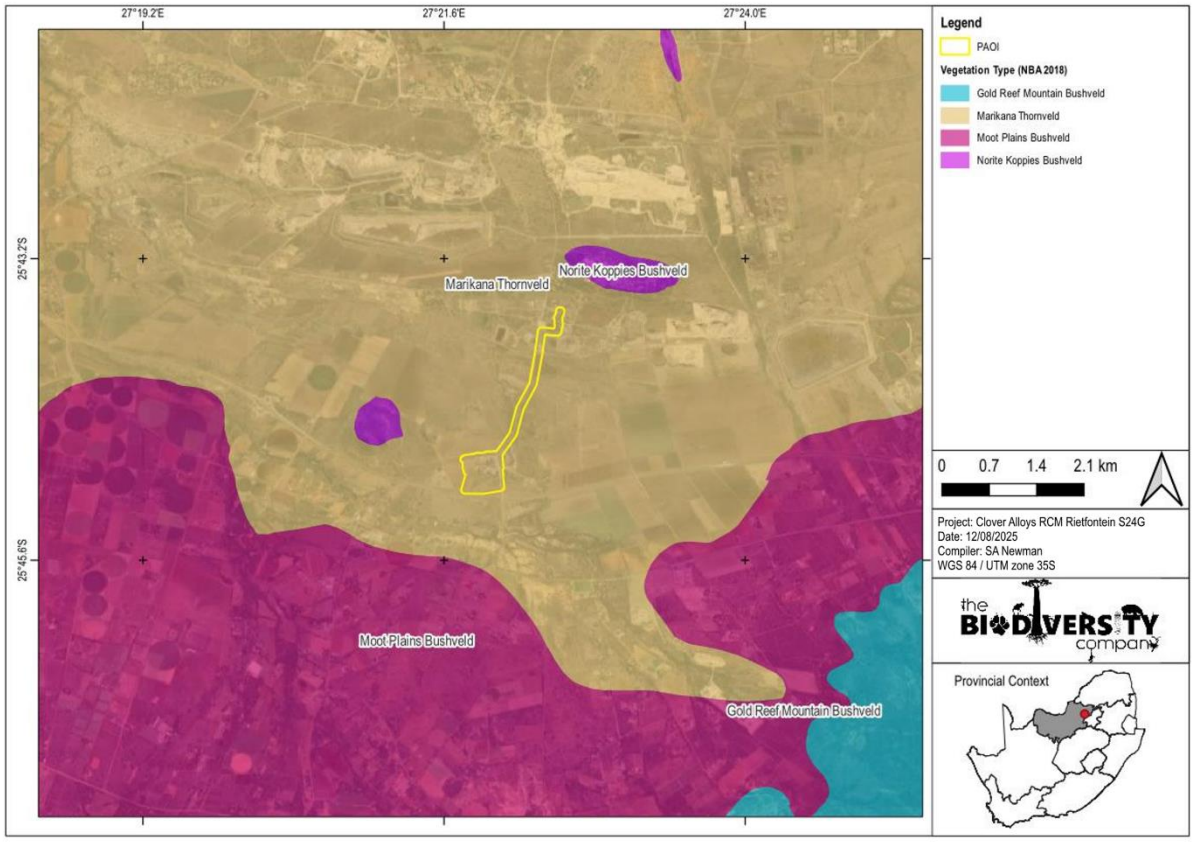


Figure 3-10 Map illustrating the vegetation types associated with the PAOI and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

3.1.2.1.1.1 Marikana Thornveld

Marikana Thornveld extends on the broad plains from Rustenburg in the West, through Marikana and Brits, and towards Pretoria in the East (Mucina & Rutherford, 2006). It is characterised by open *Vachellia karroo* woodland, which occurs in valleys and on undulating plains and hills (Mucina & Rutherford, 2006). Fire-protected habitats, such as drainage lines, rocky outcrops and termitaria are typically dominated by denser, shrub-dominated vegetation (Mucina & Rutherford, 2006).

Important Plant Taxa in the Marikana Thornveld

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species are important taxa in the Marikana Thornveld vegetation type:

Tall Tree: *Senegalia burkei*.

Small Trees: *Senegalia caffra, Vachellia gerrardii, Vachellia karroo, Combretum molle, Searsia lancea, Ziziphus mucronata, Vachellia nilotica, Vachellia tortilis subsp. heteracantha, Celtis africana, Dombeya rotundifolia, Pappea capensis, Peltophorum africanum, Terminalia sericea*.

Tall Shrubs: *Euclea crispa subsp. crispa, Olea europaea subsp. africana, Searsia pyroides var. pyroides, Diospyros lycioides subsp. guerkei, Ehretia rigida subsp. rigida, Euclea undulata, Grewia flava, Pavetta gardeniifolia*.

Low Shrubs: *Asparagus cooperi, Rhynchosia nitens, Indigofera zeyheri, Justicia flava*.

Woody Climbers: *Clematis brachiata, Helinus integrifolius*.

Herbaceous Climbers: *Pentarrhinum insipidum, Cyphostemma cirrhosum*.

Graminoids: *Elionurus muticus, Eragrostis lehmanniana, Setaria sphacelata, Themeda triandra, Aristida scabrivalvis subsp. scabrivalvis, Fingerhuthia africana, Heteropogon contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa*.

Herbs: *Hermannia depressa, Ipomoea obscura, Barleria macrostegia, Dianthus mooiensis subsp. mooiensis, Ipomoea oblongata, Vernonia oligocephala*.

Geophytic Herbs: *Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica*.

Conservation Status

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered, with its national conservation target being 19%. Over 48% has already been transformed by urban expansion and cultivation, and alien invasive plants occur in high densities, especially along drainage lines (Mucina & Rutherford, 2006). Erosion is very low to moderate (Mucina & Rutherford, 2006). Less than 1% is conserved in the Magaliesberg Nature Area, De Onderstepoort Nature Reserve and other reserves. Erosion is very low to moderate (Mucina & Rutherford, 2006).

3.1.2.2 Expected Flora Species

The POSA database indicates that 318 species of indigenous plants are expected to occur within the PAOI (Appendix D). No SCC are expected to occur within the PAOI based on the POSA database. The Screening Tool did not list any flora SCC for the PAOI.

3.1.3 Faunal Assessment

3.1.3.1 Mammals

The MammalMAP database lists 73 non-volant mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are normally restricted to protected areas. Thirteen of these expected species are regarded as SCC (Table 3-2). Two (2) species were listed by the Screening Tool.

Table 3-2 List of mammal Species of Conservation Concern that may occur in the PAOI. EN = Endangered, NT = Near Threatened, LC = Least Concern and VU = Vulnerable

Scientific name	Common name	Screening Tool	Red list		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Aonyx capensis	Cape Clawless Otter	-	NT	NT	Moderate	Some suitable habitat present on site
Atelerix frontalis	South African Hedgehog	-	NT	LC	Moderate	Some suitable habitat present on site
Crocidura maquassiensis	Makwassie Musk Shrew	Medium	VU		Low	No suitable habitat present on site
Crocidura mariquensis	Swamp Musk Shrew	-	NT	LC	Low	No suitable habitat present on site
Dasymys robbertsii	African Marsh Rat	Medium	NT	LC	Low	No suitable habitat present on site
Felis nigripes	Black-footed Cat	-	VU	VU	Low	No suitable habitat present on site
Hydrictis maculicollis	Spotted-necked Otter	-	VU	NT	Low	No suitable habitat present on site
Mystromys albicaudatus	White-tailed Rat	-	VU	EN	Low	No suitable habitat present on site
Ourebia ourebi	Oribi	-	EN	LC	Low	No suitable habitat present on site
Panthera pardus	Leopard	-	VU	VU	Low	No suitable habitat present on site
Parahyaena brunnea	Brown Hyaena	-	NT	NT	Low	No suitable habitat present on site
Pelea capreolus	Grey Rhebok	-	NT	LC	Low	No suitable habitat present on site
Redunca fulvorufula	Mountain Reedbuck	-	EN	LC	Low	No suitable habitat present on site

3.1.3.2 Reptiles

Based on the ReptileMAP database, 66 reptile species are expected to occur within the area (Appendix D). No reptile SCCs are expected to occur within the area. No species were listed by the Screening Tool.

3.1.3.3 Amphibians

Based on the FrogMap database, 22 amphibian species are expected to occur within the area (Appendix D). No amphibian SCCs are expected to occur within the area. No species were listed by the Screening Tool.

3.1.3.4 Avifauna

The SABAP2 database lists 359 avifauna species that could be expected to occur within the PAOI and surrounding landscape (Appendix D). Twenty-one (21) of these expected species are regarded as SCC (Table 4 7). One (1) species was listed by the Screening Tool.

Table 3-3 List of avifauna Species of Conservation Concern that may occur in the PAOI. EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Scientific Name	Common Name	Screening Tool	RED List		Likelihood of Occurrence	Reason
			SANBI	IUCN		
Ciconia abdimii	Abdim's Stork	-	NT	LC	Low	No suitable habitat present on site
Ciconia nigra	Black Stork	-	VU	LC	Moderate	Some suitable habitat present on site
Glareola nordmanni	Black-winged Pratincole	-	NT	NT	Moderate	Some suitable habitat present on site
Gyps coprotheres	Cape Vulture	-	EN	VU	Low	No suitable habitat present on site
Hydropogne caspia	Caspian Tern	-	VU	LC	Low	No suitable habitat present on site
Calidris ferruginea	Curlew Sandpiper	-	LC	NT	Low	No suitable habitat present on site
Phoenicopterus roseus	Greater Flamingo	-	NT	LC	Low	No suitable habitat present on site
Rostratula benghalensis	Greater Painted-snipe	-	NT	LC	Moderate	Some suitable habitat might be present within the PAOI.
Alcedo semitorquata	Half-collared Kingfisher	-	NT	LC	Low	No suitable habitat present on site
Falco biarmicus	Lanner Falcon	-	VU	LC	Moderate	Some suitable habitat present on site
Phoeniconaias minor	Lesser Flamingo	-	NT	NT	Low	No suitable habitat present on site
Oxyura maccoa	Maccoa Duck	-	NT	EN	Low	No suitable habitat present on site
Polemaetus bellicosus	Martial Eagle	-	EN	EN	Moderate	Some suitable habitat present on site
Sagittarius serpentarius	Secretarybird	-	VU	EN	Moderate	Some suitable habitat present on site

Aquila rapax	Tawny Eagle	Medium	EN	VU	Low	No suitable habitat present on site
Aquila verreauxii	Verreaux's Eagle	-	NA	LC	Low	No suitable habitat present on site
Gyps africanus	White-backed Vulture	-	CR	CR	Low	No suitable habitat present on site
Mycteria ibis	Yellow-billed Stork	-	EN	LC	Moderate	Some suitable habitat present on site
Pterocles gutturalis	Yellow-throated Sandgrouse	-	NT	LC	Moderate	Some suitable habitat present on site

3.2 Field Assessment

This section details the observations recorded during an on-site field survey conducted to ground truth the habitat and floral features of the PAOI. These observations pertain largely to the current state of the area, which has been affected by the unauthorised land clearing. The field survey for the PAOI was conducted on the 16th of April 2025. During the survey the floral communities surrounding the project development footprint were assessed and photographs were captured.

3.2.1 Flora Assessment

The Precautionary Principle is a critical approach in biodiversity surveys for environmental assessments, particularly when the status of biodiversity receptors cannot be precisely determined. This principle operates on the assumption that the sensitivity of these biodiversity receptors is high, thereby ensuring that any potential risks to ecosystems and species are minimised. By adopting this cautious stance, environmental assessments prioritise the protection of biodiversity, even in the face of scientific uncertainty. This approach is essential for maintaining ecological integrity, as it prevents irreversible damage to biodiversity that might occur if the sensitivity of receptors were underestimated (Cooney, 2004). For example, in scenarios involving habitat destruction or the introduction of new species, the Precautionary Principle necessitates comprehensive impact assessments and the implementation of robust mitigation measures to protect sensitive biodiversity receptors (Raffensperger and Tickner, 1999). Consequently, the Precautionary Principle serves as a guiding framework for environmental decision-making, promoting sustainable development and conservation efforts by assuming high sensitivity of biodiversity receptors and prioritising their protection.

In the case of this assessment, the Precautionary Principle is applied when assuming the state of the habitats on site prior to vegetation clearing, as well as the vegetation composition. In the absence of seeing the site prior to clearing, it can be assumed that the vegetation that was cleared was largely indigenous.

The PAOI was composed predominantly of degraded and modified areas. Assessment of the areas surrounding the areas of vegetation clearing suggests that the natural areas within the PAOI were originally composed of Disturbed Thornveld habitat.

High numbers of alien and invasive plant species were recorded throughout the PAOI and pose a serious threat to the natural habitats in and around the PAOI. Dominant alien and invasive plant species include, *Tagetes minuta, Bidens pilosa, Solanum seaforthianum, Xanthium strumarium, Datura ferox, Argemone ochroleuca, Datura stramonium, Campuloclinium macrocephalum, Tecoma stans, Flaveria bidentis, Lantana camara, Ipomoea purpurea* and *Melia azedarach*. These high numbers necessitate the implementation of an Alien Invasive Plant (AIP) management plan.

No flora SCCs were recorded from the PAOI, and none are expected. One nationally protected tree species was recorded from the site, *Sclerocarya birrea* (Marula), which is protected under the National

Forests Act of 1998 (Act 84 of 1998). A map indicating the location of this individual can be seen below (Figure 3-11). This individual, and any others recorded during a protected plant walkdown are not to be disturbed in any way without acquiring the relevant permits for their relocation or destruction.

A species list of the species recorded from the surrounding area can be found at https://www.inaturalist.org/projects/clover-alloys. Some examples of indigenous flora species recorded in and around the PAOI can be seen depicted in Figure 3-12 and some examples of the alien and invasive plant species recorded from the PAOI can be seen depicted in Figure 3-13.

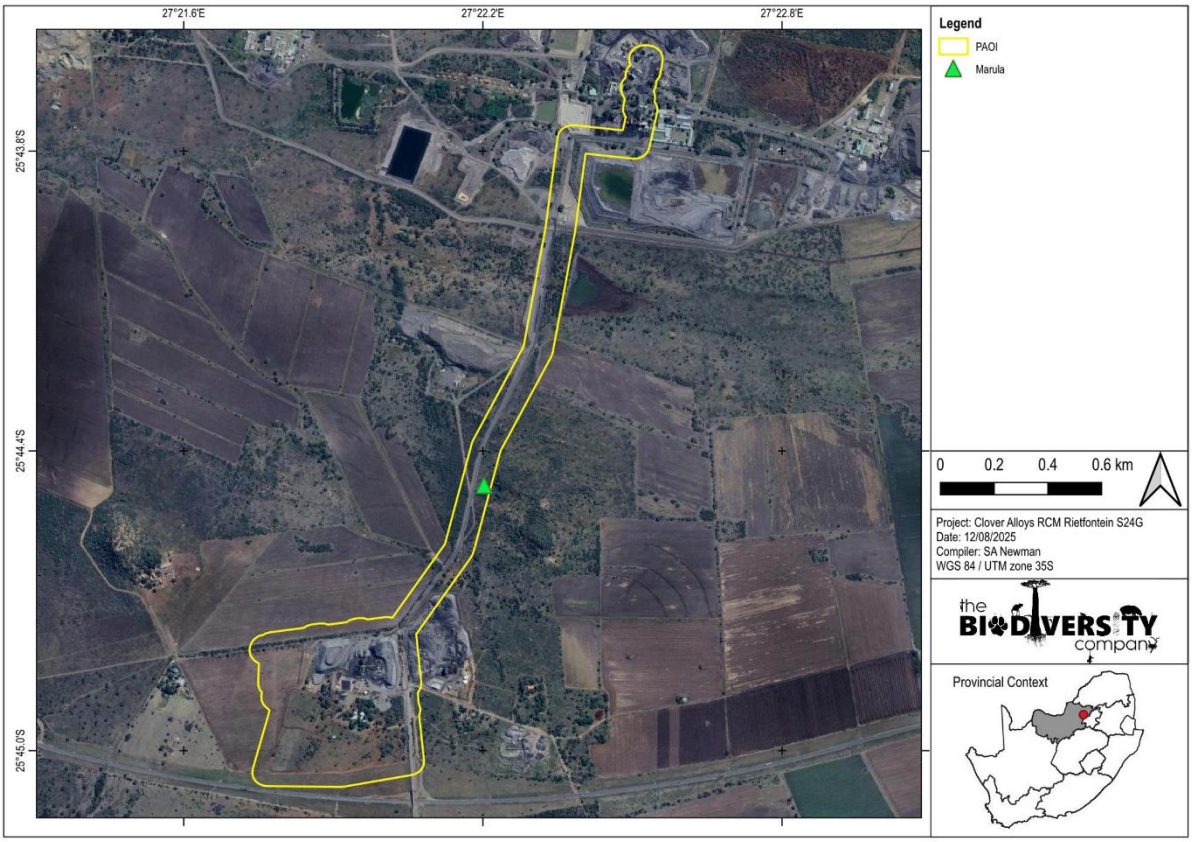


Figure 3-11 Map illustrating the location of the protected tree species recorded from the site, Sclerocarya birrea (Marula)

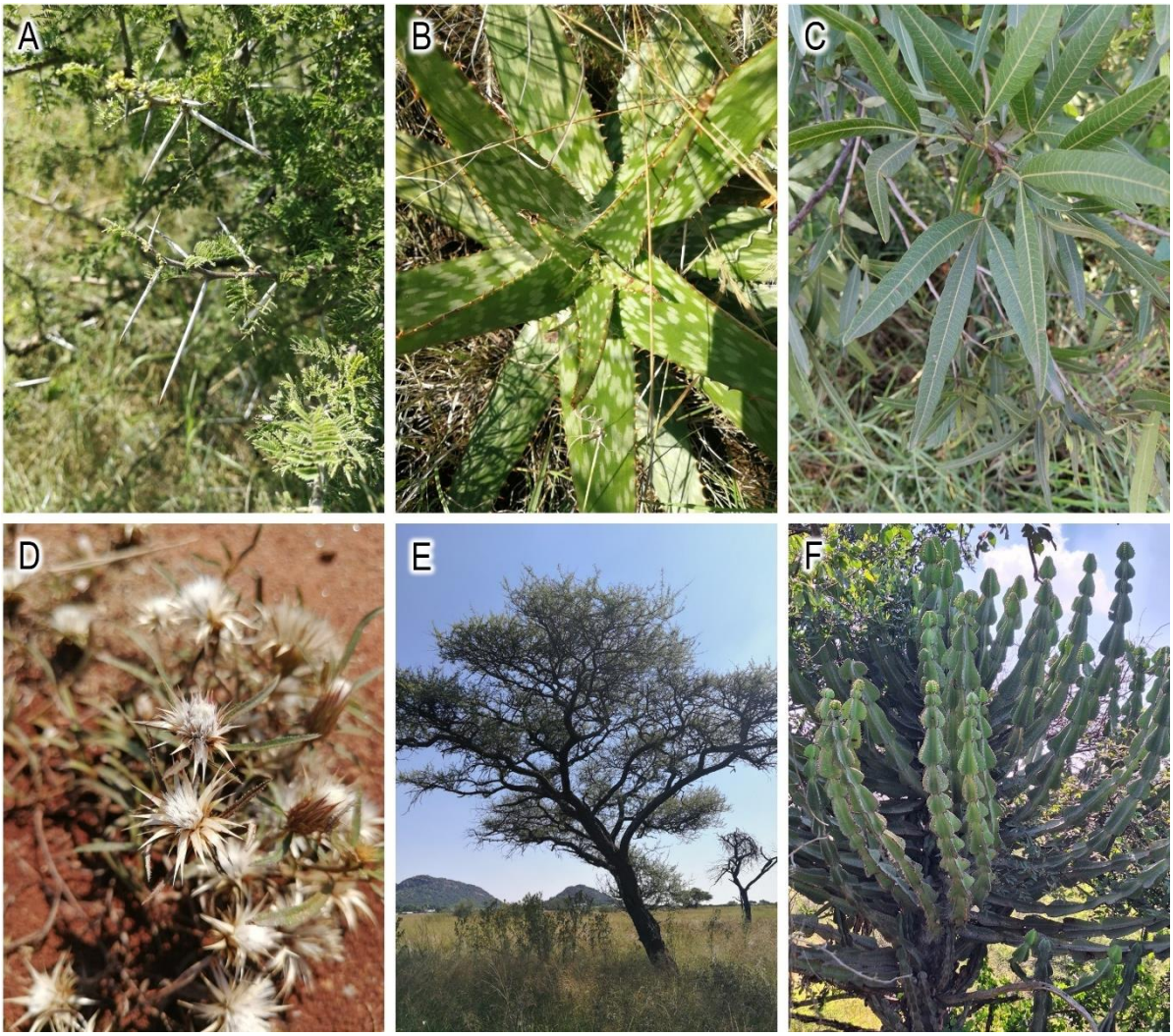


Figure 3-12 ***Photographs presenting some of the indigenous flora species recorded from and around the PAOI: A) Vachellia tortilis, B) Aloe davyana, C) Searsia lancea, D) Dicoma anomala and E) Vachellia nilotica and F) Euphorbia cooperi***

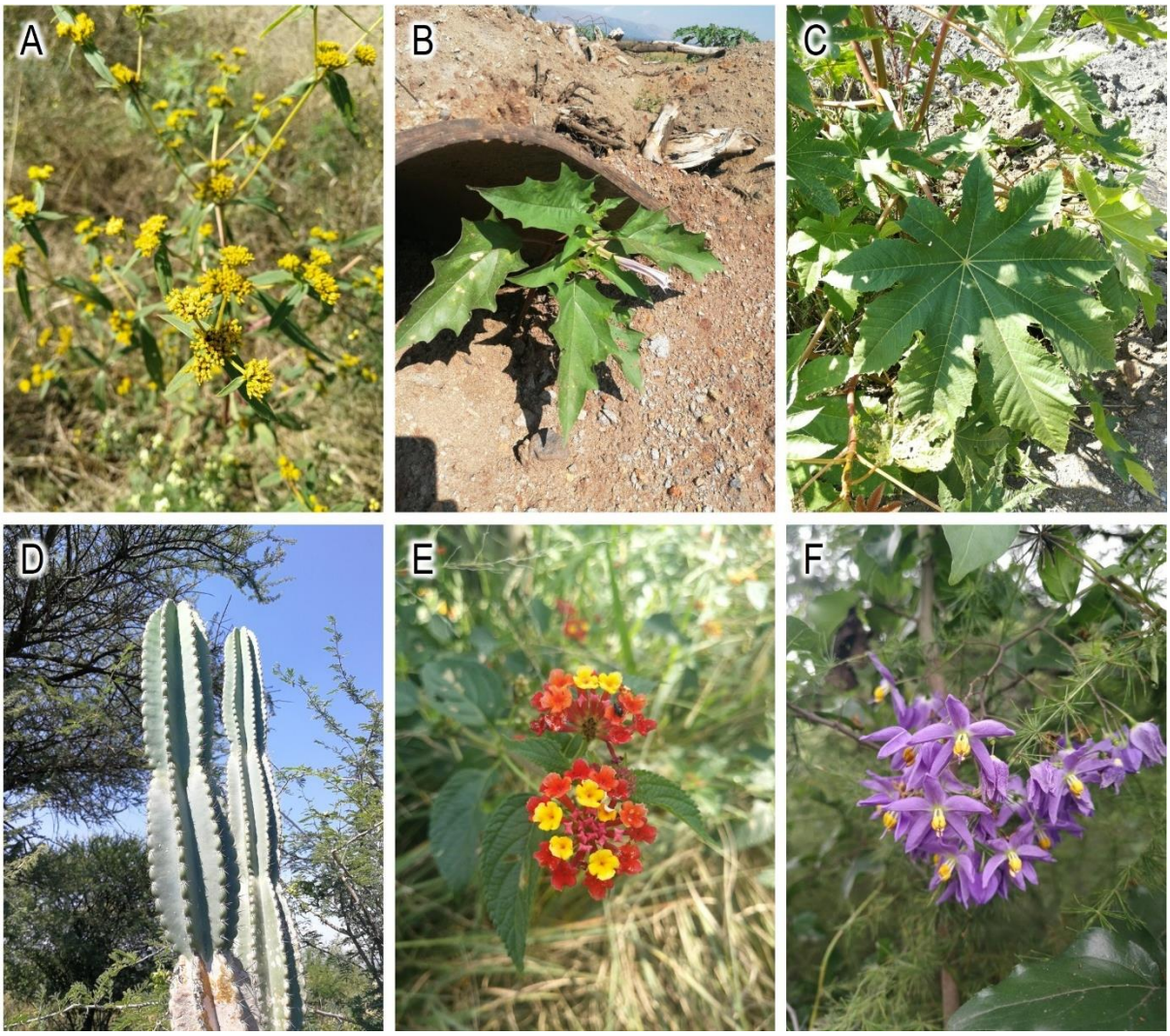


Figure 3-13 Photographs presenting some of the alien and invasive plant species recorded from the PAOI: A) Flaveria bidentis, B) Datura stramonium, C) Ricinus communis, D) Epiphyllum oxypetalum, E) Lantana camara and F) Solanum seaforthianum

3.2.2 Fauna Assessment

Some common fauna species (LC) were recorded from the PAOI during the survey, including *Equus quagga* (Plains Zebra, *introduced*), *Xerus inauris* (Cape Ground Squirrel) and *Hippotragus niger* (Sable Antelope, VU, *introduced*). Additional common species are expected.

Common avifauna species (LC) were recorded for the site, including *Merops bullockoides* (White-fronted Bee-eater), *Vanellus coronatus* (Crowned Lapwing), *Bostrychia hagedash* (Hadeda Ibis), *Spilopelia senegalensis* (Laughing Dove), *Cisticola juncidis* (Zitting Cisicola), *Euplectes albonotatus* (White-winged Widow Bird), *Trachyphonus vaillantii* (Crested Barbet) and *Corythaixoides concolor* (Grey Go-away-bird). Many more common avifauna species are expected for the PAOI.

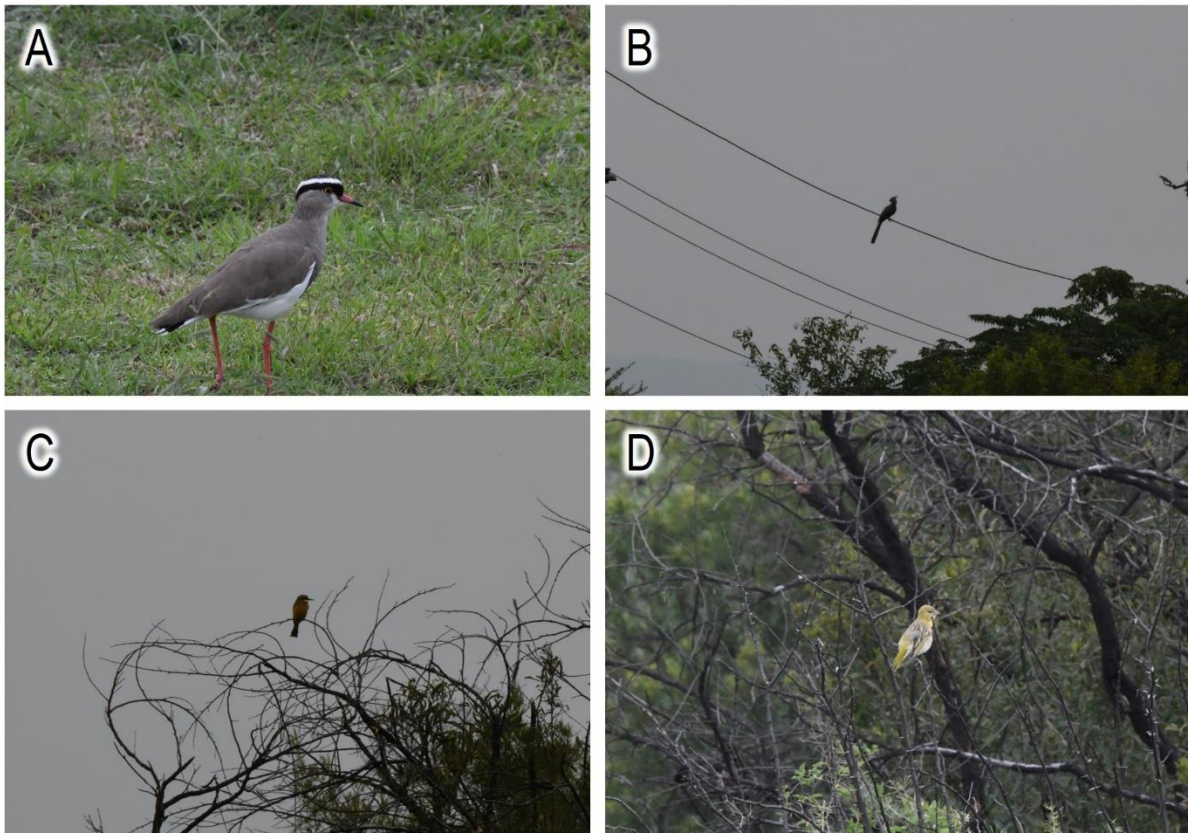


Figure 3-14 Photographs presenting some of the avifauna species recorded from the PAOI: A) Vanellus coronatus (Crowned Lapwing), B) Corythaixoides concolor (Grey Go-away-bird), C) Merops bullockoides (White-fronted Bee-eater) and D) Ploceus velatus (Southern Masked Weaver)

3.2.3 Habitat Assessment

The habitat survey is conducted in a manner that utilises the data collected from the PAOI and surrounds (during the field survey), as well as satellite imagery between 2004 and 2025, to make assumptions on the state of the habitats prior to land clearing. The Precautionary Approach is applied here when assuming the state on the habitats expected on site prior to unauthorised vegetation clearing.

The main habitat types identified across the PAOI were initially identified largely based on aerial imagery from 2014, before the area was cleared of vegetation in preparation for development. These main habitat types were then refined based on the field coverage and data collected during the survey.

Four (4) main habitat types were identified across the PAOI and include:

- Degraded Thornveld (Figure 3-16);
- Disturbed Thornveld (Figure 3-17);
- Water Resource (Figure 3-18); and
- Modified (Figure 3-19).

The habitat units delineated for the pre-development PAOI can be seen presented in Figure 3-15 and a description of the habitat units can be found in Table 3-4.

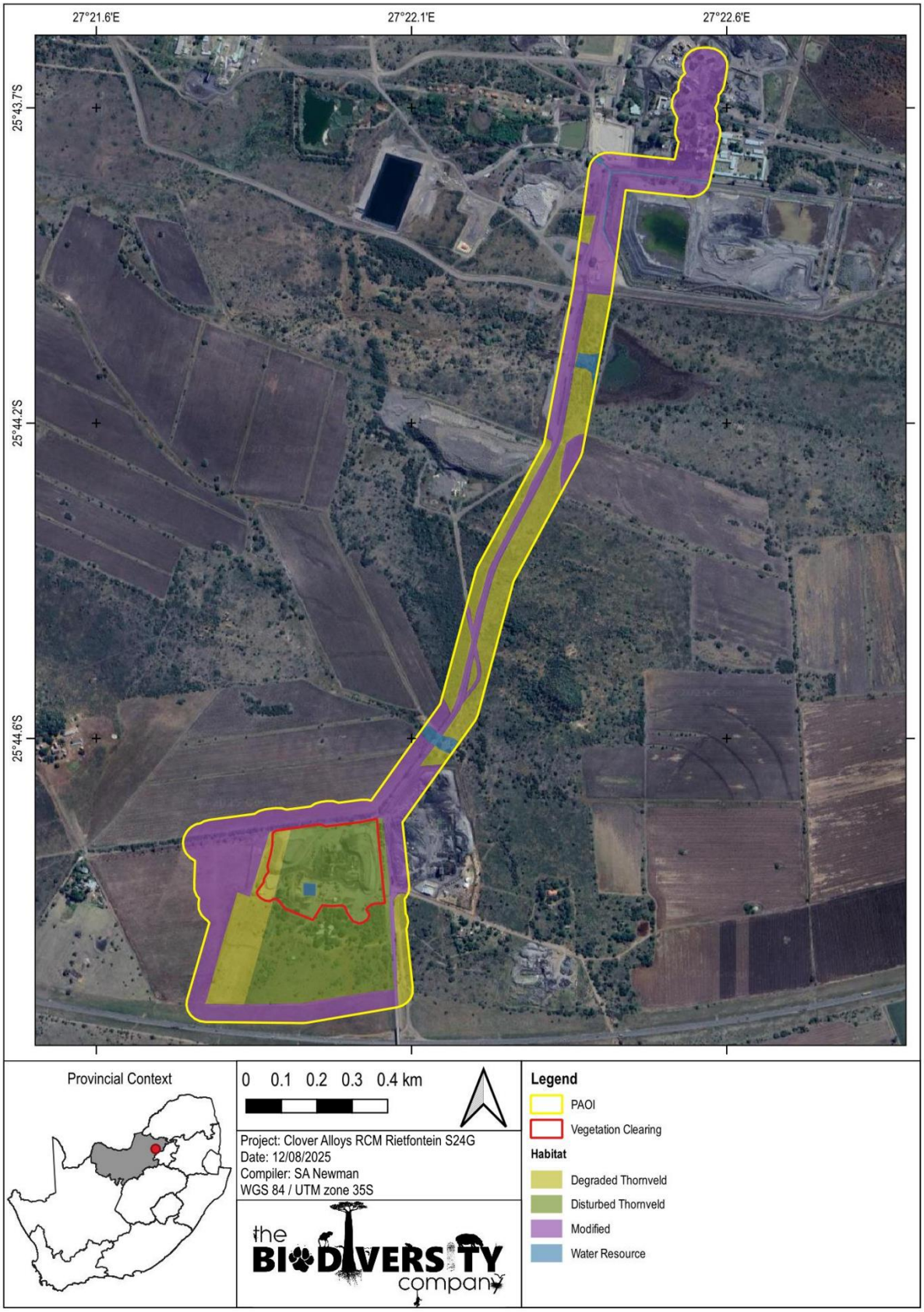


Figure 3-15 Map illustrating the pre-clearing habitats delineated for the PAOI

Table 3-4 Table providing descriptions of the habitat units delineated for the PAOI

Habitat	Description and Condition
Degraded Thornveld	This habitat unit is characterised by thornveld habitat that has experienced severe levels of degradation owing to the ongoing mining activities in the area, as well as nearby agricultural practices. This habitat unit exists in small, fragmented patches that experience frequent human ingress, and the associated impacts, such as littering and illegal dumping. Bush encroachment *by Dichrostachys cinerea* and *Vachellia tortilis* in some areas is so dense that it is impenetrable. This habitat unit also experiences invasions and infestations by alien and invasive plant species, such as *Tagetes minuta, Bidens pilosa, Solanum seaforthianum, Xanthium strumarium, Datura ferox, Argemone ochroleuca, Datura stramonium, Campuloclinium macrocephalum, Tecoma stans, Flaveria bidentis, Lantana camara, Ipomoea purpurea* and *Melia azedarach*. This habitat unit has lost much of its functionality and can be considered a poor representation of the Marikana Thornveld which it once was. Without active rehabilitation, it will continue to degrade further until it eventually loses all functionality, as it has done in some areas. Dominant species within this habitat unit, apart from those listed above, include; *Themeda triandra, Aristida congesta, Paspalum urvillei, Aristida diffusa, Hyparrhenia hirta, Setaria sphacelata, Cymbopogon caesius, Heteropogon contortus, Hilliardiella elaeagnoides, Aloe davyana* and *Vachellia robusta*. No flora or fauna SCC were recorded and none are expected for this habitat unit. This habitat unit is no longer considered representative of a CBA or ESA.
Disturbed Thornveld	This habitat unit is characterised by Marikana Thornveld habitat that has experienced high levels of disturbance owing to its close proximity to active mining practices, the beneficiation plant and the high incidence of human ingress within the area. In addition, this habitat unit experiences invasions by alien and invasive plant species such as; *Tagetes minuta, Bidens pilosa, Flaveria bidentis, Lantana camara, Ipomoea purpurea* and *Melia azedarach.* This habitat unit still maintains some of its functionality, but without human intervention and the implementation of mitigations against the nearby anthropogenic disturbances, it will continue to degrade. Dominant species include, but are not limited to, *Themeda triandra, Heteropogon contortus,* Hyparrhenia hirta, *Aloe davyana, Vachellia robusta*, *V. nilotica, Ziziphus mucronata*, and *Searsia lancea.* No flora SCC were recorded and none are expected for this habitat unit. Some fauna SCC may make use of this habitat unit for foraging and as a movement corridor, however, none are likely to be resident here due to the high levels of human presence and none were recorded during the field survey. Prior to clearing, it is possible that this habitat could have been considered representative of a CBA.
Water Resource	This is a non-terrestrial habitat made up of wetlands, drainage features, and streams within the PAOI. This habitat unit is associated with hydrophytes and provides habitat for many fauna species, as well as an important source of water for fauna passing through the area. It is associated with high levels of degradation due to the ongoing mining and agricultural activities in the area, as well as human ingress. No fauna or flora SCC were recorded and none are expected. Additional information regarding this habitat unit may be found in the accompanying wetland assessment (TBC, 2025).
Modified	This habitat unit includes all areas that maintain little to no native vegetation and/or where anthropogenic activity has substantially modified an area's primary ecological functions and species composition. Within the PAOI, these areas are mostly comprised of the beneficiation plant areas, the

associated infrastructure, existing roads and agricultural fields. These areas include very few, if any, indigenous species and are associated with alien and invasive plant species.

No fauna or flora SCC were observed, and none are expected for the habitat unit.

Figure 3-16 Photograph illustrating the Degraded Thornveld habitat type

Figure 3-17 Photographs illustrating the Disturbed Thornveld habitat type

Figure 3-18 Photographs illustrating the Water Resource habitat type

Figure 3-19 Photographs illustrating the Modified habitat type

3.3 Site Ecological Importance

3.3.1 Desktop Ecological Sensitivity

Based on the criteria provided in Appendix B of this report, the delineated habitat types have been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 3-5 below. To identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivity of the habitat type delineated within the PAOI is mapped in Figure 3-20.

It is important to note that the map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 3-5 Summary of the PAOI Site Ecological Importance (SEI) prior to clearance

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity Importance	Project Component in relation to habitat type	Receptor Resilience	Site Ecological Importance Guidelines
Degraded Thornveld Water Resource (Artificial)	**High**	**Low**	**Medium**	Beneficiation Plant & Pipeline	**High**	**Low**
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area.			Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Disturbed Thornveld Water Resource (HGM 2 – Unchannelled Valley Bottom)	**High**	**Medium**	**Medium**	Beneficiation Plant	**Medium**	**Medium**
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type	Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate			Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
				Pipeline	**High**	**Low**

		rehabilitation potential.			Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Water Resource: (HGM 1 – Unchannelled Valley-bottom)	**High**	**Low**	**Medium**	Pipeline	**Low**	**High**
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area			Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
				No construction within habitat	**Medium**	**Medium**
					Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities
Modified	**Very Low**	**Low**	**Very Low**	Beneficiation Plant & Pipeline	**High**	**Very Low**
	No natural habitat remaining.	Several minor and major current negative ecological impacts.			Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

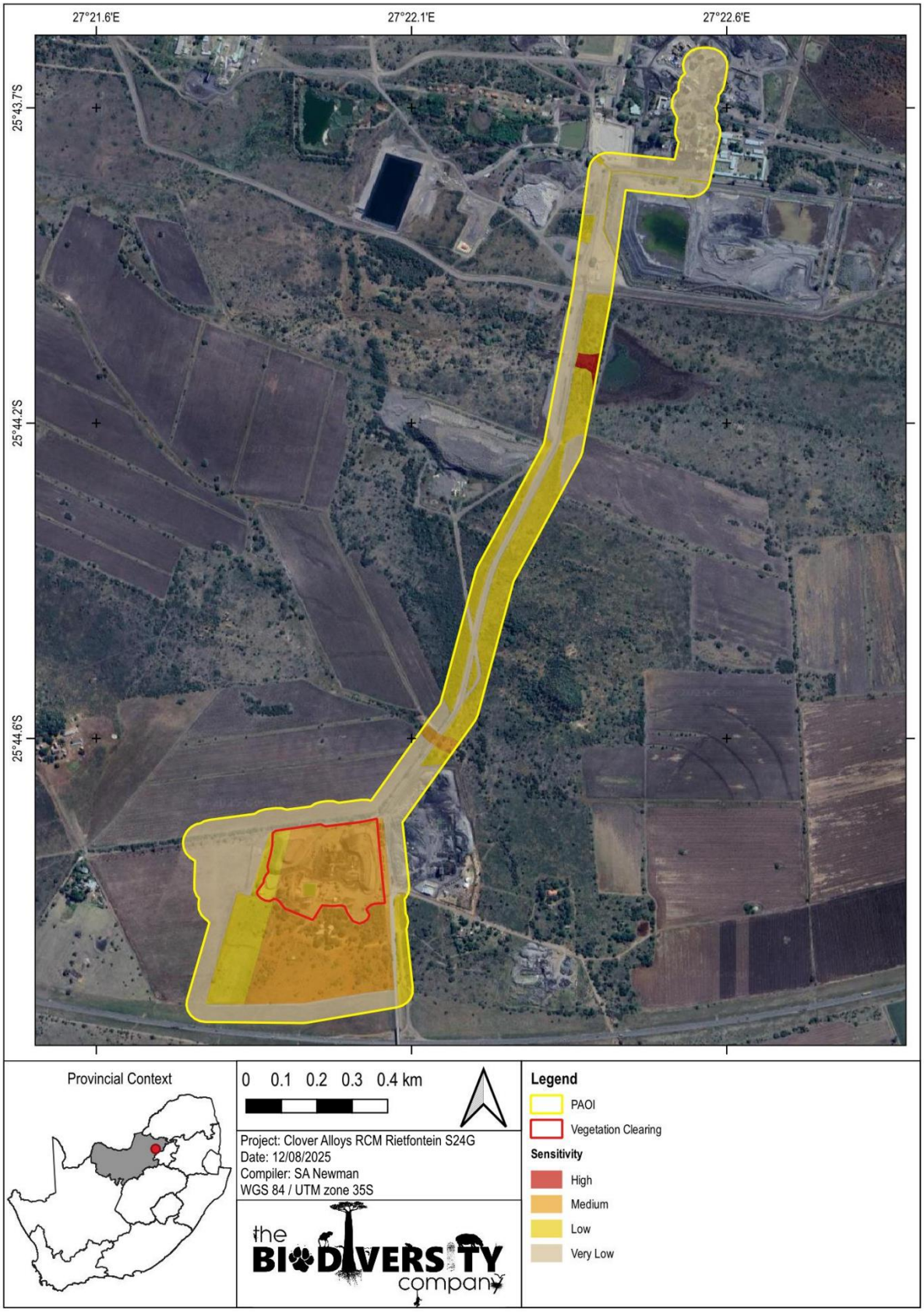


Figure 3-20 Map illustrating Site Ecological Importance (SEI) of the habitat types within the PAOI prior to clearance

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities (noted in conjunction with provincial guidelines pertaining to CBA areas):

- High: Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

- Medium: Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

- Low: Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

- Very Low: Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

3.3.2 Screening Tool Comparison

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

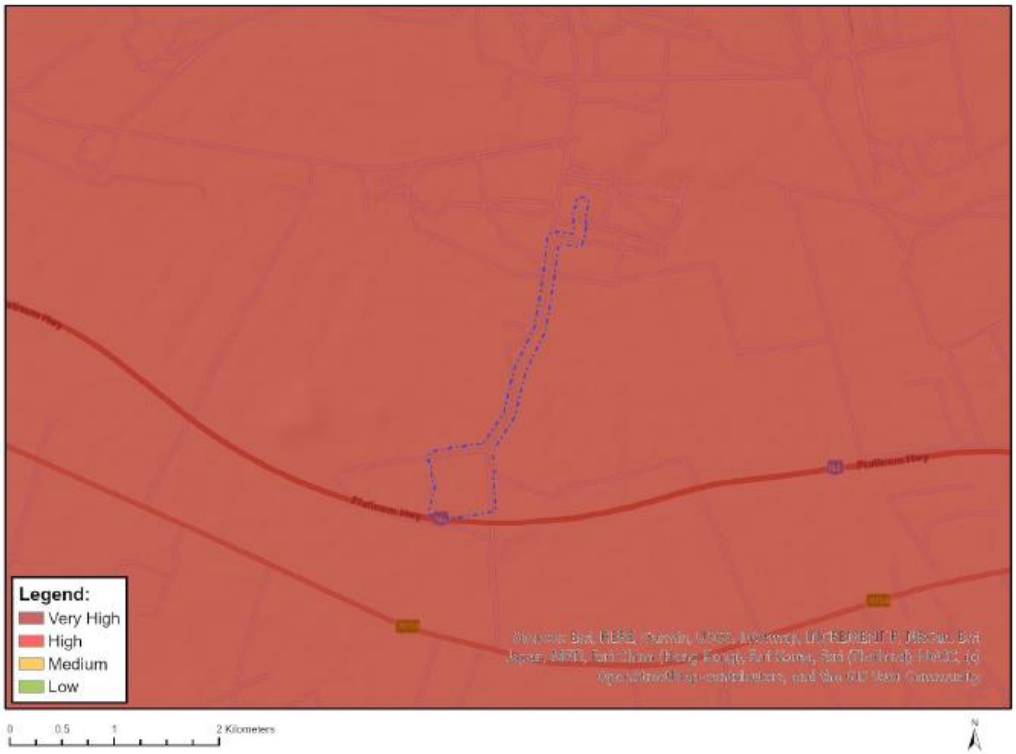
- Terrestrial Biodiversity Theme sensitivity is 'Very High' for the development area, due to it overlapping with a CBA 2, ESA 1, ESA 2, NPAES and Endangered Marikana Thornveld vegetation type (Figure 3-21);

- Plant Species Theme sensitivity is 'Low' due the presence of low sensitivity species (Figure 3-22); and

- Animal Species Theme sensitivity is 'Medium' due to the presence of several medium sensitivity fauna species (Figure 3-23).

The completion of the terrestrial biodiversity desktop and field assessments disputes the 'Very High' sensitivity presented by the screening report for the PAOI, for both periods immediately before and after the development. A sensitivity of 'Medium' has been assigned to the Disturbed Grassland habitat and a sensitivity of 'Low' has been assigned to the Degraded Grassland habitat. Water Resource habitats range from 'Low' to 'High' sensitivity. Modified habitats receive a 'Very Low' sensitivity due to their modified nature.

The plant species theme is to retain its sensitivity and the animal species theme is instead assigned a 'Low' sensitivity because SCC are unlikely to be resident in the PAOI.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA2
Very High	ESA1
Very High	ESA2
Very High	National Protected Area Expansion Strategy (NPAES)
Very High	EN_Marikana Thornveld

Figure 3-21 Relative Terrestrial Biodiversity Theme Sensitivity for the PAOI

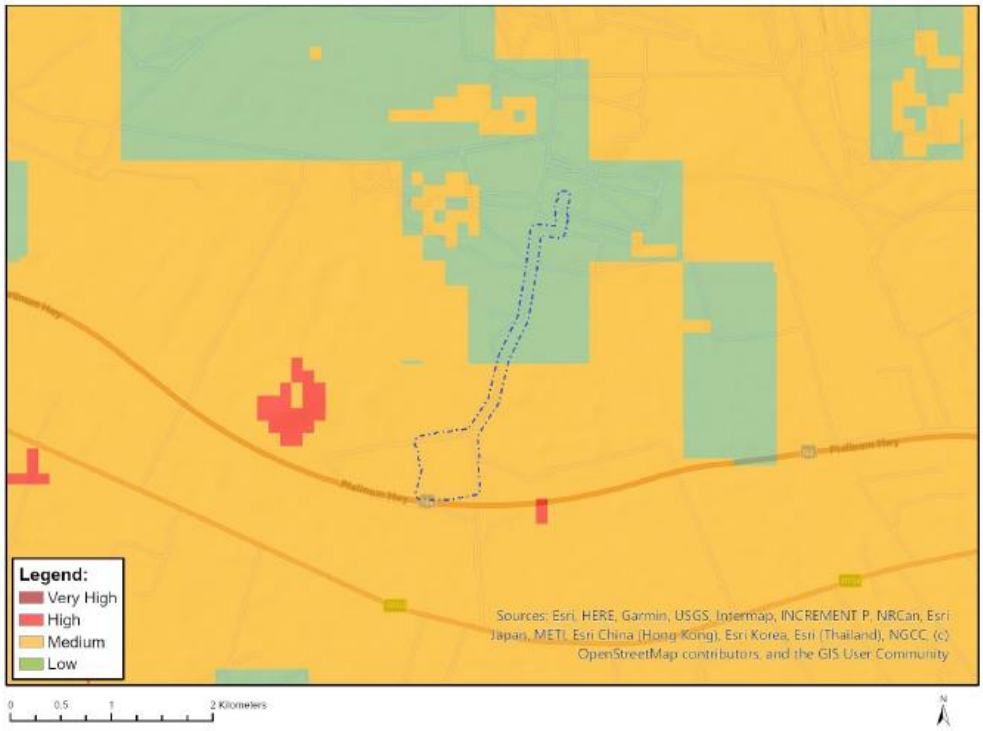
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 3-22 Relative Plant Species Theme Sensitivity for the PAOI



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Aquila rapax
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii

Figure 3-23 Relative Animal Species Theme Sensitivity for the PAOI

4 Section 24G Impact Assessment

In accordance with the requirements for Environmental Authorisation rectification as per NEMA Section 24G, a retrospective terrestrial biodiversity assessment must take place to determine the potential state of the environment prior to development taking place as well as the likely impacts that the development has had on the area.

Read in conjunction with Section 3, this section of the report utilises historical imagery analyses to assess pre-development and clearance environmental conditions to compare them with current conditions.

4.1 Assessment of Historical Imagery

The earliest historical satellite imagery available from Google Earth (2025) for the PAOI is from August 2004 (Figure 4-1). Figure 4-2 presents satellite imagery of the PAOI between July 2014 and the most recent available satellite imagery from April 2025. Based on the field coverage and satellite imagery, it can be assumed that the vegetation which was cleared without authorisation formed part of the Disturbed Thornveld habitat type.

Figure 4-1 Satellite imagery (Google Earth, 2025) presenting the PAOI in August 2004

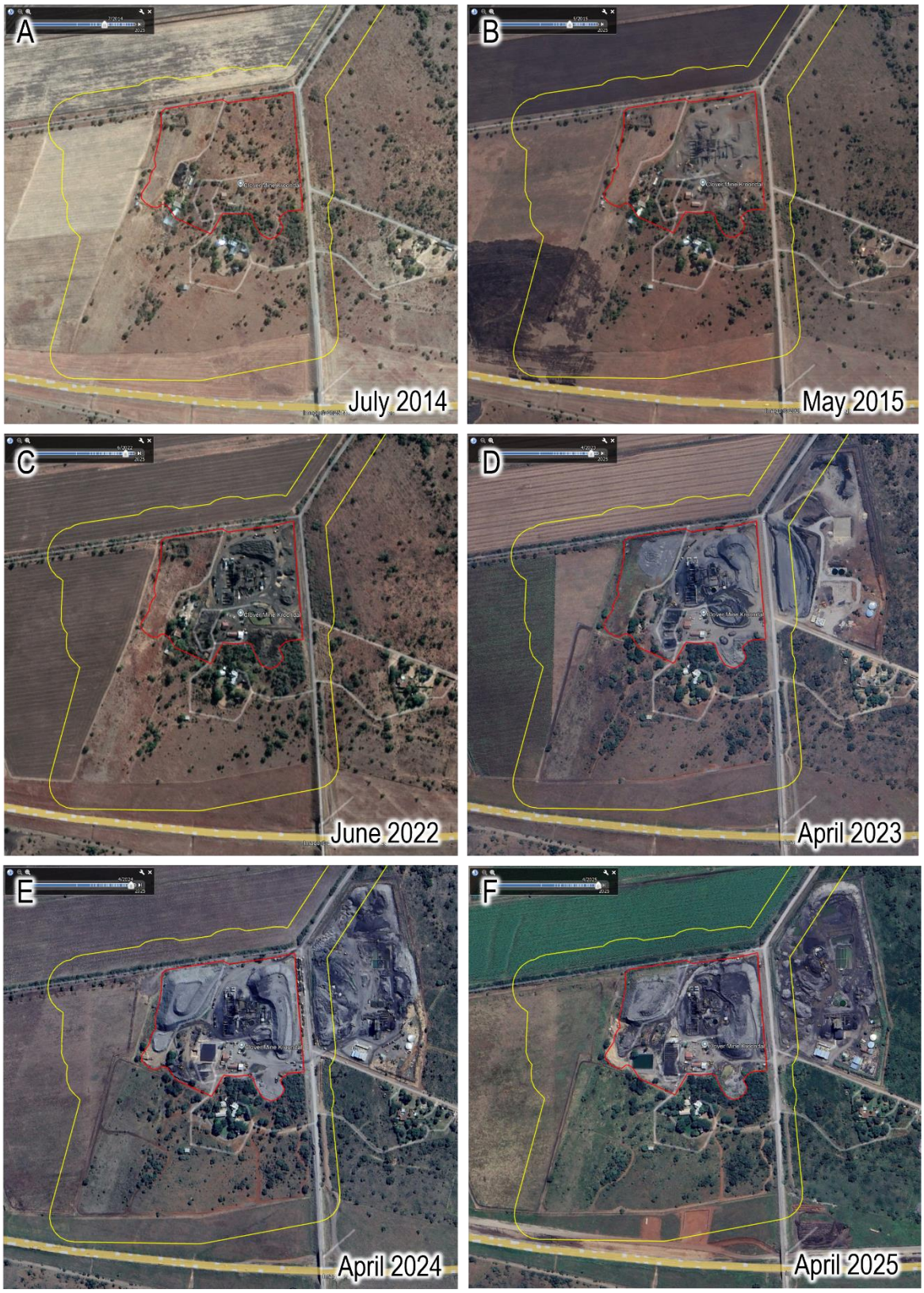


Figure 4-2 ***Satellite imagery (Google Earth, 2025) presenting the PAOI (yellow) and areas of unauthorised vegetation clearing (red): A) July 2014, B) May 2015, C) June 2022, D) April 2023, E) April 2024, and F) April 2025***

An initial instance of clearing of vegetation took place between July 2014 (Figure 4-2, A) and May 2015 (Figure 4-2, B). Additional areas were cleared between June 2022 (Figure 4-2, C) and April 2023 (Figure 4-2, D) which triggered a listed activity. This clearance of vegetation was expanded further still between April 2024 (Figure 4-2, E) and April 2025 (Figure 4-2).

Figure 4-3 presents some photographs of the current state of the areas that were cleared of vegetation without authorisation. No natural vegetation remains where clearing occurred, and the area is currently functioning as an active beneficiation plant. Approximately 6.92 ha of indigenous vegetation was cleared.

Figure 4-3 Photographs illustrating some of the areas of unauthorised vegetation clearing

4.2 Biodiversity Risk Assessment

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora, and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors, such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the PAOI. The relevant impacts associated with the construction, operation and decommissioning of the development were then subjected to a prescribed impact assessment method. Impacts were assessed in terms of the construction, operational and decommissioning phases. The operational phase refers to that phase of the project where the construction has been completed. It should be noted that the impacts described are not exhaustive, and more impacts may be identified at a later stage. Mitigation measures were only applied to impacts deemed relevant based on the impact analysis.

Impacts were assessed for the following activities:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

4.3 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the PAOI (Figure 4-4). These include:

- Beneficiation plant and associated infrastructure;
- Unauthorised clearing of indigenous vegetation;
- Roads (primary and secondary) and associated road killings by trucks and other vehicles;
- Dustfall;
- Fences;
- Soil erosion and runoff;
- Bush encroachment;
- Invasions and infestations by AIPs; and
- Loss of indigenous vegetation, including an Endangered vegetation type.

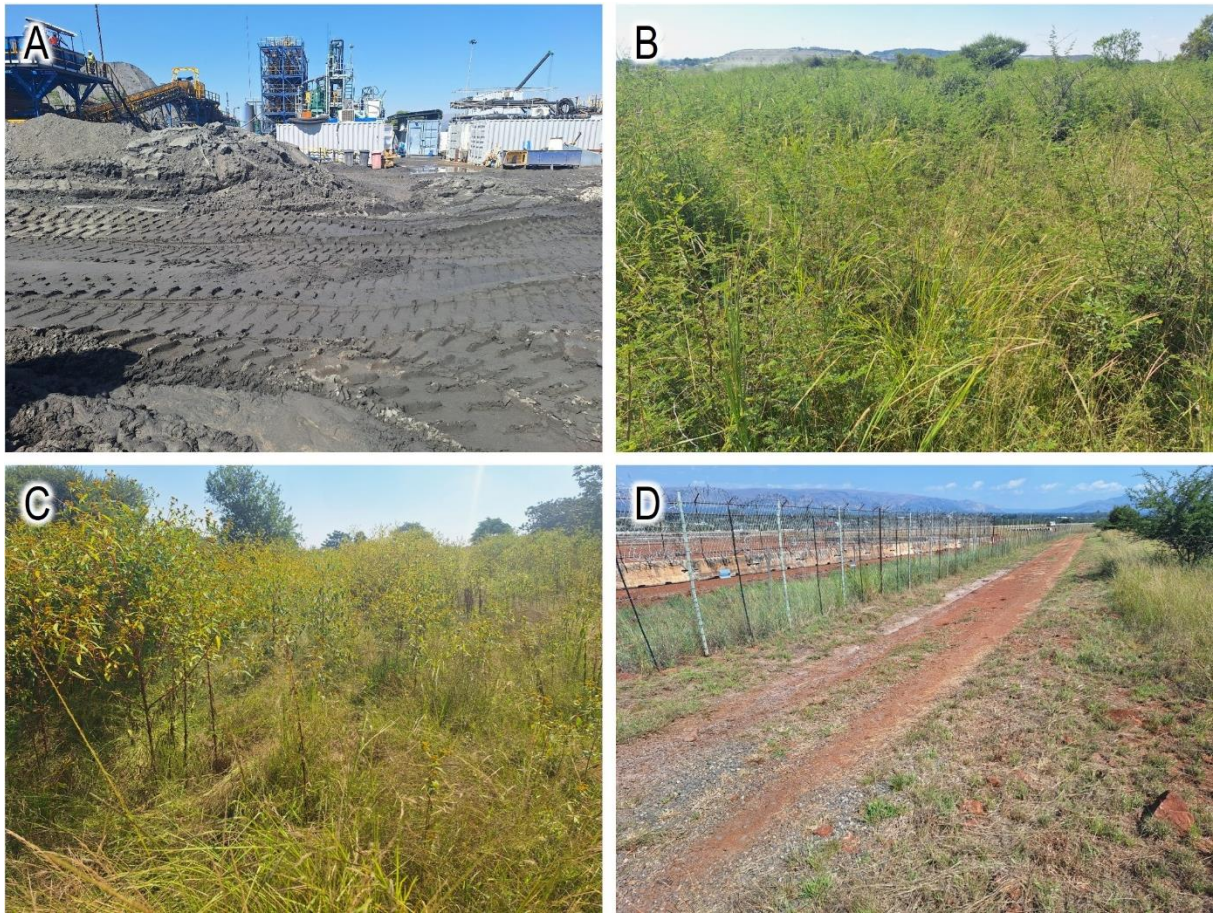


Figure 4-4 ***Photographs illustrating impacts associated with unauthorised development activities, as well as existing impacts: A) Beneficiation plant activities, B) Bush encroachment, C) Infestations by AIPs and D) Roads and fences.***

4.4 Irreplaceable Loss

Any development within the PAOI will result in the irreplaceable loss of:

- Portions of CBA 2, ESA 1, ESA 2 and NPAES;
- Water resources; and
- Endangered Marikana Thornveld vegetation type.

4.5 Identification of Additional Impacts

A summary of the potential impacts during the construction and operational phases of the proposed activity are presented in Table 4-1.

Table 4-1 Summary of potential impacts to the biodiversity associated with the proposed activity

Main Impact	Project Activities	Secondary Impacts Anticipated
Loss of indigenous habitats , (EN Marikana Thornveld)	• Direct loss as a result of construction and operation of the proposed development. • Secondary impacts associated with noise, dust, pesticide use, fertilisers and influx of AIPs into these areas. • Prevention of fires or incorrect fire regimes. • Improper solid waste disposal • Dust precipitation.	• Habitat fragmentation. • Loss of ecosystem services. • Emigration of fauna species, potentially including SCC. • Increased potential for soil erosion. • Habitat fragmentation. • Increased potential for establishment of alien invasive vegetation.
Encroachment of AIP species in disturbed areas.	• Vegetation removal. • Soil disturbance. • Vehicles potentially spreading seed. • Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents.	• Habitat loss for native flora & fauna (including potential SCC). • Alteration of fauna assemblages due to habitat modification. • Reduced forage quality of grazing habitat. • Spreading of potentially dangerous diseases.
Direct mortality of fauna species.	• Clearing of vegetation. • Roadkill due to vehicle collision. • Preparation of soil with heavy machinery • Soil excavations and soil transportation. • Intentional killing of fauna for food (hunting) or persecution (especially with regard to herpetofauna). • Pollution of water resources due to spilling of hazardous chemicals from heavy machinery during construction.	• Loss of ecosystem services. • Explosion of rodent populations and associated disease risk.
Emigration of fauna	• Disturbance from construction activities. • Loss of habitat and degradation of surrounding habitats.	• Reduced population of protected species, and potentially SCC • Loss of ecosystem services.
Reduced dispersal/migration of fauna	• Removal of vegetation.	• Loss of ecosystem services • Reduced plant seed dispersal.
Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, light and dust	• Operation of machinery (generators, crushers, vehicles). • Vehicles operating at night. • Large, intense fluorescent and mercury vapor lighting.	• Loss of ecosystem services.
Loss of protected species	• All unregulated/unsupervised activities outdoors. • Poaching and trapping • Staff and others interacting directly with fauna (potentially dangerous), or flora.	• Harm to people (dangerous fauna).

4.6 Quantitative Impact Assessment

An impact assessment methodology was provided by EIMS to determine the environmental risk associated with various aspects related to the proposed activities. This impact assessment takes the following components into consideration:

- The nature of the associated impact (positive or negative);
- The extent of the proposed activities;
- The duration of the proposed activities;

- The magnitude of the effects caused by the proposed activities;
- The reversibility of associated impacts; and
- The probability of relevant aspects affecting sensitive receptors.

Each one of the above-mentioned components are given a rating, which cumulatively provides the specialist with a pre-mitigation environmental risk rating. These components are then scored again taking into consideration mitigating factors. The cumulative impact and irreplaceable loss to sensitive receptors are then scored to ultimately indicate a "Priority Factor" score.

It is important to note that the ratings applied within the risk assessment model, considered impacts to open space or natural habitats within the development area and not for areas already historically transformed, but do apply to the areas which were cleared without authorisation. **As an impact assessment was not performed prior to the unlawful vegetation clearing, the precautionary principal has been applied here whereby it is assumed that the appropriate mitigation measures were not applied to reduce the impact significance during the construction and subsequent operational phases.**

4.6.1 Construction Phase

The following potential impacts on the biodiversity were considered for the construction phase of the plant project. This phase refers to the period during construction when the proposed infrastructure is constructed or upgraded. This phase usually has the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered.

4.6.1.1 Destruction, loss and fragmentation of the vegetation community

Through site clearing, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion.

Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Physical removal of vegetation;
- Temporary site establishment (laydown, chemical toilets etc.);
- Soil dust precipitation as a result of site establishment;
- Dumping of waste products;
- Hydrocarbon storage and leakages; and
- Random events such as fire (cooking fires or cigarettes).

4.6.1.1.1 Cumulative Impacts

Cumulative impacts include:

- Further loss of EN vegetation type.

4.6.1.1.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of EN vegetation type; and
- Loss of CBA, ESA and NPAES areas.

4.6.1.2 Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching)

Faunal community will be influenced in a number of ways, including the loss of habitat, disturbances that will either make them move out of the area if possible or have to adapt and possible deaths due to physical harm or indirect harm. Activities that will contribute to this impact:

- Clearing of vegetation;
- Roadkill due to vehicle collision;
- Pollution of water resources due to dust effects and run-off;
- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes);
- Disease caused by increased dust levels;
- Increase in pest species in the area due to new food source created; and
- Vibrations, noise and rock chips skidding out due to the construction activities.

4.6.1.2.1 Cumulative Impacts

Cumulative Impacts include:

- Loss of usable water resources for fauna species; and
- Loss of viable habitat.

4.6.1.2.2 Irreplaceable Loss

Irreplaceable loss of the following resources:

- Loss of usable water resources for fauna species resulting in loss of fauna species.

4.6.1.3 Clearing of vegetation leading to soil erosion and loss of topsoil

Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat. Activities that will contribute to this impact:

- Storm water runoff from roads, and other paved areas;
- Vehicles driving outside demarcated areas;
- Footpaths outside demarcated areas;
- Clearing of vegetation;
- Water runoff from areas with bare soil; and
- Compacting of roads.

4.6.1.3.1 Cumulative Impacts

Cumulative Impacts include:

- Removal of topsoil; and
- Loss of habitat for indigenous species.

4.6.1.3.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of CBA, ESA and NPAES areas.

4.6.1.4 Increased risk of contamination (soil and water resource) from fuel spills, construction waste, pipe leaks and hazardous materials.

Pollutants spilling or leaking into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species and the associated habitat.

Activities that will contribute to this impact:

- Stormwater runoff from opencast areas; and
- Pipeline leakages or damage.

4.6.1.4.1 Cumulative Impacts

Cumulative Impacts include:

- Loss of usable water resources for fauna species; and
- Loss of viable habitat.

4.6.1.4.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of usable water resources for fauna species resulting in loss of indigenous species.

4.6.1.5 Introduction of alien species, especially plants

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive - and pest species. Overall, the fauna assemblage will be changed.

Activities that will contribute to this impact:

- Vegetation removal and disturbance of soil;
- Vehicles potentially spreading seed;
- Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive; and
- Eating area increasing pest species such as rats and flies.

4.6.1.5.1 Cumulative Impacts

Cumulative Impacts include:

- Loss of habitat for indigenous species; and
- Spread of disease to surrounding areas.

4.6.1.5.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of CBA, ESA and NPAES areas.

4.6.2 Operational Phase

It is anticipated that daily activities associated with the operation phase will lead to further spread of alien and invasive plants, as well as the deterioration of the habitats due to the increase of traffic, dust and edge effect impacts. Dust reduces the ability of plants to photosynthesise and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to

collisions, the roads and fences lead to the barrier effect reducing movement and dispersal. Environmental pollution due to water/ plant drainage runoff is also expected during this phase.

4.6.2.1 Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting

Through operation of the plant, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion. Continued operations will result in disturbance to the faunal community through the production of noise, dust, artificial lightning, as well as other factors, such as direct mortality.

Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Physical removal of vegetation and spread of AIPs;
- Pollution (noise, light, dust, chemical, etc.);
- Dumping of waste products; and
- Direct persecution of wildlife.

4.6.2.1.1 Cumulative Impacts

Cumulative impacts include:

- Further loss of EN vegetation type;
- Loss of local wildlife.

4.6.2.1.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of EN vegetation type; and
- Loss of CBA, ESA and NPAES areas.

4.6.2.2 Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.)

Daily operation of the plant will result in increased risk of direct interactions between people and the local fauna community. This subsequently results in the increased risk of road mortalities, poaching and direct persecution. This may also increase of risk of harm to staff by wildlife through these interactions.

Activities that will contribute to this impact:

- Driving within the facility;
- Poaching and setting of traps/placement of poisons;
- Dumping of waste products; and
- Direct persecution of wildlife due to fear and/or cultural beliefs.

4.6.2.2.1 Cumulative Impacts

Cumulative impacts include:

- Loss of local wildlife.

4.6.2.2.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of local wildlife.

4.6.2.3 Environmental pollution due to water/ plant drainage runoff and pipeline leaks

Pollutants spilling or leaking into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species and the associated habitat.

Activities that will contribute to this impact:

- Stormwater runoff from opencast areas; and
- Pipeline leakages or damage.

4.6.2.3.1 Cumulative Impacts

Cumulative Impacts include:

- Loss of usable water resources for fauna species; and
- Loss of viable habitat.

4.6.2.3.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of usable water resources for fauna species resulting in loss of indigenous species.

4.6.2.4 Continuous stripping of topsoil for beneficiation plant activities, leading to ongoing land degradation, including erosion

Ongoing opencast activities will result in the need to keep stripping topsoil. This will result in ongoing degradation of the surrounding habitats and increase the risk of erosion.

Activities that will contribute to this impact:

- Beneficiation plant activities;
- Clearing of vegetation;
- Water runoff from areas with bare soil; and
- Compacting of roads.

4.6.2.4.1 Cumulative Impacts

Cumulative Impacts include:

- Removal of topsoil; and
- Loss of habitat for indigenous species.

4.6.2.4.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of CBA, ESA and NPAES areas.

4.6.2.5 Continued encroachment by alien and invasive plant species

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the flora assemblage will be changed.

Activities that will contribute to this impact:

- Vehicles potentially spreading seed;

- Unsanitary conditions during infrastructure removal promoting the establishment of alien and/or invasive;
- Vehicles driving outside demarcated areas; and
- Footpaths outside demarcated areas.

4.6.2.5.1 Cumulative Impacts

Cumulative Impacts include:

- Loss of habitat; and
- Loss of indigenous flora species due to competition.

4.6.2.5.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of habitat and food sources for Fauna.

4.6.3 Decommissioning Phase

Although beneficial overall, this phase can result in increased disruptions to the surrounding habitats and fauna community though the use of machinery and the removal of long term infrastructure. This phase also carries the risk of permanent environmental damage if not carried out correctly. A crucial component of this phase to manage risks is the correct and effective rehabilitation of habitats on site at plant closure.

4.6.3.1 Increased risk of soil erosion and instability due to removal of infrastructure

The removal of infrastructure during this phase carries the same risks of the construction phase due to the reintroduction of heavy machinery for the removal and transport of infrastructure. Removal of long term infrastructure will result in soil erosion due to increased areas of bare ground that have not yet been rehabilitated and revegetated.

Activities that will contribute to this impact:

- Removal of infrastructure and associated areas of bare ground;
- Movement of heavy vehicles and machinery through the site;
- Footpaths outside demarcated areas;
- Water runoff from areas with bare soil; and
- Compacting of roads and areas that no longer house infrastructure.

4.6.3.1.1 Cumulative Impacts

Cumulative Impacts include:

- Areas of bare ground; and
- Loss of habitat for indigenous species.

4.6.3.1.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of CBA, ESA and NPAES areas.

4.6.3.2 Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting

Through the removal of infrastructure during the closure of the plant, there is expected to be increased human traffic and movement of heavy vehicles and machinery. This phase carries the same risks as the construction phase in terms of pollution, such as chemical, noise, light and dust. These disruptions also carry the risk of impacting surrounding habitat.

Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Physical removal of vegetation and spread of AIPs;
- Pollution (noise, light, dust, chemical, etc.); and
- Dumping of waste products.

4.6.3.2.1 Cumulative Impacts

Cumulative impacts include:

- Further loss of EN vegetation type;
- Loss of local wildlife.

4.6.3.2.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of EN vegetation type; and
- Loss of CBA, ESA and NPAES areas.

4.6.3.3 Slow regrowth of natural vegetation and potential further spread of alien and invasive species

If not implemented correctly, rehabilitation may not be successful, resulting in ongoing degradation of the natural habitats adjacent to the project site through the spread of alien and invasive vegetation, as well as stormwater runoff and erosion. Without the implementation of a rehabilitation plan, the project site will not recover to a natural state that is capable of supporting local fauna once more and contributing the functioning of ecosystem.

Activities that will contribute to this impact:

- Previously modified areas left bare;
- Ongoing spread of alien and invasive plants;
- Dumping of decommissioning phase waste; and
- Newly vegetated areas left unfenced.

4.6.3.3.1 Cumulative Impacts

Cumulative Impacts include:

- Further loss of EN vegetation type;
- Loss of local wildlife.

4.6.3.3.2 Irreplaceable Loss of Resources

Irreplaceable loss of the following resources:

- Loss of EN vegetation type; and
- Loss of CBA, ESA and NPAES areas.

4.6.4 Assessment of Significance

Table 4-2 shows a summary of the significance of potential impacts associated with the proposed infrastructure on biodiversity before and after the implementation of mitigation measures, as well as cumulative and irreplaceable loss. The full impact assessment can be seen presented in Table 7-7 under Appendix D.

Table 4-3 shows the significance of potential impacts associated with the existing infrastructure on biodiversity before and after the implementation of mitigation measures, as well as cumulative and irreplaceable loss. The full impact assessment can be seen presented in Table 7-8 under Appendix D.

The precautionary principal has been applied here as an impact assessment was not performed prior to the unlawful vegetation clearing and the site has already undergone impacts associated with the construction phase and the plant is currently in operation.

Table 4-2 Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	High -	Medium to high -	Medium to high -
Mitigation Measures				
• The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas. • Areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to already modified areas and should take up the smallest footprint possible. • Offsets may be required for the CBA 2 areas, and at the required ratio for the EN ecosystem, pending discussions with the provincial authorities. Offsets are at the discretion of the department. • A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld. • Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation. • A qualified environmental control officer must be on site when activities begin. A site walk through must be performed by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. • A dust management plan must be compiled and implemented.				
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -
Mitigation Measures				
• Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.				

- Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day.
- Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.
- If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.

Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.
- Only existing access routes and walking paths may be made use of.

Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities that could result in a spill should occur away from them.
- Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.
- No servicing of equipment on site unless necessary.
- All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.
- Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.
- All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.
- All construction waste must be removed from site at the closure of the construction phase.
- Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.

Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -

Mitigation Measures

- An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.
- It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.
- A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.

Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	Medium to high -	Medium to low -	Medium to high -

Mitigation Measures

- Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.

- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.

Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Operational	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.
- Waste management must be a priority and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility.
- Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan.

Environmental pollution due to water/ mine drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A stormwater management plan must be compiled and implemented.
- A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.

Continuous stripping of topsoil for beneficiation plant, leading to ongoing land degradation, including erosion	Operational	Medium to high -	Medium to high -	Medium to high -

Mitigation Measures

- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.

Continued encroachment by alien and invasive plant species	Operational	High -	Low -	Low -

Mitigation Measures

- An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual change in AIP composition.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.
- It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.

Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.

Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	Medium to low -	Low -	Medium to low -

Mitigation Measures

- Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.
- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.
- A dust management plan must be compiled and implemented.

Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- This will also reduce the likelihood of encroachment by alien invasive plant species.
- An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.
- A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld.

Table 4-3 Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the existing infrastructure

Impact	Phase	Pre-Mitigation Significance	Post-Mitigation Significance	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	High -	Medium to high -	Medium to high -

Mitigation Measures

- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.
- Offsets may be required for the CBA 2 areas, and at the required ratio for the EN ecosystem, pending discussions with the provincial authorities. Offsets are at the discretion of the department.
- A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld.
- Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.
- A dust management plan must be compiled and implemented.

Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	Medium to high -	Medium to high -	Medium to high -

Mitigation Measures

- The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.
- Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.
- No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.
- Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day.

- Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.
- If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.

Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	High -	Medium to low -	Medium to high -

Mitigation Measures

- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.
- Only existing access routes and walking paths may be made use of.

Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities that could result in a spill should occur away from them.
- Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.
- No servicing of equipment on site unless necessary.
- All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.
- Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.
- All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.
- All construction waste must be removed from site at the closure of the construction phase.
- Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.

Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Low -

Mitigation Measures

- An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.
- It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.
- Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure.

Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	Medium to high -	Medium to low -	Medium to high -

Mitigation Measures

- Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.

- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.
- A dust management plan must be compiled and implemented.

Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.)	Operational	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.
- No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.
- Waste management must be a priority and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility.
- Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan.
- Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.

Environmental pollution due to water/ mine drainage runoff.	Operational	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- A stormwater management plan must be compiled and implemented.
- A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes. Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.

Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion	Operational	Medium to high -	Medium to high -	Medium to high -

Mitigation Measures

- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.
- Only existing access routes and walking paths may be made use of.

Continued encroachment by alien and invasive plant species	Operational	High -	Low -	Low -

Mitigation Measures

- An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.
- Assess the state of rehabilitation and encroachment of alien vegetation twice a year.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.

Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	Medium to high -	Medium to low -	Medium to low -

Mitigation Measures

- Habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.

Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	Medium to low -	Low -	Medium to low -

Mitigation Measures				
• Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals. • Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces. • A dust management plan must be compiled and implemented.				
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	Medium to high -	Medium to low -	Medium to low -
Mitigation Measures				
• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • Assess the state of rehabilitation and encroachment of alien vegetation quarterly for up to two years after the closure. • An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.				

4.6.5 Unplanned Events

The planned activities will have anticipated impacts as discussed; however, unplanned events may occur on any project and may have potential impacts which will need management.

Table 4-4 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 4-4 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be always available. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural vegetation.	An appropriate/adequate fire management plan needs to be implemented.

4.7 Proposed Impact Management Plan

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr), and possible biodiversity management programme, for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 4-5 presents the recommended mitigation measures and the respective time frames, targets, and performance indicators relative to the terrestrial assessment.

The focus of mitigation measures is to reduce the significance of the likely impacts associated with the development, and thereby:

- Prevent the further loss and fragmentation of indigenous vegetation communities within the ecosystem in the vicinity of the PAOI;
- Reduce the negative fragmentation effects of the development and enable the safe movement of fauna species;

- Prevent the direct and indirect loss and disturbance of flora and fauna species and communities, including the negative effects associated with the introduction and proliferation of alien and invasive species; and
- Adequately follow the guidelines for interpreting the Site Ecological Importance ratings assigned to the PAOI.

In this case, because the land clearance has already occurred, the management outcomes presented may be included retrospectively into any EMPrs compiled for the PAOI and the landowner/s must take note of any mitigation measures that apply post-construction (i.e., during the operational phase/life of operation – see the first column below under 'Implementation'). This includes those relevant to the control of waste and AIP species, as well as the revegetation of indigenous flora. It is required that any AIP species that may colonise the proposed development in the future be controlled by implementing an AIP Management Programme in compliance of section 75 of the Act National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA).

Table 4-5 Summary of management objectives pertaining to impacts to biodiversity and ecosystems associated with the proposed development

No	Mitigation Measure	Phase	Timeframe	Responsible Party for Implementation	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
			Vegetation and Habitats				
A	Offsets may be required for the CBA 2 areas, and at the required ratio for the EN ecosystem, pending discussions with the provincial authorities. Offsets are at the discretion of the department.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	Develop Offset Strategy	Offset Strategy
B	Mitigation measures and buffers must be implemented as stipulated in the wetland report (TBC, 2025).	Planning Phase, Pre-Construction	Planning Phase, Pre-Construction	Project Manager, Environmental Officer & Contractor	Ongoing	Buffer implementation	Buffer demarcation
C	Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to already modified areas and should take up the smallest footprint possible.	Construction	Construction Phase	Project manager, Environmental Officer	Ongoing	Minimum laydown footprint	Site plan
D	It is recommended that areas to be developed/disturbed be specifically demarcated so that during the construction/activity phase, only the demarcated areas be impacted upon.	Construction	Construction Phase	Project manager, Environmental Officer	Ongoing	Development demarcation	Site plan
E	Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	Maintenance of indigenous vegetation units	Biodiversity management
F	The clearing of vegetation must be minimised where possible. All activities must be restricted to within the authorised areas.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	Minimise vegetation clearing	Boundary compliance checks
G	Materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas.	Construction Operation	Construction and Operational Phase	Environmental Officer, Design Engineer, and Contractor	Ongoing	Temporary storage areas	Storage logs & site clearance certificates

H	Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by alien invasive plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.	Operation	Operational phase	Environmental Officer & Contractor	Quarterly for up to two years after the closure	Revegetation	Rehabilitation progress reports & vegetation monitoring
I	All activities must make use of existing roads and tracks as far as practically and feasibly possible. No new roads are to be constructed under any circumstance. Parking of vehicles may only occur in already modified areas.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	No construction of new roads	Vehicle movement logs & site maps
J	A habitat rehabilitation plan must be compiled and implemented for all areas that must be rehabilitated back to Thornveld.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	Rehabilitation plan development & implementation	Rehabilitation plan & monitoring reports
K	A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. The water resources must to be protected and all activities that could result in a spill should occur away from them. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	Ongoing	Zero hydrocarbon spills	Spill incident logs & equipment inspection records

	• Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.						
L	It must be made an offence for any staff member to remove any indigenous plant species from the PAOI or bring any alien species in. This is to prevent the spread of exotic or alien species or the illegal collection of plants.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	No movement of plants into or out of site (outside of rehab)	Staff induction records & incident reports
M	A protected plant walkdown must be conducted prior to development activities to confirm the presence and location of any protected plant species that may be found on site. The confirmed protected tree species (*Sclerocarya birrea*) is not to be disturbed in any way without acquiring the relevant permits for its relocation or destruction.	Planning Pre-construction	Planning Phase, Pre-Construction	Project Manager, Environmental Officer & Contractor	Once-off	Protected plant walkdown	Walkdown report & permit records
N	Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Operation Construction Decommissioning	Life of operation	Project Manager	Ongoing	Revegetation	Rehabilitation records & site inspections
O	A fire management plan needs to be compiled and implemented to restrict the impact fire would have on the surrounding areas.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	During Phase	Implementation of fire management plan	Approved plan & fire drill records
P	All construction waste must be removed from site at the closure of the construction phase.	Construction	Construction phase	Environmental Officer & Contractor	During Phase	Waste removal	Waste removal certificates & site clearance reports
			Fauna				
A	A qualified environmental control officer must be on site when activities begin. A site walk through must be performed by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required	Construction	Construction Phase	Environmental Officer, Contractor	During phase	Site walkthrough	ECO attendance register & walk-through report

	permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated.						
B	Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.	Construction	Construction Phase	Environmental Officer & Contractor	Ongoing	Progressive land clearing operations and the movement of fauna	Clearing schedule & daily logs
C	The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.	Construction Operational	Construction/Operational Phase	Project manager, Environmental Officer	Ongoing	Site demarcation & signage	Site inspection & incident reports
D	The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.	Construction	Construction	Project manager, Environmental Officer & Design Engineer	Ongoing	Disturbance over shortest feasible time	Construction schedule & completion reports
E	Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals	Construction	Construction	Project Manager Contractor Foreman	Ongoing	No construction noise at night	Noise monitoring logs
F	No trapping, killing, or poisoning of any wildlife is to be permitted and must be made a punishable offense.	Operation Construction Decommissioning	Life of operation	Project Manager Contractor	Ongoing	Zero tolerance for wildlife harm	Incident reports and staff disciplinary records
G	Outside lighting should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.	Construction Operational	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Ongoing	Use of sodium vapor lights	Lighting plan & site inspections
H	All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Operation Construction Decommissioning	Life of operation	Health and Safety Officer	Ongoing	100% of operators to complete environmental induction &	Training records & speed monitoring logs

						comply with speed limits	
I	Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. In this case, activities should take place during the day.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer & Design Engineer	Ongoing	Activities should take place during the day	Activity schedule & ecological monitoring
J	Any holes/deep excavations must be dug in a progressive manner and should not be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.	Planning Construction	Planning and Construction	Environmental Officer & Contractor, Engineer	Ongoing	No open holes overnight	Excavation logs & inspection records
K	If fencing is required: wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.	Planning Construction	Planning and construction	Environmental Officer & Contractor, Engineer	Ongoing	Installation of wildlife permeable fencing where required	Fencing design & installation records
				Invasive Alien Plants			
A	An Alien Invasive Plant Management Plan must be compiled and implemented. This should be regularly updated to reflect the annual changed in AIP composition.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer & Contractor	Twice a year	Compile, implement, & update the plan annually	Plan document & annual review reports
B	The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.	Operation Construction	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Life of operation	Keep all construction footprints to the minimum and within demarcated areas	Site maps and inspection reports
C	A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Life of operation	Implement pest control plan with no use of poisons	Plan & pest monitoring records
				Dust Pollution			
A	Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction or bare ground. This includes wetting of exposed soft soil surfaces.	Operation Construction Decommissioning	Life of operation	Project Manager Contractor	As per the air quality report and the dust monitoring program.	Apply dust suppression	Dust monitoring results and suppression logs

B	A dust management plan must be compiled and implemented.	Operation Construction Decommissioning	Life of Operation	Project manager, Environmental Officer & Contractor	Dust monitoring program	Compile & implement a dust management plan before construction	Plan & dustfall monitoring reports
			Waste management				
A	Waste management must be a priority and a Solid Waste Management Plan must be developed and implemented. All waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility	Operation Construction Decommissioning	Life of operation	Project Manager Contractor	Weekly	All waste collected, stored, and disposed at licensed facilities	Waste manifests & disposal certificates
B	Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan.	Construction Closure	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Daily	Zero visible waste	Daily inspection logs
C	Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.	Construction	Construction Phase	Environmental Officer & Contractor	Every occurrence	No cement mixing on ground	Incident logs & site inspections
D	Toilets at the recommended Health and Safety standards must be provided. These should be emptied regularly and once no longer required, they must be pumped dry to prevent leakage into the surrounding environment and removed from site.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Daily	Toilets per Health and Safety standards	Toilet maintenance logs
E	The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Health and Safety Officer	Ongoing	Waste bins & timeous disposal	Bin logs & waste collection records
F	Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site	Operation Construction Decommissioning	Life of operation	Project Manager Health and Safety Officer Contractor	Ongoing	No burning of waste	Method statement & inspection reports
G	Refuse bins must be emptied and secured. Temporary storage of domestic waste must be in covered waste skips. Maximum domestic	Operation Construction Decommissioning	Life of operation	Project Manager Health and Safety Officer Contractor	Ongoing	All bins secured & covered	Site inspection & recycling records

	waste storage period will be 10 days. Recycling is encouraged.						
			Environmental Awareness Training				
A	All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the PAOI to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.		Life of operation	Project Manager Health and Safety Officer Contractor Environmental Officer	As needed	100% of personnel to complete environmental awareness training before site access	Signed attendance register
			Erosion				
A	A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.	Operation Closure	Operational Phase and Closure	Project manager, Environmental Officer, Contractor	During Phase	Develop and implement plan	Plan & rehabilitation progress reports
B	Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds where relevant.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	Enforce speed limits & wet soil surfaces as needed	Speed monitoring & dust suppression logs
C	Only existing access routes and walking paths may be made use of.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Ongoing	No new access roads	Route maps & inspection reports
D	A stormwater management plan must be compiled and implemented.	Operation Construction Decommissioning	Life of operation	Project manager, Environmental Officer	Before construction phase: Ongoing	Compile & implement plan before construction	Plan & stormwater inspection records
E	A pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes.	Operation Construction Decommissioning	Life of operation	Environmental Officer & Contractor	During Phase and Ongoing Monitoring	Zero uncontained pipe leaks	Leak detection logs & water quality monitoring

	Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water sources.	

5 Conclusion

5.1 General Conclusion

The PAOI has undergone vegetation clearing and development without environmental authorisation. Development which occurred in the already modified portions of the PAOI is of little consequence. However, natural habitats made up of indigenous vegetation, even those which are disturbed in nature, require authorisation.

Table 5-1 provides a breakdown of the ecologically important features that were impacted by the unauthorised vegetation clearing, including the area that was cleared of each.

Table 5-1 Table presenting the ecologically important features that were impacted by the unauthorised vegetation clearing

Ecologically Important Feature	Area lost to unauthorised vegetation clearing (ha)
CBA 2	6.74
ESA 1	0.18
NPAES	2.61
EN Marikana Thornveld	6.03

The 'Very High' terrestrial theme sensitivity posed by the screening tool was disputed and the habitats on site were instead assigned the following sensitivities:

- Degraded Thornveld: Low;
- Disturbed Thornveld: Medium;
- Water Resource: Low – High; and
- Modified: Very Low.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas is at risk with considerable damage already done. The rehabilitation and preservation of these systems is the most important aspect to consider for the proposed project.

5.2 Impact Statement

5.2.1 Proposed Infrastructure

The location, state and size of the ecosystem suggests that it is unlikely that any functional habitat or SCCs will be lost as a result of the impacts arising from the proposed activities. However, these assumptions pertain to the terrestrial habitat only and the recommendations and mitigations presented in the accompanying wetland assessment must be strictly adhered to. The mitigation hierarchy will be able to bring the residual impacts down to Medium-High or lower.

5.2.2 Section 24G

Regarding the habitats already lost to unauthorised vegetation clearing (Table 5-1), discussions with the provincial authorities must be conducted regarding offsets for sensitive habitats lost, at the discretion of the department.

5.3 Specialist Opinion

An impact statement is required as per the NEMA regulations with regard to the proposed development.

The main impact of the unauthorised clearing of vegetation and ongoing project activities include:

- Habitat loss and fragmentation as well as degradation of surrounding habitat, including CBA 2, ESA 1 and ESA 2 areas, an Endangered ecosystem and NPAES;
- Disturbance and displacement caused during the construction and operational phases where mitigations were not applied due to the lack of an EMPr;
- Direct mortality during the construction phase; and
- Potential loss of protected flora.

As project activities went ahead without authorisation, and subsequently the impacts associated with the project potentially incur a listed (and notable) change to:

- Biodiversity of major potential concern:
    - CBA 2; and
    - Endangered ecosystem.
- Biodiversity of potential concern:
    - ESAs;
    - Strategic Water Source Areas;
    - Areas evaluated as to be of Medium SEI; and
    - Priority Focus Areas in the NPAES.

In accordance with the Biodiversity Offset Guidelines (2023), offsets are required at a ratio agreed upon with the provincial authorities. In the case of the CBA 2 areas, like-for-like or better habitat has to be secured and managed for conservation in perpetuity. Any remaining areas of EN ecosystem must also be offset, at ratios up to 25:1. However, due to the levels of degradation of the habitats in the surrounding area owing to the long-term, ongoing mining and associated activities in the region, it is unlikely that the CBA 2 areas were representative of such.

In addition, it must be noted that the current state of degradation of the habitats within the PAOI was likely exacerbated by the plant activities that have been occurring since the initial clearing in 2014, and unauthorised clearing between 2022 and 2023. Therefore, the current state of the habitats is likely a poor reflection of the state of the habitat lost during the clearing event.

It is the opinion of the specialist that offsets are not strictly necessary in this particular case as the habitats on site were expected to have been of a medium sensitivity prior to vegetation clearing and in fair to poor condition, but this decision is at the discretion of the department. The following course of action is recommended by the specialist, along with the mitigation measures listed in this report:

- The potential for offsets must be discussed with the provincial authorities for the unauthorised clearing of vegetation. Should the provincial authorities deem them unnecessary under the circumstances, offsets may not be required;
- A rehabilitation plan must be compiled and implemented for all areas affected by construction and project activities; and

- An AIP management plan must be compiled and implemented throughout the PAOI with immediate effect.

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7 Appendix Items

7.1 Appendix A: Methods

7.1.1 Desktop Dataset Assessment

7.1.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno *et al,* 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - Red List of Ecosystems (RLE) 2022 – The list was first published in 2011 and has since been substantially revised by authors Dr Andrew Skowno and Mrs Maphale Monyeki (SANBI, 2022). This list is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa by Mucina and Rutherford (2006). A total of 120 of the 456 terrestrial ecosystem types assessed are categorised as threatened and together make up approximately 10% of the remaining natural habitat in the country. Of these 120 ecosystem types, 55 are Critically Endangered (CR), 51 Endangered (EN) and 14 are Vulnerable (VU). The remainder are categorised as Least Concern (LC) (SANBI, 2022; Skowno & Monyeki, 2022).
    - Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DFFE, 2024a) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
    - National Protected Areas Expansion Strategy (NPAES) (DFFE, 2022b) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact

and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- Conservation/Biodiversity Sector Plans:

  The North-West Department of Rural, Environment, and Agricultural Development (READ), as custodian of the environment in the North West, is the primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ, 2015).

  CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).

  ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

  Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as a CBA1 ‘Irreplaceable Critical Biodiversity Area’ which usually represents pristine natural habitat that is very important for conservation

- Key Biodiversity Areas (KBA, 2024) – A new set of Key Biodiversity Areas (KBA) specific to South Africa has been identified using the Global Standard for the Identification of Key Biodiversity Areas version 1.2 (IUCN 2016), applied to South African species and ecosystems. KBAs are critical sites that play a vital role in maintaining global biodiversity by serving as essential habitats for species. The identification of KBAs enables governments and civil society to pinpoint key locations crucial for species and their habitats worldwide. This understanding facilitates collaborative efforts to manage and conserve these areas, thereby safeguarding global biological diversity and supporting international biodiversity objectives. Unlike the Important Bird Areas (IBAs), which primarily focus on birds, the KBA framework encompasses a broader spectrum of biodiversity, including mammals, amphibians, plants, and other taxa. BirdLife South Africa (BLSA), in consultation with the KBA National Coordination Group, has opted to retire IBAs and integrate KBAs into its conservation strategy. This strategic shift acknowledges the necessity of investing resources effectively to protect avian and other macroecological elements at the site level within a comprehensive framework of biodiversity conservation (KBA NCG, 2024)

- Freshwater Ecology:

  - Strategic Water Source Areas (SWSAs) (Le Maitre *et al,* 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the

country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

- National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

7.1.2 Desktop Flora Assessment

The desktop flora assessment encompassed an assessment of all the vegetation units and habitat types within the PAOI, as well as the identification of expected plant species and any locally occurring flora SCC.

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) and the 2018 Terrestrial & Freshwater Assessment by SANBI (2018) was used to identify the vegetation types that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, , the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the PAOI (Figure 7-1). The Red List of South African Plants website (SANBI, 2016) was used to provide the most current account of the national conservation status of flora.

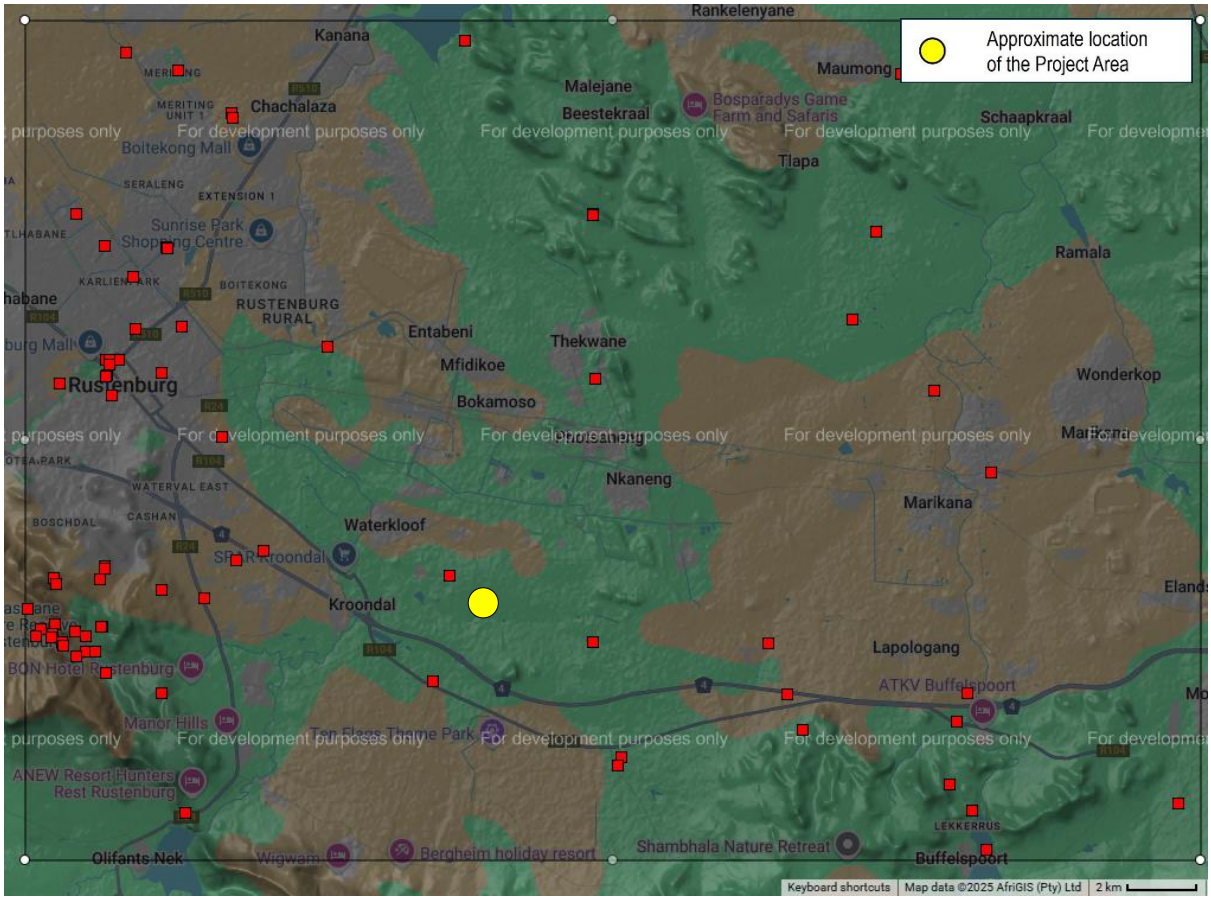

Figure 7-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the PAOI. The red squares are cluster markers of botanical records as per POSA data.***

The latest information regarding provincially, and nationally protected flora was obtained from the following published legislative sources:

- Provincially Protected Plant Species (Schedule 2 of the North West Biodiversity Management Act (Act No 4 of 2016));
- Nationally Protected plant species (The 2007 lists of Threatened or Protected Species (TOPS), published in terms of Section 56(1) of the NEM:BA No. 10 of 2004); and
- List of Nationally Protected Tree Species (DEFF, 2022).

7.1.3 Desktop Fauna Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the FrogMap database of the Animal Demography Unit (Fitzpatrick Institute of African Ornithology, 2024a) using the 2527 quarter degree square;
- Compiling an expected reptile list generated from the ReptileMap database of the Animal Demography Unit (Fitzpatrick Institute of African Ornithology, 2024b) using the 2527 quarter degree square;

- Compiling an expected mammal list generated from the MammalMap database of the Animal Demography Unit (Fitzpatrick Institute of African Ornithology, 2024c) using the 2527 quarter degree square; and

- Compiling an expected avifauna list generated from the South African Bird Atlas 2 (SABAP2) database using the 2535_2715, 2535_2720, 2535_2725, 2535_2730, 2540_2715, 2540_2720, 2540_2725, 2540_2730, 2545_2715, 2545_2720, 2545_2725, 2545_2730 pentads.

South Africa's official site for Species Information and National Red Lists (SANBI, 2022) was used to provide the most current national Red-List status of fauna. The latest information regarding provincially, and nationally protected fauna was obtained from the following published legislative lists:

- Provincially Protected Wildlife Species (Schedule 2 of the North West Biodiversity Management Act (Act No 4 of 2016)); and

- Nationally Protected Wildlife species (The 2007 lists of Threatened or Protected Species (TOPS), published in terms of Section 56(1) of the NEM:BA No. 10 of 2004).

7.1.4 Vegetation & Flora Survey

The wet season fieldwork and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was, therefore, to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps (confirmed during the field survey). The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units delineated during the desktop assessment. Emphasis was placed on sensitive habitats, especially those overlapping with the PAOI.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting protected plants and flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling observed flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff et al. (1982). Suitable habitat for SCC were identified according to Raimondo et al. (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g., roads, erosion etc.), and this included the subjective recording of dominant vegetation species and any sensitive features (e.g., wetlands, rock outcrops etc.). In addition, opportunistic observations were made while navigating through the area.

Species were identified in field wherever possible. If they could not be identified in the field, field guides and texts were used. Relevant field guides and texts consulted for identification purposes included, but was not limited, to the following:

- Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al.*, 2015);

- A Field Guide to Wild Flowers (Pooley, 1998);

- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);

- Field Guide to Succulents in Southern Africa (Smith *et al.*, 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at https://www.inaturalist.org/home

7.1.5 Fauna Survey

The faunal component of this report pertains only to mammals and herpetofauna (reptiles and amphibians), as a separate avifauna assessment was conducted and can be found in the accompanying avifauna assessment report (TBC, 2024). The faunal field survey utilised a variety of sampling techniques, including but not limited to:

- Visual and auditory searches: This involves strategic meandering and the use of binoculars and specialist camera equipment to view species from a distance without them being disturbed;
- Active hand-searches: Used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.); and
- The identification of tracks and signs, and listening to species calls.

Relevant field guides and texts consulted for identification purposes included the following:

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates et al, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Stuarts' Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi (Stuart and Stuart, 2015); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

7.1.6 Impact Assessment

Duration of impact	**Rating**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5
Spatial scope of impact	Rating
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Sensitivity of receiving environment	Rating
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5
Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)															
	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Absent
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low
	3	6	9	12	15	18	21	24	27	301	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	High
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	Critical
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

7.2 Appendix B: Terrestrial Site Ecological Importance

The different habitat types within the PAOI were delineated and identified based on observations made during the field survey, and information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present in the PAOI) and Receptor Resilience (RR) (its resilience to impacts).

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 7-1 and Table 7-2 respectively.

Table 7-1 Summary of Conservation Importance (CI) criteria

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

Table 7-2 Summary of Functional Integrity (FI) criteria

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

BI can be derived from a simple matrix of CI and FI as provided in Table 7-3.

Table 7-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 7-4.

Table 7-4 Summary of Receptor Resilience (RR) criteria

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

After the determination of BI and RR, the SEI can be ascertained using the matrix as provided in Table 7-5.

Table 7-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed project is provided in Table 7-6.

Table 7-6 Guideline for interpreting Site Ecological Importance in the context of proposed activities

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

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

7.3 Appendix C: Expected Species Lists

7.3.1 Expected Flora Species

Family	Scientific Name	Ecology	SANBI	IUCN
Acanthaceae	*Blepharis integrifolia*	Indigenous		
Acanthaceae	*Blepharis leendertziae*	Indigenous	LC	LC
Acanthaceae	*Crabbea hirsuta*	Indigenous	LC	LC
Acanthaceae	*Hypoestes forskaolii*	Indigenous	LC	LC
Acanthaceae	*Barleria pretoriensis*	Indigenous	LC	LC
Acanthaceae	*Crabbea ovalifolia*	Indigenous	LC	LC
Acanthaceae	*Ruellia cordata*	Indigenous	LC	LC
Acanthaceae	*Justicia anagalloides*	Indigenous	LC	LC
Acanthaceae	*Isoglossa grantii*	Indigenous	LC	LC
Aizoaceae	*Khadia acutipetala*	Indigenous; Endemic	LC	LC
Aizoaceae	*Frithia pulchra*	Indigenous; Endemic	LC	LC
Amaranthaceae	*Hermbstaedtia odorata*	Indigenous	LC	LC
Amaryllidaceae	*Crinum graminicola*	Indigenous	LC	LC
Anacardiaceae	*Searsia pyroides*	Indigenous		
Anacardiaceae	*Ozoroa paniculosa*	Indigenous		
Anacardiaceae	*Searsia magalismontana*	Indigenous		
Anacardiaceae	*Searsia chirindensis*	Indigenous	LC	LC
Anacardiaceae	*Searsia lancea*	Indigenous	LC	LC
Anacardiaceae	*Ozoroa paniculosa*	Indigenous		
Apiaceae	*Deverra burchellii*	Indigenous	LC	LC
Apocynaceae	*Asclepias densiflora*	Indigenous	LC	LC
Apocynaceae	*Cryptolepis cryptolepioides*	Indigenous	LC	LC
Apocynaceae	*Stenostelma umbelluliferum*	Indigenous; Endemic	NT	NT
Apocynaceae	*Huernia transvaalensis*	Indigenous; Endemic	LC	LC
Apocynaceae	*Aspidoglossum glabrescens*	Indigenous; Endemic	LC	LC
Apocynaceae	*Raphionacme galpinii*	Indigenous	LC	LC
Apocynaceae	*Sarcostemma viminale*	Indigenous		
Apocynaceae	*Asclepias aurea*	Indigenous	LC	LC
Araliaceae	*Cussonia spicata*	Indigenous	LC	LC
as	*Ipomoea oblongata*	Indigenous	LC	LC
Asparagaceae	*Asparagus virgatus*	Indigenous	LC	LC
Asphodelaceae	*Kniphofia ensifolia*	Indigenous		
Asphodelaceae	*Bulbine angustifolia*	Indigenous	LC	LC
Asteraceae	*Psiadia punctulata*	Indigenous	LC	LC
Asteraceae	*Helichrysum coriaceum*	Indigenous		
Asteraceae	*Nolletia jeanettae*	Indigenous; Endemic	LC	LC

Asteraceae	*Helichrysum nudifolium*	Indigenous		
Asteraceae	*Athrixia elata*	Indigenous	LC	LC
Asteraceae	*Schistostephium crataegifolium*	Indigenous	LC	LC
Asteraceae	*Senecio breviscapus*	Indigenous		
Asteraceae	*Stoebe vulgaris*	Indigenous		
Asteraceae	*Lopholaena coriifolia*	Indigenous	LC	LC
Asteraceae	*Adenostemma caffrum*	Indigenous	LC	LC
Asteraceae	*Senecio subcoriaceus*	Indigenous	LC	LC
Asteraceae	*Hilliardiella oligocephala*	Indigenous	LC	LC
Asteraceae	*Ursinia nana*	Indigenous		
Asteraceae	*Helichrysum cerastioides*	Indigenous		
Asteraceae	*Doellia cafra*	Indigenous	LC	LC
Asteraceae	*Tagetes minuta*	Not indigenous; Naturalised; Invasive		
Asteraceae	*Helichrysum paronychioides*	Indigenous	LC	LC
Asteraceae	*Oocephala staehelinoides*	Indigenous; Endemic		
Asteraceae	*Senecio hieracioides*	Indigenous	LC	LC
Asteraceae	*Helichrysum argyrosphaerum*	Indigenous	LC	LC
Asteraceae	*Nidorella hottentotica*	Indigenous	LC	LC
Asteraceae	*Dicoma anomala*	Indigenous		
Asteraceae	*Helichrysum harveyanum*	Indigenous	LC	LC
Asteraceae	*Senecio venosus*	Indigenous	LC	LC
Asteraceae	*Berkheya latifolia*	Indigenous	LC	LC
Asteraceae	*Sonchus dregeanus*	Indigenous	LC	LC
Asteraceae	*Sonchus friesii*	Indigenous		
Asteraceae	*Geigeria burkei*	Indigenous		
Asteraceae	*Macledium zeyheri*	Indigenous		
Asteraceae	*Senecio vitalis*	Indigenous; Endemic		
Asteraceae	*Helichrysum kraussii*	Indigenous	LC	LC
Asteraceae	*Vernonia galpinii*	Indigenous	LC	LC
Asteraceae	*Helichrysum rugulosum*	Indigenous	LC	LC
Bartramiaceae	*Philonotis africana*	Indigenous		
Blechnaceae	*Blechnum australe*	Indigenous		
Burmanniaceae	*Burmannia madagascariensis*	Indigenous	LC	LC
Campanulaceae	*Wahlenbergia magaliesbergensis*	Indigenous; Endemic	LC	LC
Capparaceae	*Boscia albitrunca*	Indigenous	LC	LC
Capparaceae	*Cadaba aphylla*	Indigenous	LC	LC
Caryophyllaceae	*Corrigiola litoralis*	Indigenous		
Celastraceae	*Maytenus undata*	Indigenous	LC	LC
Celastraceae	*Gymnosporia tenuispina*	Indigenous	LC	LC

Celastraceae	*Pterocelastrus echinatus*	Indigenous	LC	LC
Colchicaceae	*Colchicum melanthioides*	Indigenous		
Combretaceae	*Combretum zeyheri*	Indigenous	LC	LC
Combretaceae	*Combretum molle*	Indigenous	LC	LC
Commelinaceae	*Floscopa glomerata*	Indigenous	LC	LC
Commelinaceae	*Cyanotis speciosa*	Indigenous	LC	LC
Commelinaceae	*Commelina africana*	Indigenous		
Commelinaceae	*Commelina livingstonii*	Indigenous	LC	LC
Convolvulaceae	*Ipomoea bolusiana*	Indigenous	LC	LC
Convolvulaceae	*Ipomoea obscura*	Indigenous		
Convolvulaceae	*Convolvulus sagittatus*	Indigenous	LC	LC
Convolvulaceae	*Xenostegia tridentata*	Indigenous		
Convolvulaceae	*Ipomoea coscinosperma*	Indigenous	LC	LC
Convolvulaceae	*Evolvulus alsinoides*	Indigenous	LC	LC
Convolvulaceae	*Seddera capensis*	Indigenous	LC	LC
Corbichoniaceae	*Corbichonia decumbens*	Indigenous	LC	LC
Crassulaceae	*Crassula setulosa*	Indigenous	LC	LC
Crassulaceae	*Kalanchoe rotundifolia*	Indigenous	LC	LC
Cucurbitaceae	*Coccinia adoensis*	Indigenous	LC	LC
Cucurbitaceae	*Momordica balsamina*	Indigenous	LC	LC
Cyperaceae	*Cyperus esculentus*	Indigenous		
Cyperaceae	*Cyperus leptocladus*	Indigenous	LC	LC
Cyperaceae	*Schoenoplectus muricinux*	Indigenous	LC	LC
Cyperaceae	*Ascolepis capensis*	Indigenous	LC	LC
Cyperaceae	*Cyperus congestus*	Indigenous	LC	LC
Cyperaceae	*Kyllinga alba*	Indigenous	LC	LC
Cyperaceae	*Carex spicatopaniculata*	Indigenous	LC	LC
Cyperaceae	*Schoenoplectus brachyceras*	Indigenous	LC	LC
Dioscoreaceae	*Dioscorea retusa*	Indigenous	LC	LC
Dipsacaceae	*Scabiosa columbaria*	Indigenous	LC	LC
Droseraceae	*Drosera collinsiae*	Indigenous	LC	LC
Ebenaceae	*Diospyros lycioides*	Indigenous		
Equisetaceae	*Equisetum ramosissimum*	Indigenous		
Euphorbiaceae	*Euphorbia heterophylla*	Not indigenous; Naturalised	NE	NE
Euphorbiaceae	*Acalypha villicaulis*	Indigenous	LC	LC
Euphorbiaceae	*Acalypha indica*	Indigenous		
Euphorbiaceae	*Euphorbia davyi*	Indigenous	LC	LC
Euphorbiaceae	*Acalypha angustata*	Indigenous	LC	LC
Fabaceae	*Crotalaria distans*	Indigenous		

Fabaceae	*Indigofera heterotricha*	Indigenous	LC	LC
Fabaceae	*Ophrestia oblongifolia*	Indigenous		
Fabaceae	*Indigofera oxytropis*	Indigenous	LC	LC
Fabaceae	*Tephrosia villosa*	Indigenous		
Fabaceae	*Pearsonia sessilifolia*	Indigenous		
Fabaceae	*Tylosema esculentum*	Indigenous	LC	LC
Fabaceae	*Alysicarpus zeyheri*	Indigenous	LC	LC
Fabaceae	*Leobordea divaricata*	Indigenous	LC	LC
Fabaceae	*Indigofera vicioides*	Indigenous		
Fabaceae	*Senegalia caffra*	Indigenous	LC	LC
Fabaceae	*Rhynchosia crassifolia*	Indigenous	LC	LC
Fabaceae	*Vachellia karroo*	Indigenous	LC	LC
Fabaceae	*Senegalia burkei*	Indigenous	LC	LC
Fabaceae	*Senna septemtrionalis*	Not indigenous; Naturalised; Invasive	NE	NE
Fabaceae	*Mundulea sericea*	Indigenous		
Fabaceae	*Tephrosia capensis*	Indigenous		
Fabaceae	*Abrus laevigatus*	Indigenous	LC	LC
Fabaceae	*Rhynchosia totta*	Indigenous		
Fabaceae	*Stylosanthes fruticosa*	Indigenous	LC	LC
Fabaceae	*Tephrosia multijuga*	Indigenous	LC	LC
Fabaceae	*Indigofera melanadenia*	Indigenous	LC	LC
Fabaceae	*Eriosema pauciflorum*	Indigenous		
Fabaceae	*Sphenostylis angustifolia*	Indigenous	LC	LC
Fabaceae	*Zornia linearis*	Indigenous	LC	LC
Fabaceae	*Rhynchosia venulosa*	Indigenous	NE	NE
Fabaceae	*Senegalia erubescens*	Indigenous	LC	LC
Fabaceae	*Chamaecrista biensis*	Indigenous	LC	LC
Fabaceae	*Rhynchosia albissima*	Indigenous	LC	LC
Fabaceae	*Erythrina lysistemon*	Indigenous	LC	LC
Fabaceae	*Indigofera hilaris*	Indigenous		
Fabaceae	*Burkea africana*	Indigenous	LC	LC
Fabaceae	*Vachellia robusta*	Indigenous		
Fissidentaceae	*Fissidens ovatus*	Indigenous		
Gentianaceae	*Sebaea junodii*	Indigenous	LC	LC
Gentianaceae	*Chironia palustris*	Indigenous		
Gentianaceae	*Exochaenium grande*	Indigenous	LC	LC
Gentianaceae	*Chironia purpurascens*	Indigenous		
Gleicheniaceae	*Gleichenia polypodioides*	Indigenous	LC	LC
Hyacinthaceae	*Ledebouria ovatifolia*	Indigenous		

Hyacinthaceae	*Dipcadi papillatum*	Indigenous	LC	LC
Hyacinthaceae	*Ledebouria cooperi*	Indigenous	LC	LC
Hyacinthaceae	*Dipcadi viride*	Indigenous	LC	LC
Hyacinthaceae	*Dipcadi marlothii*	Indigenous	LC	LC
Hypericaceae	*Hypericum lalandii*	Indigenous	LC	LC
Icacinaceae	*Apodytes dimidiata*	Indigenous		
Iridaceae	*Gladiolus elliotii*	Indigenous	LC	LC
Iridaceae	*Gladiolus permeabilis*	Indigenous		
Iridaceae	*Gladiolus rehmannii*	Indigenous	LC	LC
Iridaceae	*Babiana bainesii*	Indigenous	LC	LC
Iridaceae	*Gladiolus antholyzoides*	Indigenous; Endemic	LC	LC
Iridaceae	*Tritonia nelsonii*	Indigenous	LC	LC
Iridaceae	*Psilosiphon sandersonii*	Indigenous		
Iridaceae	*Moraea stricta*	Indigenous	LC	LC
Iridaceae	*Hesperantha longicollis*	Indigenous	LC	LC
Lamiaceae	*Tetradenia brevispicata*	Indigenous	LC	LC
Lamiaceae	*Pycnostachys reticulata*	Indigenous	LC	LC
Lamiaceae	*Orthosiphon suffrutescens*	Indigenous	LC	LC
Lamiaceae	*Vitex zeyheri*	Indigenous	LC	LC
Lamiaceae	*Aeollanthus buchnerianus*	Indigenous	LC	LC
Lamiaceae	*Ocimum gratissimum*	Indigenous		
Lamiaceae	*Acrotome hispida*	Indigenous	LC	LC
Lamiaceae	*Ocimum obovatum*	Indigenous		
Leskeaceae	*Lindbergia haplocladioides*	Indigenous		
Leucobryaceae	*Campylopus pilifer*	Indigenous		
Limeaceae	*Limeum viscosum*	Indigenous		
Lobeliaceae	*Monopsis decipiens*	Indigenous	LC	LC
Lobeliaceae	*Cyphia assimilis*	Indigenous; Endemic	LC	LC
Loganiaceae	*Strychnos pungens*	Indigenous	LC	LC
Loranthaceae	*Agelanthus natalitius*	Indigenous		
Lycopodiaceae	*Lycopodiella cernua*	Indigenous	LC	LC
Malpighiaceae	*Sphedamnocarpus pruriens*	Indigenous		
Malvaceae	*Grewia subspathulata*	Indigenous	LC	LC
Malvaceae	*Triumfetta annua*	Indigenous	LC	LC
Malvaceae	*Hibiscus pusillus*	Indigenous	LC	LC
Malvaceae	*Abutilon angulatum*	Indigenous	LC	LC
Malvaceae	*Grewia monticola*	Indigenous	LC	LC
Malvaceae	*Hibiscus engleri*	Indigenous	LC	LC
Malvaceae	*Sida chrysantha*	Indigenous	LC	LC

Malvaceae	*Grewia flava*	Indigenous	LC	LC
Malvaceae	*Hibiscus marlothianus*	Indigenous; Endemic	LC	LC
Malvaceae	*Waltheria indica*	Indigenous	LC	LC
Malvaceae	*Hermannia grisea*	Indigenous; Endemic	LC	LC
Malvaceae	*Hermannia marginata*	Indigenous; Endemic	LC	LC
Malvaceae	*Hermannia floribunda*	Indigenous	LC	LC
Malvaceae	*Hibiscus subreniformis*	Indigenous	LC	LC
Malvaceae	*Grewia occidentalis*	Indigenous		
Malvaceae	*Hibiscus sidiformis*	Indigenous	LC	LC
Marattiaceae	*Ptisana fraxinea*	Indigenous	LC	LC
Molluginaceae	*Mollugo nudicaulis*	Indigenous		
Moraceae	*Ficus thonningii*	Indigenous		
Moraceae	*Ficus salicifolia*	Indigenous	LC	LC
Moraceae	*Ficus ingens*	Indigenous	LC	LC
Myricaceae	*Morella serrata*	Indigenous	LC	LC
Ochnaceae	*Ochna pulchra*	Indigenous	LC	LC
Olacaceae	*Ximenia caffra*	Indigenous		
Oleaceae	*Olea capensis*	Indigenous		
Oleaceae	*Menodora africana*	Indigenous	LC	LC
Ophioglossaceae	*Ophioglossum polyphyllum*	Indigenous		
Orchidaceae	*Satyrium hallackii*	Indigenous		
Orchidaceae	*Bonatea saundersioides*	Indigenous	LC	LC
Orchidaceae	*Satyrium cristatum*	Indigenous		
Orchidaceae	*Eulophia clitellifera*	Indigenous	LC	LC
Orchidaceae	*Disa polygonoides*	Indigenous	LC	LC
Orchidaceae	*Bonatea antennifera*	Indigenous	LC	LC
Orobanchaceae	*Striga forbesii*	Indigenous	LC	LC
Osmundaceae	*Osmunda regalis*	Indigenous	LC	LC
Peraceae	*Clutia pulchella*	Indigenous		
Phyllanthaceae	*Flueggea virosa*	Indigenous		
Pittosporaceae	*Pittosporum viridiflorum*	Indigenous	LC	LC
Plumbaginaceae	*Plumbago zeylanica*	Indigenous		
Poaceae	*Eragrostis heteromera*	Indigenous	LC	LC
Poaceae	*Melinis nerviglumis*	Indigenous	LC	LC
Poaceae	*Sporobolus nitens*	Indigenous	LC	LC
Poaceae	*Digitaria eriantha*	Indigenous	LC	LC
Poaceae	*Sorghum bicolor*	Indigenous		
Poaceae	*Sporobolus pectinatus*	Indigenous; Endemic	LC	LC
Poaceae	*Themeda triandra*	Indigenous	LC	LC

Poaceae	*Aristida diffusa*	Indigenous		
Poaceae	*Enneapogon cenchroides*	Indigenous	LC	LC
Poaceae	*Eragrostis hierniana*	Indigenous	LC	LC
Poaceae	*Aristida aequiglumis*	Indigenous	LC	LC
Poaceae	*Eragrostis racemosa*	Indigenous	LC	LC
Poaceae	*Eragrostis plana*	Indigenous	LC	LC
Poaceae	*Bewsia biflora*	Indigenous	LC	LC
Poaceae	*Imperata cylindrica*	Indigenous	LC	LC
Poaceae	*Pogonarthria squarrosa*	Indigenous	LC	LC
Poaceae	*Brachiaria serrata*	Indigenous	LC	LC
Poaceae	*Eragrostis cilianensis*	Indigenous	LC	LC
Poaceae	*Tristachya rehmannii*	Indigenous	LC	LC
Poaceae	*Eragrostis gummiflua*	Indigenous	LC	LC
Poaceae	*Hyparrhenia dregeana*	Indigenous	LC	LC
Poaceae	*Brachiaria deflexa*	Indigenous	LC	LC
Poaceae	*Cynodon dactylon*	Indigenous	LC	LC
Poaceae	*Hyparrhenia hirta*	Indigenous	LC	LC
Poaceae	*Eustachys paspaloides*	Indigenous	LC	LC
Poaceae	*Aristida adscensionis*	Indigenous	LC	LC
Poaceae	*Fingerhuthia africana*	Indigenous	LC	LC
Poaceae	*Digitaria monodactyla*	Indigenous	LC	LC
Poaceae	*Loudetia simplex*	Indigenous	LC	LC
Poaceae	*Sehima galpinii*	Indigenous	LC	LC
Poaceae	*Diheteropogon amplectens*	Indigenous		
Poaceae	*Andropogon schirensis*	Indigenous	LC	LC
Poaceae	*Sporobolus festivus*	Indigenous	LC	LC
Poaceae	*Ischaemum afrum*	Indigenous	LC	LC
Poaceae	*Aristida congesta*	Indigenous		
Poaceae	*Sorghum versicolor*	Indigenous	LC	LC
Poaceae	*Bothriochloa insculpta*	Indigenous	LC	LC
Poaceae	*Stiburus alopecuroides*	Indigenous	LC	LC
Poaceae	*Melinis repens*	Indigenous		
Poaceae	*Eragrostis curvula*	Indigenous	LC	LC
Poaceae	*Schizachyrium sanguineum*	Indigenous	LC	LC
Poaceae	*Chrysopogon serrulatus*	Indigenous	LC	LC
Poaceae	*Anthephora pubescens*	Indigenous	LC	LC
Poaceae	*Arundinella nepalensis*	Indigenous	LC	LC
Poaceae	*Setaria incrassata*	Indigenous	LC	LC
Poaceae	*Tragus berteronianus*	Indigenous	LC	LC

Poaceae	*Eragrostis capensis*	Indigenous	LC	LC
Poaceae	*Dichanthium annulatum*	Indigenous		
Poaceae	*Trichoneura grandiglumis*	Indigenous	LC	LC
Poaceae	*Urochloa panicoides*	Indigenous	LC	LC
Poaceae	*Stipagrostis uniplumis*	Indigenous		
Poaceae	*Tripogon minimus*	Indigenous	LC	LC
Polygalaceae	*Polygala leptophylla*	Indigenous		
Polygonaceae	*Persicaria decipiens*	Indigenous	LC	LC
Polytrichaceae	*Atrichum androgynum*	Indigenous		
Portulacaceae	*Portulaca kermesina*	Indigenous	LC	LC
Portulacaceae	*Portulaca oleracea*	Not indigenous; Naturalised		
Proteaceae	*Protea gaguedi*	Indigenous	LC	LC
Pteridaceae	*Pellaea calomelanos*	Indigenous		
Pteridaceae	*Cheilanthes viridis*	Indigenous		
Rhamnaceae	*Helinus integrifolius*	Indigenous	LC	LC
Rhamnaceae	*Ziziphus zeyheriana*	Indigenous	LC	LC
Rhamnaceae	*Berchemia zeyheri*	Indigenous	LC	LC
Rhamnaceae	*Ziziphus mucronata*	Indigenous		
Rosaceae	*Rubus cuneifolius*	Not indigenous; Naturalised; Invasive		
Rubiaceae	*Pavetta gardeniifolia*	Indigenous		
Rubiaceae	*Afrocanthium mundianum*	Indigenous	LC	LC
Rubiaceae	*Pentanisia angustifolia*	Indigenous	LC	LC
Rubiaceae	*Kohautia caespitosa*	Indigenous		
Rubiaceae	*Vangueria parvifolia*	Indigenous	LC	LC
Rubiaceae	*Vangueria infausta*	Indigenous		
Rubiaceae	*Canthium suberosum*	Indigenous	LC	LC
Rubiaceae	*Pygmaeothamnus zeyheri*	Indigenous		
Rutaceae	*Zanthoxylum capense*	Indigenous	LC	LC
Santalaceae	*Thesium utile*	Indigenous	LC	LC
Santalaceae	*Thesium magalismontanum*	Indigenous	LC	LC
Sapindaceae	*Erythrophysa transvaalensis*	Indigenous	LC	LC
Scrophulariaceae	*Buddleja salviifolia*	Indigenous	LC	LC
Scrophulariaceae	*Buddleja saligna*	Indigenous	LC	LC
Selaginellaceae	*Selaginella dregei*	Indigenous	LC	LC
Sematophyllaceae	*Sematophyllum brachycarpum*	Indigenous		
Solanaceae	*Solanum campylacanthum*	Indigenous		
Sphagnaceae	*Sphagnum truncatum*	Indigenous		
Thymelaeaceae	*Lasiosiphon capitatus*	Indigenous	LC	LC
Urticaceae	*Pouzolzia mixta*	Indigenous		

Vahliaceae	*Vahlia capensis*	Indigenous		
Verbenaceae	*Lantana rugosa*	Indigenous	LC	LC
Verbenaceae	*Chascanum hederaceum*	Indigenous		
Verbenaceae	*Verbena officinalis*	Not indigenous; Naturalised		
Verbenaceae	*Duranta erecta*	Not indigenous; Naturalised; Invasive		
Vitaceae	*Cissus cactiformis*	Indigenous	LC	LC
Vitaceae	*Cyphostemma puberulum*	Indigenous	LC	LC
Vitaceae	*Cyphostemma lanigerum*	Indigenous	LC	LC
Vitaceae	*Cyphostemma sulcatum*	Indigenous; Endemic	LC	LC

7.3.2 Expected Mammal Species

Scientific Name	Common Name	SANBI	IUCN
Cryptomys hottentotus	Southern African Mole-rat	LC	LC
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua Rock Rat	LC	LC
Aonyx capensis	Cape Clawless Otter	NT	NT
Atelerix frontalis	South African Hedgehog	NT	LC
Atilax paludinosus	Marsh Mongoose	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Civettictis civetta	African Civet	LC	LC
Cloeotis percivali	African Trident Bat	EN	LC
Crocidura cyanea	Reddish-Gray Musk Shrew	LC	LC
Crocidura fuscomurina	Bicolored Musk Shrew	LC	LC
Crocidura hirta	Lesser Red Musk Shrew	LC	LC
Crocidura mariquensis	Swamp Musk Shrew	NT	LC
Crocidura silacea	Lesser Gray-Brown Musk Shrew	LC	LC
Cryptomys hottentotus	African Mole Rat	Not listed	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Dendromus melanotis	Gray African Climbing Mouse	LC	LC
Desmodillus auricularis	Cape Short-eared Gerbil	LC	LC
Elephantulus brachyrhynchus	Short-snouted Elephant Shrew	LC	LC
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wild Cat	Not listed	LC
Galago moholi	South African Galago	LC	LC
Genetta genetta	Common Genet	Not listed	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC
Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Graphiurus microtis	Small-eared Dormouse	LC	LC
Graphiurus platyops	Rock Dormouse	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Hipposideros caffer	Sundevall's Leaf-nosed Bat	LC	LC
Hydrictis maculicollis	Spotted-necked Otter	VU	NT
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ichneumia albicauda	White-tailed Mongoose	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Lemniscomys rosalia	Single-striped Grass Mouse	LC	LC

Leptailurus serval	Serval	LC	LC
Lepus saxatilis	Cape Scrub Hare	LC	LC
Lepus victoriae	African Savanna Hare	LC	LC
Mastomys coucha	Multimammate Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC
Mungos mungo	Banded Mongoose	LC	LC
Mus indutus	Desert Pygmy Mouse	LC	LC
Mystromys albicaudatus	White-tailed Rat	VU	EN
Oreotragus oreotragus	Klipspringer	LC	LC
Orycteropus afer	Aardvark	LC	LC
Otomys angoniensis	Angoni Vlei Rat	LC	LC
Otomys irroratus	Southern African Vlei Rat	LC	LC
Panthera pardus	Leopard	Not listed	VU
Papio ursinus	Chacma Baboon	LC	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Paraxerus cepapi	Smith's Bush Squirrel	LC	LC
Pedetes capensis	Springhare	LC	LC
Pelea capreolus	Grey Rhebok	NT	LC
Phacochoerus africanus	Common Warthog	LC	LC
Poecilogale albinucha	African Striped Weasel	LC	LC
Procavia capensis	Rock Hyrax	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rattus rattus	House Rat	Not listed	LC
Redunca arundinum	Southern Reedbuck	LC	LC
Redunca fulvorufula	Mountain Reedbuck	EN	LC
Rhabdomys pumilio	Four-striped Grass Mouse	LC	LC
Saccostomus campestris	Pouched Mouse	LC	LC
Steatomys krebsii	Kreb's Fat Mouse	LC	LC
Steatomys pratensis	Fat Mouse	LC	LC
Suncus lixus	Greater Dwarf Shrew	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Suricata suricatta	Meerkat	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Thallomys paedulcus	Acacia Rat	LC	LC
Vulpes chama	Cape Fox	LC	LC
Xerus inauris	South African Ground Squirrel	LC	LC

7.3.3 Expected Reptile Species

Scientific Name	Common Name	SANBI	IUCN
Acontias gracilicauda	Slender-tailed Legless Skink	LC	LC
Acontias occidentalis	Western Legless Skink	LC	LC
Afroedura nivaria	Drakensberg Rock Gecko	LC	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC
Agama aculeata	Ground Agama	LC	LC
Agama atra	Southern Rock Agama	LC	LC
Aparallactus capensis	Black-headed Centipede-eater	LC	LC
Atractaspis bibronii	Bibron's Stiletto Snake	LC	LC
Bitis arietans	Puff Adder	LC	LC
Boaedon capensis	Brown House Snake	LC	LC
Causus rhombeatus	Rhombic Night Adder	LC	LC
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Chondrodactylus turneri	Turner's Gecko	LC	LC
Cordylus jonesii	Jones' Girdled Lizard	LC	LC
Cordylus vittifer	Common Girdled Lizard	LC	LC
Crocodylus niloticus	Nile Crocodile	VU	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	LC
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Dispholidus typus	Boomslang	LC	LC
Duberria lutrix	Common Slug-eater	LC	LC
Elapsoidea sundevallii media	Sundevall's Garter Snake	LC	LC
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	LC
Hemachatus haemachatus	Rinkhals	LC	LC
Hemidactylus mabouia	Common Tropical House Gecko	LC	LC
Homoroselaps dorsalis	Striped Harlequin Snake	LC	LC
Kinixys lobatsiana	Lobatse Hinged Tortoise	VU	VU
Lamprophis aurora	Aurora House Snake	LC	LC
Leptotyphlops distanti	Distant's Thread Snake	LC	LC
Leptotyphlops incognitus	Incognito Thread Snake	LC	LC
Leptotyphlops scutifrons	Peter's Thread Snake	LC	LC
Limaformosa capensis	Common File Snake	LC	LC
Lycodonomorphus rufulus	Brown Water Snake	LC	LC
Lycophidion capense	Cape Wolf Snake	LC	LC
Lygodactylus capensis	Common Dwarf Gecko	LC	LC
Meroles squamulosus	Common Desert Lizard	LC	LC
Mochlus sundevallii	Sundevall's Writhing Skink	LC	LC
Naja annulifera	Snouted Cobra	LC	LC

Naja mossambica	Mozambique Spitting Cobra	LC	LC
Nucras holubi	Holub's Sandveld Lizard	LC	LC
Nucras intertexta	Spotted Sandveld Lizard	LC	LC
Nucras lalandii	Delalande's Sandveld Lizard	LC	LC
Pachydactylus affinis	Transvaal Gecko	LC	LC
Pachydactylus capensis	Cape Gecko	LC	LC
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	LC	LC
Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	LC	LC
Pelomedusa galeata	South African Marsh Terrapin	LC	LC
Pelusios sinuatus	Serrated Hinged Terrapin	LC	Not listed
Philothamnus hoplogaster	Southeastern Green Snake	LC	LC
Philothamnus occidentalis	South African Green Snake	LC	LC
Philothamnus semivariegatus	Spotted Bush Snake	LC	LC
Prosymna bivittata	Two-striped Shovel-snout	LC	LC
Prosymna sundevallii	Sundevall's Shovel-snout	LC	LC
Psammobates oculifer	Kalahari Tent Tortoise	LC	Not listed
Psammophis angolensis	Dwarf Sand Snake	LC	LC
Psammophis brevirostris	Short-snouted Grass Snake	LC	LC
Psammophis subtaeniatus	Western Yellow-bellied Sand Snake	LC	LC
Psammophylax rhombeatus	Spotted Skaapsteker	LC	LC
Psammophylax tritaeniatus	Striped Skaapsteker	LC	LC
Pseudaspis cana	Mole Snake	LC	LC
Python natalensis	Southern African Python	LC	LC
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	LC
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Telescopus semiannulatus	Common Tiger Snake	LC	LC
Thelotornis capensis	Twig Snake	LC	LC
Trachylepis capensis	Cape Skink	LC	LC
Trachylepis damarana	Damara Variable Skink	LC	LC
Trachylepis laevigata	Striped-neck Variable Skink	DD	DD
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis varia	Variable Skink	LC	LC
Varanus albigularis	Rock Monitor	LC	LC
Varanus niloticus	Water Monitor	LC	LC

7.3.4 Expected Amphibian Species

Scientific Name	Common Name	SANBI	IUCN
Amietia delalandii	Delalande's River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Chiromantis xerampelina	Southern Foam Nest Frog	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Phrynobatrachus natalensis	Snoring Puddle Frog	LC	LC
Phrynomantis bifasciatus	Banded Rubber Frog	LC	LC
Poyntonophrynus fenoulheti	Northern Pygmy Toad	LC	LC
Ptychadena anchietae	Plain Grass Frog	LC	LC
Ptychadena mossambica	Broad-banded Grass Frog	LC	LC
Pyxicephalus adspersus	Giant Bull Frog	LC	LC
Pyxicephalus edulis	African Bull Frog	LC	LC
Schismaderma carens	Red Toad	LC	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys garmani	Olive Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys poweri	Power's Toad	LC	LC
Strongylopus fasciatus	Striped Stream Frog	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna natalensis	Natal Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Xenopus laevis	Common Platanna	LC	LC

7.3.5 Expected Avifauna Species

Scientific name	Common name	Regional (SANBI, 2023)	Global (BirdLife, 2023)
Accipiter badius	Shikra	Unlisted	Unlisted
Amadina erythrocephala	Red-headed Finch	Unlisted	Unlisted
Amadina fasciata	Cut-throat Finch	Unlisted	Unlisted
Anas platyrhynchos	Mallard	Unlisted	Unlisted
Anas sparsa	African Black Duck	Unlisted	Unlisted
Anas undulata	Yellow-billed Duck	Unlisted	Unlisted
Anhinga rufa	African Darter	Unlisted	Unlisted
Anomalospiza imberbis	Cuckoo Finch	Unlisted	Unlisted
Apalis thoracica	Bar-throated Apalis	Unlisted	Unlisted
Aquila rapax	Tawny Eagle	EN	VU
Aquila verreauxii	Verreaux's Eagle	NA	LC
Ardea alba	Great Egret	Unlisted	Unlisted
Ardea intermedia	Intermediate Egret	Unlisted	Unlisted
Aviceda cuculoides	African Cuckoo-Hawk	Unlisted	Unlisted
Batis molitor	Chinspot Batis	Unlisted	Unlisted
Bubo africanus	Spotted Eagle-Owl	Unlisted	Unlisted
Bubulcus ibis	Western Cattle Egret	Unlisted	Unlisted
Buteo buteo	Common Buzzard	Unlisted	Unlisted
Buteo rufofuscus	Jackal Buzzard	Unlisted	Unlisted
Calidris pugnax	Ruff	Unlisted	Unlisted
Camaroptera brevicaudata	Grey-backed Camaroptera	Unlisted	Unlisted
Campephaga flava	Black Cuckooshrike	Unlisted	Unlisted
Centropus burchellii	Burchell's Coucal	Unlisted	Unlisted
Chlorophoneus sulfureopectus	Orange-breasted Bushshrike	Unlisted	Unlisted
Chrysococcyx caprius	Diederik Cuckoo	Unlisted	Unlisted
Chrysococcyx klaas	Klaas's Cuckoo	Unlisted	Unlisted
Cisticola aberrans	Lazy Cisticola	Unlisted	Unlisted
Cisticola aridulus	Desert Cisticola	Unlisted	Unlisted
Cisticola ayresii	Wing-snapping Cisticola	Unlisted	Unlisted
Cisticola chiniana	Rattling Cisticola	Unlisted	Unlisted
Cisticola fulvicapilla	Neddicky	Unlisted	Unlisted
Cisticola juncidis	Zitting Cisticola	Unlisted	Unlisted
Cisticola lais	Wailing Cisticola	Unlisted	Unlisted
Cisticola rufilatus	Tinkling Cisticola	Unlisted	Unlisted
Cisticola tinniens	Levaillant's Cisticola	Unlisted	Unlisted
Clamator glandarius	Great Spotted Cuckoo	Unlisted	Unlisted
Clamator jacobinus	Jacobin Cuckoo	Unlisted	Unlisted

Clamator levaillantii	Levaillant's Cuckoo	Unlisted	Unlisted
Columba livia	Rock Dove	Unlisted	Unlisted
Corvus albus	Pied Crow	Unlisted	Unlisted
Corvus capensis	Cape Crow	Unlisted	Unlisted
Corythaixoides concolor	Grey Go-away-bird	Unlisted	Unlisted
Crecopsis egregia	African Crake	Unlisted	Unlisted
Crithagra atrogularis	Black-throated Canary	Unlisted	Unlisted
Crithagra flaviventris	Yellow Canary	Unlisted	Unlisted
Crithagra mozambica	Yellow-fronted Canary	Unlisted	Unlisted
Cuculus clamosus	Black Cuckoo	Unlisted	Unlisted
Cuculus solitarius	Red-chested Cuckoo	Unlisted	Unlisted
Cursorius temminckii	Temminck's Courser	Unlisted	Unlisted
Dendrocygna bicolor	Fulvous Whistling Duck	Unlisted	Unlisted
Dendrocygna viduata	White-faced Whistling Duck	Unlisted	Unlisted
Dendroperdix sephaena	Crested Francolin	Unlisted	Unlisted
Dicrurus adsimilis	Fork-tailed Drongo	Unlisted	Unlisted
Egretta garzetta	Little Egret	Unlisted	Unlisted
Emberiza capensis	Cape Bunting	Unlisted	Unlisted
Emberiza flaviventris	Golden-breasted Bunting	Unlisted	Unlisted
Emberiza impetuani	Lark-like Bunting	Unlisted	Unlisted
Emberiza tahapisi	Cinnamon-breasted Bunting	Unlisted	Unlisted
Eremomela icteropygialis	Yellow-bellied Eremomela	Unlisted	Unlisted
Eremomela usticollis	Burnt-necked Eremomela	Unlisted	Unlisted
Euplectes afer	Yellow-crowned Bishop	Unlisted	Unlisted
Falco amurensis	Amur Falcon	Unlisted	Unlisted
Falco biarmicus	Lanner Falcon	VU	LC
Falco peregrinus	Peregrine Falcon	Unlisted	Unlisted
Fulica cristata	Red-knobbed Coot	Unlisted	Unlisted
Haliaeetus vocifer	African Fish Eagle	Unlisted	Unlisted
Hieraaetus wahlbergi	Wahlberg's Eagle	Unlisted	Unlisted
Ixobrychus minutus	Little Bittern	Unlisted	Unlisted
Ixobrychus sturmii	Dwarf Bittern	Unlisted	Unlisted
Lagonosticta rhodopareia	Jameson's Firefinch	Unlisted	Unlisted
Lagonosticta rubricata	African Firefinch	Unlisted	Unlisted
Lagonosticta senegala	Red-billed Firefinch	Unlisted	Unlisted
Laniarius ferrugineus	Southern Boubou	Unlisted	Unlisted
Lanius collaris	Southern Fiscal	Unlisted	Unlisted
Lophaetus occipitalis	Long-crested Eagle	Unlisted	Unlisted
Lybius torquatus	Black-collared Barbet	Unlisted	Unlisted

Malaconotus blanchoti	Grey-headed Bushshrike	Unlisted	Unlisted
Melaenornis mariquensis	Marico Flycatcher	Unlisted	Unlisted
Melaenornis pallidus	Pale Flycatcher	Unlisted	Unlisted
Melaenornis pammelaina	Southern Black Flycatcher	Unlisted	Unlisted
Melaenornis silens	Fiscal Flycatcher	Unlisted	Unlisted
Merops apiaster	European Bee-eater	Unlisted	Unlisted
Merops bullockoides	White-fronted Bee-eater	Unlisted	Unlisted
Merops hirundineus	Swallow-tailed Bee-eater	Unlisted	Unlisted
Merops pusillus	Little Bee-eater	Unlisted	Unlisted
Microcarbo africanus	Reed Cormorant	Unlisted	Unlisted
Muscicapa striata	Spotted Flycatcher	Unlisted	Unlisted
Nilaus afer	Brubru	Unlisted	Unlisted
Oena capensis	Namaqua Dove	Unlisted	Unlisted
Oenanthe familiaris	Familiar Chat	Unlisted	Unlisted
Ortygospiza atricollis	Quailfinch	Unlisted	Unlisted
Oxyura maccoa	Maccoa Duck	NT	EN
Peliperdix coqui	Coqui Francolin	Unlisted	Unlisted
Pernis apivorus	European Honey Buzzard	Unlisted	Unlisted
Phalacrocorax lucidus	White-breasted Cormorant	Unlisted	Unlisted
Phoeniconaias minor	Lesser Flamingo	NT	NT
Phoenicopterus roseus	Greater Flamingo	NT	LC
Polemaetus bellicosus	Martial Eagle	EN	EN
Pycnonotus nigricans	African Red-eyed Bulbul	Unlisted	Unlisted
Pycnonotus tricolor	Dark-capped Bulbul	Unlisted	Unlisted
Recurvirostra avosetta	Pied Avocet	Unlisted	Unlisted
Rhinoptilus africanus	Double-banded Courser	Unlisted	Unlisted
Rhinoptilus chalcopterus	Bronze-winged Courser	Unlisted	Unlisted
Sagittarius serpentarius	Secretarybird	VU	EN
Sarkidiornis melanotos	Knob-billed Duck	Unlisted	Unlisted
Sarothrura rufa	Red-chested Flufftail	Unlisted	Unlisted
Scleroptila gutturalis	Orange River Francolin	Unlisted	Unlisted
Scleroptila levaillantii	Red-winged Francolin	Unlisted	Unlisted
Scopus umbretta	Hamerkop	Unlisted	Unlisted
Spilopelia senegalensis	Laughing Dove	Unlisted	Unlisted
Stenostira scita	Fairy Flycatcher	Unlisted	Unlisted
Streptopelia capicola	Ring-necked Dove	Unlisted	Unlisted
Streptopelia semitorquata	Red-eyed Dove	Unlisted	Unlisted
Sylvietta rufescens	Long-billed Crombec	Unlisted	Unlisted
Telophorus zeylonus	Bokmakierie	Unlisted	Unlisted

Terpsiphone viridis	African Paradise Flycatcher	Unlisted	Unlisted
Thalassornis leuconotus	White-backed Duck	Unlisted	Unlisted
Thamnolaea cinnamomeiventris	Mocking Cliff Chat	Unlisted	Unlisted
Trachyphonus vaillantii	Crested Barbet	Unlisted	Unlisted
Tricholaema leucomelas	Acacia Pied Barbet	Unlisted	Unlisted
Turdoides bicolor	Southern Pied Babbler	Unlisted	Unlisted
Turdoides jardineii	Arrow-marked Babbler	Unlisted	Unlisted
Turnix sylvaticus	Common Buttonquail	Unlisted	Unlisted
Zapornia flavirostra	Black Crake	Unlisted	Unlisted

7.4 Appendix D: Impact Assessment

Table 7-7 Assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed infrastructure

Impact	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Post-Consequence	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	-1	2	5	3	3	-3,25	5	-16,25	High	-1	2	4	2	3	-2,75	4	-11	Medium to high	High	2	1	1,13	-12,38	Medium to high
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	3	-2,75	4	-11	Medium to high	High	2	1	1,13	-12,38	Medium to high
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	-1	2	5	3	3	-3,25	4	-13	Medium to high	-1	1	4	2	2	-2,25	3	-6,75	Medium to low	High	2	2	1,25	-8,44	Medium to low
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	2	1,25	-6,25	Medium to low

Introduction of alien species, especially plants	Construction	-1	2	5	3	3	-3,25	4	-13	Medium to high	-1	1	2	2	2	-1,75	2	-3,5	Low	High	2	1	1,13	-3,94	Low
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	3	-2,75	3	-8,25	Medium to low	High	2	1	1,13	-9,28	Medium to high
Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Operational	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	1	1,13	-5,63	Medium to low
Environmental pollution due to water/ mine drainage runoff.	Operational	-1	3	4	3	3	-3,25	4	-13	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	2	1,25	-6,25	Medium to low
Continuous stripping of topsoil for beneficiation plant, leading to ongoing land degradation, including erosion	Operational	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	3	-2,75	4	-11	Medium to high	High	2	1	1,13	-12,38	Medium to high
Continued encroachment by alien and invasive plant species	Operational	-1	3	5	3	3	-3,5	4	-14	High	-1	1	2	2	2	-1,75	2	-3,5	Low	Medium	2	1	1,13	-3,94	Low
Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	-1	2	3	3	3	-2,75	4	-11	Medium to high	-1	1	3	2	3	-2,25	3	-6,75	Medium to low	Medium	1	1	1,00	-6,75	Medium to low

Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	-1	2	3	3	3	-2,75	3	-8,25	Medium to low	-1	1	3	2	2	-2	2	-4	Low	High	2	1	1,13	-4,50	Medium to low
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	-1	2	5	3	3	-3,25	4	-13	Medium to high	-1	2	2	2	3	-2,25	2	-4,5	Medium to low	Medium	1	1	1,00	-4,50	Medium to low

Table 7-8 Assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed infrastructure

Impact	Phase	Pre-Nature	Pre-Extent	Pre-Duration	Pre-Magnitude	Pre-Reversibility	Consequence	Pre-Probability	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-Nature	Post-Extent	Post-Duration	Post-Magnitude	Post-Reversibility	Post-Consequence	Post-Probability	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
Destruction, loss and fragmentation of the vegetation community	Construction	-1	2	5	4	3	-3,5	5	-17,5	High	-1	2	4	3	3	-3	4	-12	Medium to high	High	2	1	1,13	-13,50	Medium to high
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).	Construction	-1	2	4	4	3	-3,25	4	-13	Medium to high	-1	2	4	3	3	-3	4	-12	Medium to high	High	2	1	1,13	-13,50	Medium to high
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	-1	2	5	4	3	-3,5	4	-14	High	-1	1	4	4	2	-2,75	3	-8,25	Medium to low	High	2	2	1,25	-10,31	Medium to high
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	2	1,25	-6,25	Medium to low

Introduction of alien species, especially plants	Construction	-1	2	5	3	3	-3,25	4	-13	Medium to high	-1	1	2	2	2	-1,75	2	-3,5	Low	High	2	1	1,13	-3,94	Low
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Operational	-1	2	4	4	3	-3,25	4	-13	Medium to high	-1	2	4	2	3	-2,75	3	-8,25	Medium to low	High	2	1	1,13	-9,28	Medium to high
Increased human-wildlife conflicts due to habitat fragmentation (litter, pollution, road mortalities, poaching, etc.).	Operational	-1	2	4	3	3	-3	4	-12	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	1	1,13	-5,63	Medium to low
Environmental pollution due to water/ mine drainage runoff.	Operational	-1	3	4	3	3	-3,25	4	-13	Medium to high	-1	2	4	2	2	-2,5	2	-5	Medium to low	High	2	2	1,25	-6,25	Medium to low
Continuous stripping of topsoil for opencast mining, leading to ongoing land degradation, including erosion	Operational	-1	2	4	4	3	-3,25	4	-13	Medium to high	-1	2	4	3	3	-3	4	-12	Medium to high	High	2	1	1,13	-13,50	Medium to high
Continued encroachment by alien and invasive plant species	Operational	-1	3	5	3	3	-3,5	4	-14	High	-1	1	2	2	2	-1,75	2	-3,5	Low	Medium	2	1	1,13	-3,94	Low

Increased risk of soil erosion and instability due to removal of infrastructure.	Decommissioning	-1	2	3	4	3	-3	4	-12	Medium to high	-1	1	3	2	3	-2,25	3	-6,75	Medium to low	Medium	1	1	1,00	-6,75	Medium to low
Ongoing habitat destruction and disturbance to fauna from noise, dust, and artificial lighting.	Decommissioning	-1	2	3	3	3	-2,75	3	-8,25	Medium to low	-1	1	3	2	2	-2	2	-4	Low	High	2	1	1,13	-4,50	Medium to low
Slow regrowth of natural vegetation and potential further spread of alien and invasive species.	Rehab and Closure	-1	2	5	3	3	-3,25	4	-13	Medium to high	-1	2	2	2	3	-2,25	2	-4,5	Medium to low	Medium	1	1	1,00	-4,50	Medium to low

7.5 Appendix E: Specialist Declaration of Independence

I, Sarah Newman, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Sarah Newman

Terrestrial Ecologist

The Biodiversity Company

May 2025

I, Dr. Candyce Areington, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Dr. Candyce Areington

Terrestrial Ecologist

The Biodiversity Company

May 2025

I, Leigh-Ann de Wet, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Leigh-Ann de Wet

Terrestrial Ecologist

The Biodiversity Company

May 2025

7.6 Appendix F: Specialist CVs

Sarah Newman

M.Sc. Entomology

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Email: sarah@thebiodiversitycompany.com

Identity Number: 9312170034086

Date of birth: 17 December 1993

Profile Summary

Work experience throughout South Africa, as well as Lesotho, Angola, Mauritius and Costa Rica.

Extensive experience working in the Sani Pass region of southern Africa investigating the patterns and drivers of ant diversity across an elevation gradient.

Experience with sea turtle monitoring and conservation in Costa Rica.

Experience conducting terrestrial biodiversity specialist assessments throughout South Africa.

Areas of Interest

Entomology, Zoology, Biodiversity, Conservation and Community Ecology.

Key Experience

- Terrestrial Ecological Assessments
- Rehabilitation plans and monitoring
- Field work and research
- Taxonomic classification of insects

Country Experience

South Africa

Lesotho

Angola

Mauritius

Costa Rica

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Spanish – Conversational

Qualifications

- MSc Entomology (*Distinction*), University of Pretoria
- BSc (Hons) Zoology, University of Pretoria
- BSc Zoology, University of Pretoria
- Cand Nat Sci (158474)

Signed:

Sarah Newman

CURRICULUM VITAE: Sarah Newman

Dr Candyce Areington

PhD Plant Ecophysiology and Biotechnology (Cand. Sci. Nat. 167868)

Cell: +27 79 896 5889
Email: candyce@thebiodiversitycompany.com
Identity Number: 9112090106083
Date of birth: 9 December 1991

Profile Summary

Working experience throughout KwaZulu-Natal (South Africa).

Environmental Control Officer (ECO).

Specialist expertise in Climate Change and Plant Ecophysiology and Biochemistry.

Areas of Interest

Plant Ecophysiology, Biochemistry and Biochemistry.

Abiotic Stress.

Air Pollution.

Sustainability and Conservation.

Landscape rehabilitation.

Experimental Design.

Key Experience

- Vegetation Assessments
- Rehabilitation Plans Development and Implementation
- Monitoring programmes
- Field work and research

Country Experience

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Qualifications

- PhD Biological Sciences, University of KwaZulu-Natal
- MSc Biological Sciences (*Cum-laude),* University of KwaZulu-Natal
- BSc (Hons) Biological Sciences (*Cum laude*), University of KwaZulu-Natal
- BSc Environmental Science, University of KwaZulu-Natal
- Cand. Sci. Nat. 167868
- Snake Awareness, first aid for snakebites and venomous snake handling (ASI-January 2024)

Leigh-Ann de Wet

M.Sc. Botany (*Pr Sci Nat*)

Cell: +27 83 352 1936
Email: leigh-ann@thebiodiversitycompany.com
Identity Number: 8209010127081
Date of birth: 1 September 1982

Profile Summary

Working experience throughout South Africa, Southern Africa West and Central Africa and also Madagascar.

Specialist experience in exploration, mining, engineering, hydropower, private sector and renewable energy.

Experience with project management for national and international biodiversity projects.

Experience with IFC Performance Standards, Critical Habitat and High Conservation Value Assessments. Experience in numerous vegetation and habitat types throughout Africa,

Specialist expertise includes botany, forest ecology, avifauna and terrestrial fauna. Methodology development, conservation management and terrestrial monitoring.

Areas of Interest

Forest ecology and ecosystem functionality.

Ecology and plant identification.

Field methodology.

Publication of scientific journals and articles.

Key Experience

- World Bank, Equator Principles and the International Finance Corporation requirements
- Familiar with High Conservation Value assessments as per ProForest guidelines.
- Conservation Management Plans.
- Flora assessments.
- Avifauna assessments.
- Terrestrial fauna assessments.
- Monitoring.
- Ecosystem services
- Rehabilitation Plans.
- Alien Invasive Plant Management Plans.
- Permitting.

Country Experience

Mozambique, Botswana;

Malawi,

Zambia,

Madagascar,

Liberia,

Guinea'

Democratic Republic of the Congo,

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Zulu - Basic

Qualifications

- MSc (Rhodes University) – Botany.
- BSc Honours (Rhodes University) – Botany
- BSc Natural Science (Botany and Entomology)
- Pr Sci Nat (400233/12)
- Certificate of Competence: UFS Introduction to wetland delineation.
- Certificate of Competence: UFS Introduction to wetland law
- Certificate of competence: Africa Land Use Training Grass Identification (long and short course)
- Certificate of Competence: ASI Snake Awareness, first aid for snake bite and venomous snake handling.

Signed:

CURRICULUM VITAE: Leigh-Ann de Wet