



# **The Terrestrial and Freshwater Assessment for the proposed Solar Photovoltaic (PV) Energy Generation Facility at the Rhovan Vanadium Mine**

**Rustenburg Local Municipality, Bojanala  
Platinum District, Northwest Province**

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**CLIENT**



**Prepared by:**

**The Biodiversity Company**

Cell: +27 81 319 1225

Fax: +27 86 527 1965

[info@thebiodiversitycompany.com](mailto:info@thebiodiversitycompany.com)

[www.thebiodiversitycompany.com](http://www.thebiodiversitycompany.com)



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## Table of Acronyms

Acronym/Abbreviation	Definition
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CR	Critically Endangered
DD	Data Deficient
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Integrity and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
IBA	Important Bird Area
IAP	Invasive Alien Plants
IUCN	International Union for Conservation of Nature
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFEPA	National Freshwater Ecosystem Protection Assessment
NFA	National Forest Act, Act 84 of 1998
NNR	No Natural Habitat Remaining
NSBA	National Spatial Biodiversity Assessment
ONAs	Other Natural Areas
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SWMP	Storm Water Management Plan
ToR	Terms of reference
VU	Vulnerable

# 1 Introduction

## 1.1 Background

The Biodiversity Company was appointed by Rhovan Mine ("Rhovan") (RM), a Vanadium Opencast Mine to undertake a terrestrial (including Regime 1 avifauna) and freshwater ecology assessment for the Solar Photovoltaic (PV) Energy Generation Facility at the Rhovan Vanadium Mine (Figure 3-1 and **Figure 3-2**).

The survey focused on the project footprint and the 500 m regulation areas directly adjacent to the project area, hereafter referred to as the "project area". Furthermore, identification and description of any sensitive receptors were recorded across the project area, and how these sensitive receptors may be affected by the proposed development were also investigated.

This assessment was conducted per the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). This report was compiled to fulfil the requirement for a Terrestrial Biodiversity Assessment as per the 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 NEMA (GNR 320), as gazetted on 20 March 2020. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity. In terms of the 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 NEMA, gazetted on 30 October 2020, relating to requirements relating specifically to the Terrestrial Plant and Animal (species) themes, this report includes these requirements.

The following is deduced from the National Web-based Environmental Screening Tool:

- Terrestrial biodiversity theme is "High" for the proposed project due to traversing the following:
  - Ecological support area;
  - Endangered ecosystem; and
  - Protected Areas Expansion Strategy.
- Plant species theme ranges from Medium to Low for the project (Mostly Low) with several sensitive species predicted to be present;
- The avian theme sensitivity as indicated in the screening report was derived to be very High due to being within 50 km of breeding Cape vulture colonies;
- It is medium animal species sensitivity due to sensitive species being possibly present including the Makwassie musk shrew (*Crocidura maquassiensis*) which is listed as Vulnerable on the national red list; and
- The aquatic biodiversity theme is rates as "Low".

The purpose of the specialist studies is to provide relevant input into the authorisation process and to provide a report for the proposed activities associated with the project. 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 ecological viability of the proposed project.






## 1.2 Terms of Reference

The principal aim of the assessment was to provide information to guide the risk of the activity to the flora and fauna communities of the associated ecosystems within the project area. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the project area;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the project area;
- Field survey to ascertain the species composition of the present flora and fauna community within the project area;
- Delineate and map the habitats and their respective sensitivities that occur within the project area;
- The prescription of mitigation measures and recommendations for potential risks; and
- Provide measures to promote and enhance biodiversity in the project area.

## 2 Specialist Details

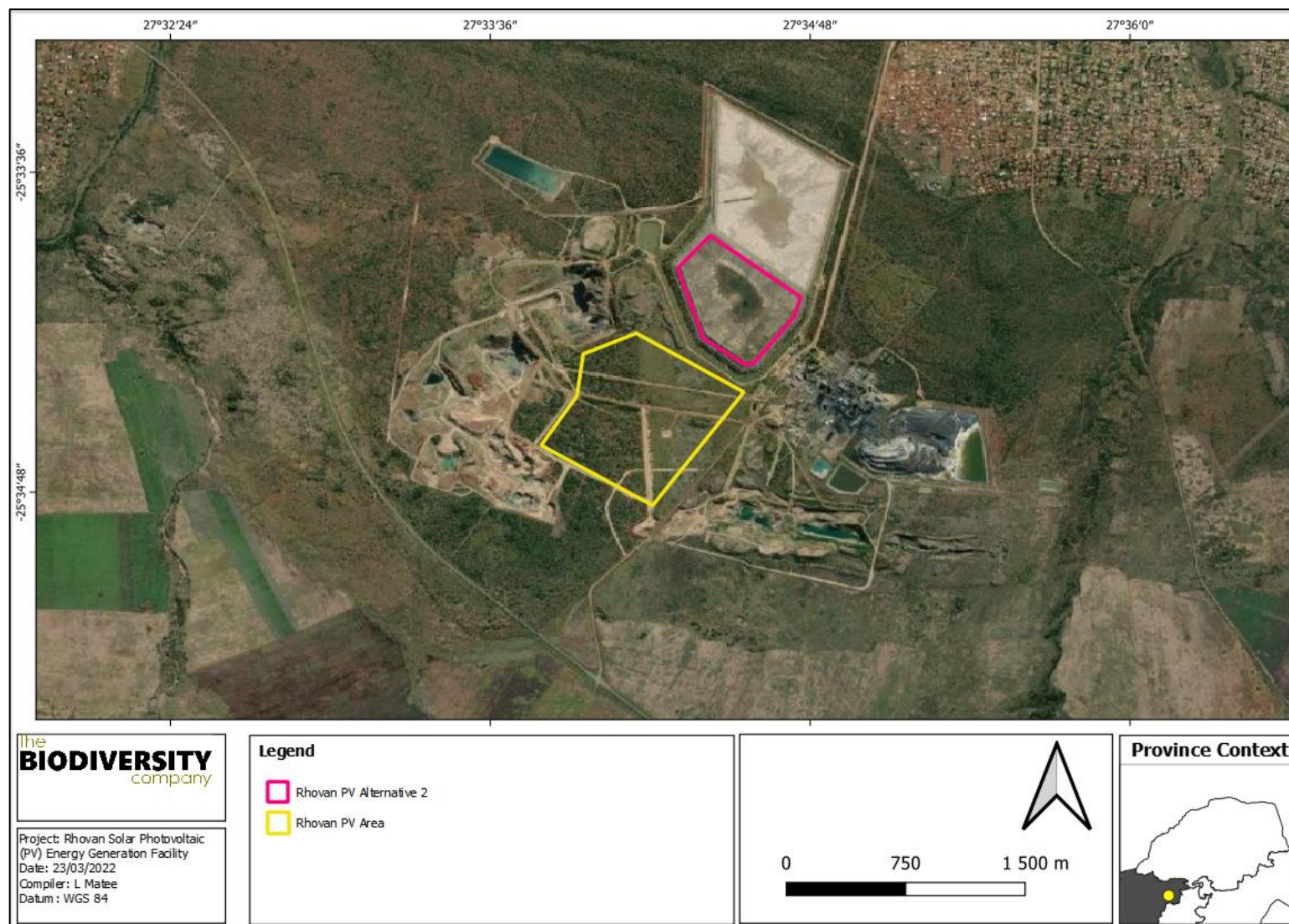
Report Name	<b>The Terrestrial and Freshwater Assessment for the proposed Solar Photovoltaic (PV) Energy Generation Facility at the Rhovan Vanadium Mine</b>
Reference	<b>Rhovan Solar Photovoltaic (PV)</b>
Submitted to	
Report Writer	<p><b>Lusanda Matee</b> </p> <p>Lusanda Matee is a Pr Sci Nat registered (119257/2018) in the fields of Biological Science. He is a specialist terrestrial ecologist and botanist who conducts floral surveys faunal surveys which include mammals, birds, amphibians, and reptiles for projects as per the International Finance Corporation Performance Standards notably IFC PS6, World Bank Operation Guidelines (OP/04.4), World Bank Environmental and Social Standards, in particular, ESS6, Equator Principles and best practice guidelines. He received a Bachelor of Science, Honours, and MSc in Biological Sciences from the University of KwaZulu-Natal.</p>
Report Writer / Reviewer	<p><b>Andrew Husted</b> </p> <p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.</p>
Declaration	<p>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 principles of science.</p>

### 3 Project area

The proposed project is located on portion 0 of the Farm Leeuwpenn 403 JQ and portion 0 of the Farm Beestkraal 397 JQ within the Rustenburg Local Municipality, Bojanala Platinum District, North West Province. RM is an established (est. 1990's) open cast Vanadium Mine and processing plant. RM is located near the towns of Berseba and Bethanie between Brits (Madibeng) and Rustenburg (Bojanala) in the Central Bankeveld of the North-West Province of South Africa. (Figure 3-1).







**Figure 3-2** Project boundary.

## 4 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 4-1 apply 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 4-1 A list of key legislative requirements relevant to these studies in the North West Province**

Region	Legislation
<b>International</b>	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	Rio Declaration on Environment and Development (1992)
	Convention on the Conservation of Migratory Species of Wild Animals (CMS) (1979)
	Conservation of African-Eurasian Migratory Water birds (AEWA) (2004)
	The United Nations Framework Convention on Climate Change (UNFCCC, 1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
<b>National</b>	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
<b>Provincial</b>	North West Biodiversity. Sector Plan (NW BSP) (2015)
	Transvaal Nature Conservation Ordinance (Ordinance 12 of 1983)

## 5 Methods

### 5.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

#### 5.1.1 Ecologically Important Landscape Features

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

- *National Biodiversity Assessment 2018 (Skowno et al, 2019) (NBA)*- The purpose of the NBA is to assess the state of South Africa's biodiversity based on the 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:
  - *Ecosystem Threat Status* – 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), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
  - *Ecosystem Protection Level* – an 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. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:

*South Africa Protected Areas Database (SAPAD) (DEA, 2021)* – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attributes information for both formally protected areas and areas that have less formal protection. SAPAD is updated continuously 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) (SANBI, 2017)* – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- 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).

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria; and
- 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.

### 5.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) was used to identify the vegetation type 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 project area (Figure 6-12). The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

### 5.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following, compiling an expected:

- Amphibian list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2427 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2427 quarter degree square;
- Avifauna list, generated from the Southern African Bird Atlas Project 2 (1:50 000 map grid references: 2527 DD); and
- Mammal list from the IUCN spatial dataset (2017).

A single field survey was undertaken in March 2022, which is a wet season survey, to determine the presence of Species of Conservation Concern (SCC). An effort was made to cover all the different habitat types, within the limits of time and access.

### 5.1.4 Flora Survey

The 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, to perform rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed mostly on sensitive habitats overlapping with the project areas.



The timed random meander method is highly efficient for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost-effective and highly suited for compiling 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 habitats 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., livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g., wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

#### **5.1.5 Fauna Survey**

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles), avifauna and mammals. The faunal field survey comprised of the following techniques:

- *Visual and auditory searches* - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed, and listening to species calls;
- *Active hand-searches* - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.); and
- Utilization of local knowledge.

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

- 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);
- Smithers' Mammals of Southern Africa (Apps, 2000);
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000);
- Sinclair and Ryan (2010), Birds of Africa. Secondary source for identification;
- Taylor *et al.* (2015), Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland. Used for conservation status, nomenclature, and taxonomical ordering.

##### **5.1.5.1 Avifaunal Assessment**

Sampling consisted of standardized point counts as well as random diurnal incidental surveys and vantage point surveys. Standardized point counts (following Buckland *et al.* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. Each point count was run over a 5 min period. The horizontal detection limit was set at 50 m. At each point, the observer would document the date, start time and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal



incidental searches were conducted. This involved the opportunistic sampling of species between point count periods and road cruising.

#### **5.1.5.2 Data analysis**

Point count data were arranged into a matrix with point count samples in rows and species in columns. Present and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore, then by the medium upon/within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

#### **5.1.6 Wetland Assessment**

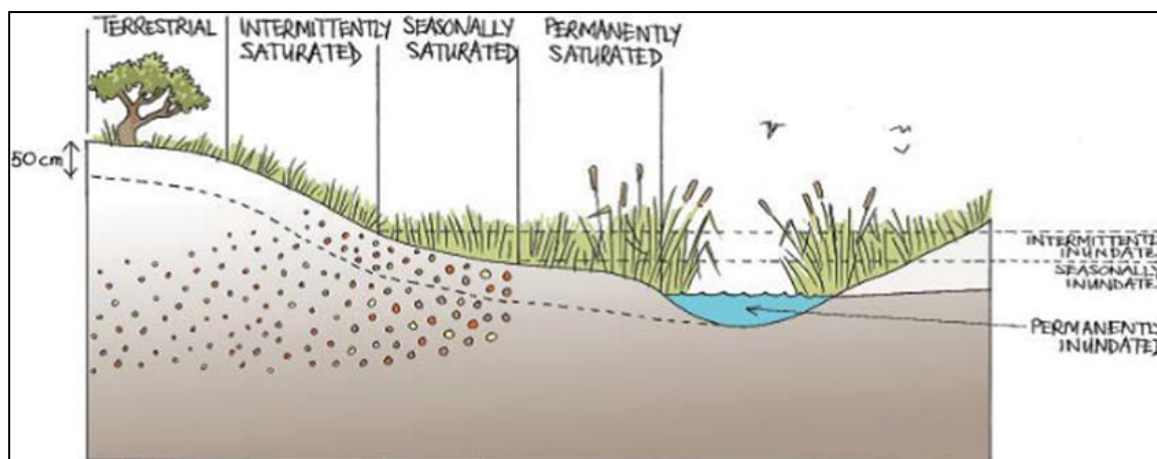
##### **5.1.6.1 Wetland Identification and Mapping**

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) was considered for this assessment. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels. In addition, the method also includes the assessment of structural features at the lower levels of classification (Ollis *et al.*, 2013).

The wetland areas are delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 5-1. The outer edges of the wetland areas were identified by considering the following four specific indicators:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
  - The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.



**Figure 5-1** Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

#### 5.1.6.2 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. EcoServices serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze et al. 2008). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 5-1).

**Table 5-1** Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

#### 5.1.6.3 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 5-2.

**Table 5-2** The Present Ecological Status categories (Macfarlane et al., 2009)

Impact Category	Description	Impact Score Range	Present State Category
None	Unmodified, natural	0 to 0.9	A
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	C

Large	<b>Largely Modified.</b> A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	<b>Seriously Modified.</b> The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	<b>Critical Modification.</b> The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

#### 5.1.6.4 Ecological Importance and Sensitivity

The method used for the Importance and Sensitivity (IS) determination was adapted from the method as provided by DWS (1999) for floodplains. The method takes into consideration PES scores obtained for WET-Health as well as function and service provision to enable the assessor to determine the most representative ES category for the wetland feature or group being assessed. A series of determinants for IS are assessed on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. The mean of the determinants is used to assign the IS category as listed in Table 5-3 (Rountree and Kotze, 2013).

**Table 5-3 Description of Ecological Importance and Sensitivity categories**

EIS category	Range of mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	A
High	2.1 to 3.0	B
Moderate	1.1 to 2.0	C
Low Marginal	< 1.0	D

#### 5.1.6.5 Determining Buffer Requirements

The “Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries” (Macfarlane *et al.*, 2014) was used to determine the appropriate buffer zone for the proposed activity.

#### 5.1.6.6 Risk Assessment

The risk assessment was conducted in accordance with the DHSWS risk-based water use authorisation approach and delegation guidelines. The significance of the impact is calculated according to Table 5-4.

**Table 5-4 Significance ratings matrix**

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

## 5.2 Terrestrial Site Ecological Importance

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern 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 on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 5-5 and

Table 5-6, respectively.

**Table 5-5 Summary of Conservation Importance (CI) criteria**

Conservation Importance	Fulfilling Criteria
<b>Very High</b>	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 <sup>2</sup> . Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
<b>High</b>	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km <sup>2</sup> . 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).
<b>Medium</b>	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 ten 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. > Fifty percent of receptor contains natural habitat with potential to support SCC.
<b>Low</b>	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < Fifty percent of receptor contains natural habitat with limited potential to support SCC.
<b>Very Low</b>	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

**Table 5-6 Summary of Functional Integrity (FI) criteria**

Functional Integrity	Fulfilling Criteria
<b>Very High</b>	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.
<b>High</b>	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.
<b>Medium</b>	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.
<b>Low</b>	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.
<b>Very Low</b>	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 5-7.

**Table 5-7 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)**

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very high	High	Medium	Low	Very low
Functional Integrity (FI)	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 5-8.

**Table 5-8 Summary of Resource Resilience (RR) criteria**

Resilience	Fulfilling Criteria
<b>Very High</b>	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.
<b>High</b>	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (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.
<b>Medium</b>	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.
<b>Low</b>	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (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.
<b>Very Low</b>	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.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 5-9.

**Table 5-9 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)**

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	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 project is provided in Table 5-10.

**Table 5-10 Guidelines for interpreting Site Ecological Importance in the context of the development activities**

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

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 conform to the highest CI and FI, and the lowest RR across all taxa.

### 5.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends;
- Only a single season survey will be conducted for the respective studies, this would constitute a wet season survey; and
- The GPS used in the assessment has an accuracy of 5 m and consequently, any spatial features may be offset by 5 m.

## 6 Results & Discussion

### 6.1 Literature Review

An EMPr Terrestrial Biodiversity Assessment was conducted for the 2020 financial year by Agreeco. Based on the results of this assessment, total of 71 species represented by 1 088 individuals was recorded during the FY2020 avifaunal survey. One regionally threatened species the Yellow-throated Sandgrouse (*Pterocles gutturalis*) (NT) was recorded incidentally on Rhovan. No other reports were available, however according to the report mentioned above avifaunal surveys have been undertaken on a quantitative basis since 2011 at Rhovan. For herpetofauna species a total of 11 and four amphibian and reptile species, respectively were recorded during the above-mentioned survey. In terms of mammal species only four species were recorded. None of the mammal and herpetofauna species recorded were SCC.



## 6.2 Desktop Spatial Assessment

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and the SANBI. The desktop analysis and their relevance to this project are listed in Table 6-1.

**Table 6-1 Desktop spatial features examined.**

Desktop Information Considered	Relevant/Irrelevant	Section
<b>Critical Biodiversity Area</b>	Irrelevant: The project area traverses CBA 2 areas according to the NWBSP	6.2.1.1
<b>Ecosystem Threat Status</b>	Relevant: The project area falls within an ecosystem which is listed as an EN ecosystem.	6.2.1.2.1
<b>Ecosystem Protection Level</b>	Relevant: The project area falls in a "Poorly Protected" area.	6.2.1.2.2
<b>National Threatened Ecosystem</b>	The project area falls within the Marikana Thornveld (SVcb 6) (original extent) which is currently listed as Vulnerable (VU)	6.2.1.3
<b>National Protected Areas Expansion Strategy</b>	Relevant: The project area marginally overlaps with a Priority Focus Area	6.2.1.4
<b>South African Inventory of Inland Aquatic Ecosystems</b>	The project area does not overlap or traverse any NBA River or NBA wetlands, it is however close to CR Rivers and CR wetlands (ca. 3 km)	6.2.1.5
<b>National Freshwater Priority Area</b>	The NFEPA spatial data indicates that no FEPA wetlands were identified within the project area and the closest river is more than 2 km from the project area (NFEPA 0= None) (	6.2.1.6
<b>Protected Areas</b>	Irrelevant: No protected areas can be found in close proximity to the project area.	6.2.1.7
<b>Coordinated Avifaunal Roadcount (CAR)</b>	The project area is 50 km away from the closest CAR routes	6.2.1.8
<b>The Coordinated Waterbird Count (CWAC)</b>	The Coordinated Waterbird Count (CWAC) areas data were reviewed and revealed that there are no CWAC areas through the project area. The nearest Coordinated Waterbird Counts (CWAC) site is Vaalkop Dam (25202728) which is situated 30.56 km northeast of the project area	6.2.1.9
<b>Strategic Water Source Areas</b>	The project area does not traverse any SWSA	-
<b>Important Bird and Biodiversity Areas</b>	Relevant: No Important Bird and Biodiversity Areas (IBAs) are situated within the project area. The proposed project area is however located approximately 12 km north of the Magaliesberg IBA.	6.2.1.11
<b>Vegetation Type</b>	The project area occurs in the Marikana Thornveld (SVcb 6) which is Endangered (EN).	6.2.2

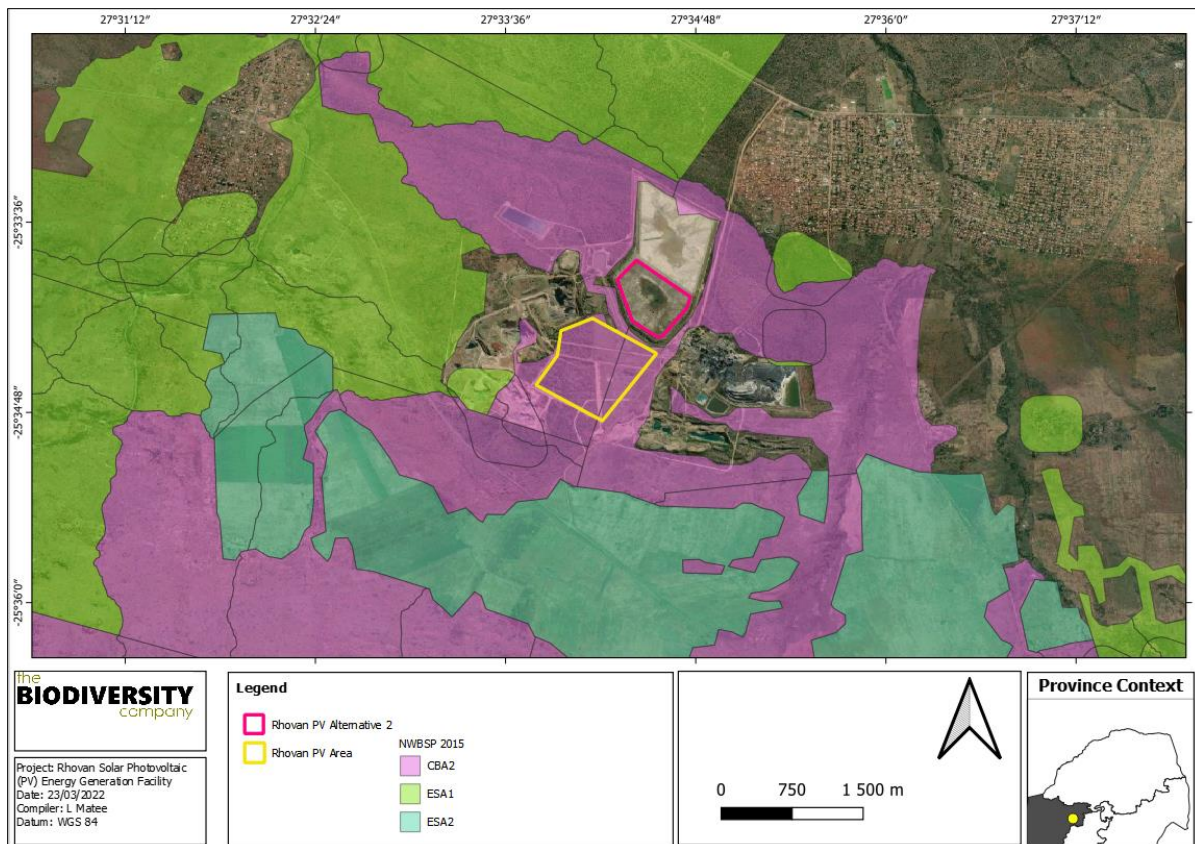
### 6.2.1.1 Critical Biodiversity Areas (CBA)

The North West - Department of Agriculture, Conservation, Environment and Rural Development (NWREAD) developed the North West Biodiversity Sector Plan (NWBSP) in 2015. In essence, the NWBSP is a map guiding areas of conservation concern for the North West Province. Two maps have been developed, namely one for terrestrial biodiversity, and the other for freshwater/aquatic biodiversity. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by NWREAD. 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 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 (NWREAD, 2015).

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (NWREAD, 2015).

Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of the restriction on land use and resource use in these areas may be lower than that recommended for CBAs (NWREAD, 2015).

The project areas traverses a Critical Biodiversity Area two (CBA 2) in accordance with the NWBSP. (Figure 6-1). CBA2 areas reflect an optimum configuration for reaching provincial biodiversity targets for ecosystem types, species or ecological processes (Collins, 2017). In terms of managing the loss of natural habitat in CBAs, the NWBSP 2015 states, amongst others, that 'further loss of natural habitat should be avoided in CBA 1, whereas loss should be minimised in CBA 2 i.e., land in these two categories should be maintained as natural vegetation cover as far as possible. However, the project area is already in a degraded state and does not reflect that of a CBA2 area.



**Figure 6-1** The proposed Rhovan Solar Photovoltaic (PV) Project in relation to the NWBSP (READ, 2015)

### 6.2.1.2 The National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over three years (Skowno *et al.*, 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al.*, 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al.*, 2019).

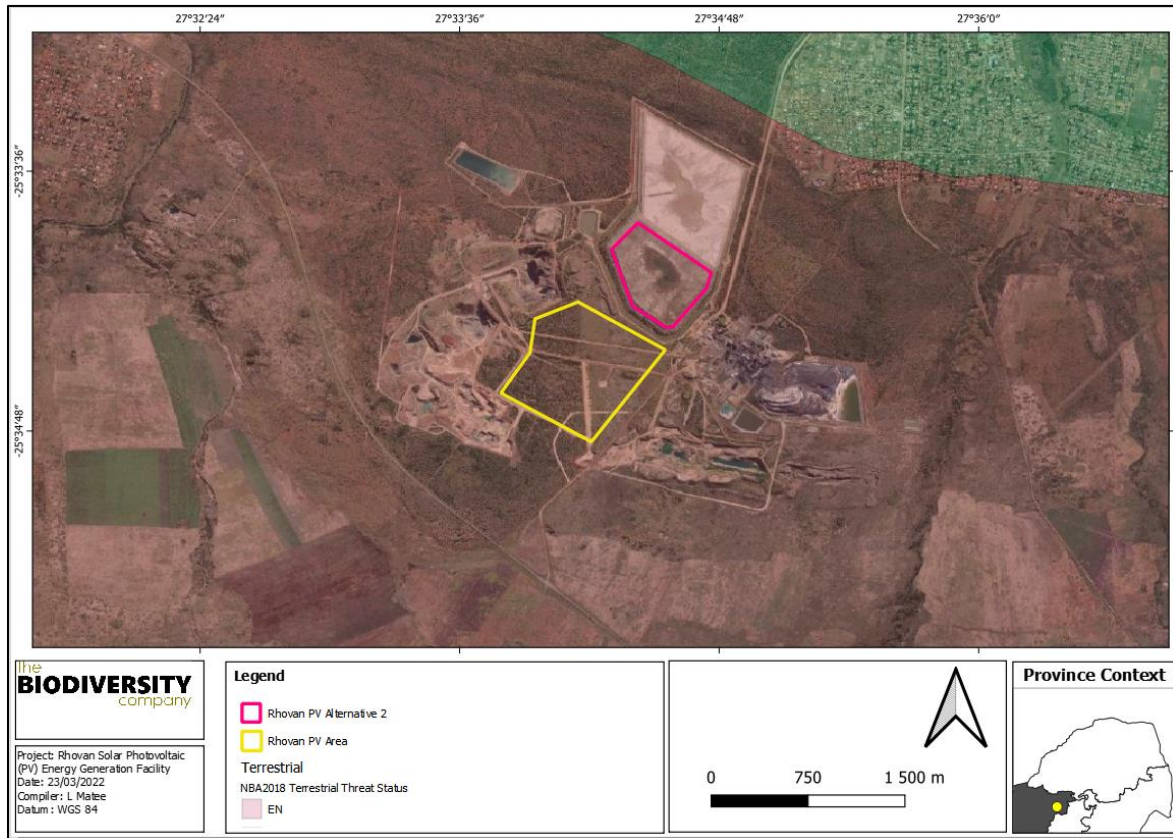


#### 6.2.1.2.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al.*, 2019).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al.*, 2019).

The project area was superimposed on the terrestrial ecosystem threat status (Figure 6-2). As seen in this figure, the project area falls in an EN ecosystem.

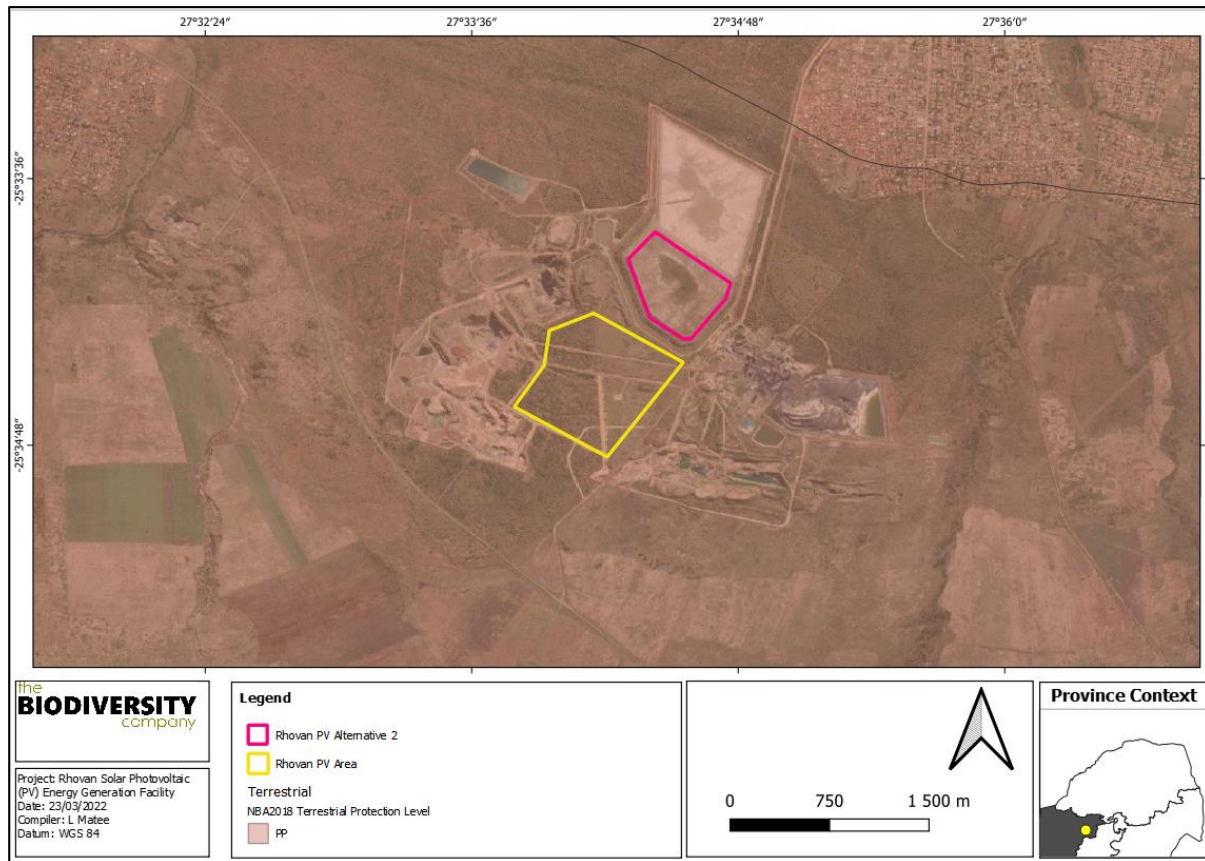


**Figure 6-2** Map illustrating the ecosystem threat status associated with the project area.

#### 6.2.1.2.2 Ecosystem Protection Level

The ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected (NP), poorly protected (PP), moderately protected (MP) or well protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.*, 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development. Based on Figure 6-3 the terrestrial ecosystem associated with the project area is rated as *PP* for the entire project area. This means that these ecosystems are considered not to be adequately protected in areas such as national parks or other formally protected areas.



**Figure 6-3** Map illustrating the ecosystem protection level associated with the project area.

### 6.2.1.3 The National List of Threatened Terrestrial Ecosystems

The National List of Threatened Terrestrial Ecosystems for South Africa (NEM:BA: National list of ecosystems that are threatened and in need of protection, (GN 34809, GN 1002), 9 December 2011) was published in terms of NEM: BA and the list categorizes ecosystems into Critically Endangered (CR) which have undergone severe degradation; Endangered (EN) which have undergone lesser degradation; Vulnerable (VU), which are at a high risk of undergoing degradation and protected which are of high conservation importance. The criteria used for identifying threatened terrestrial ecosystems was done through extensive stakeholder engagement and based on the best available science. The criteria for thresholds for CR, EN, and VU ecosystems are summarized in Table 6-2.

**Table 6-2 Criteria used to identify threatened terrestrial ecosystems**

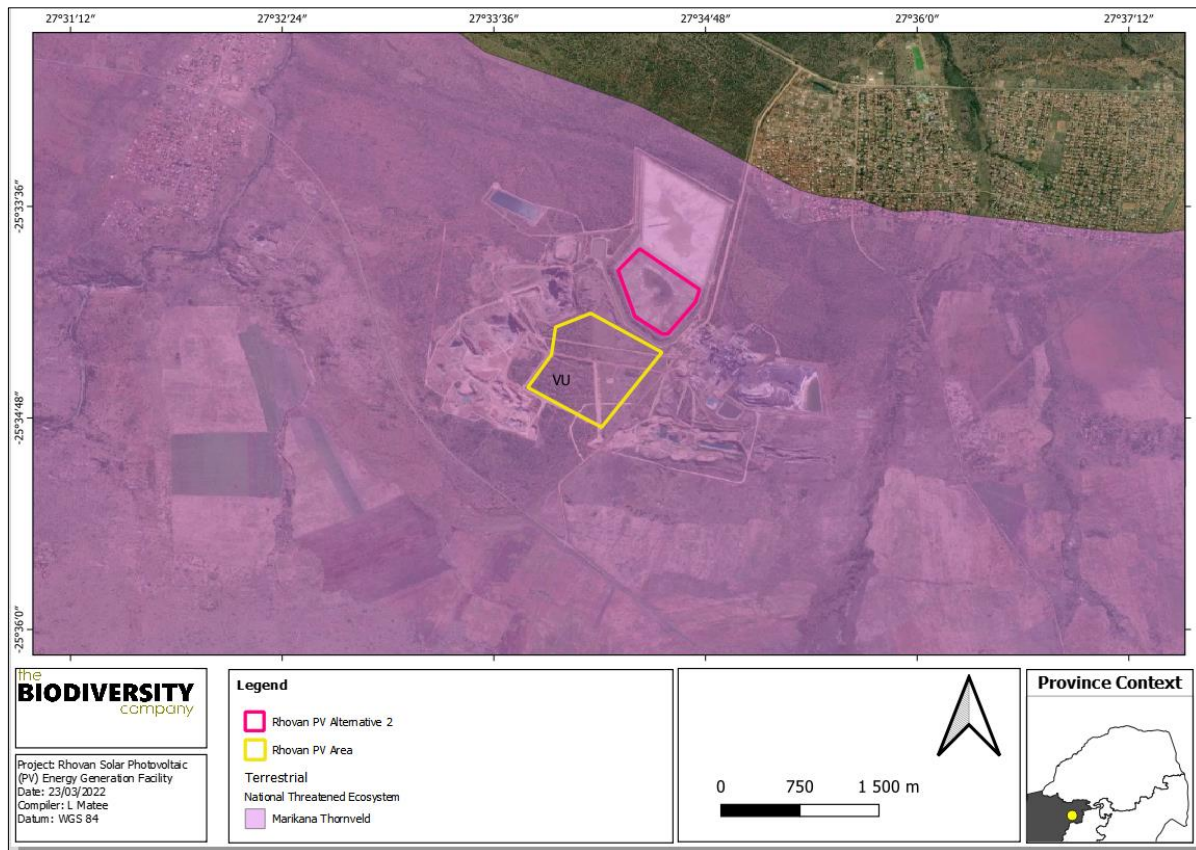
Criterion	Critically Endangered	Endangered	Vulnerable
<b>A1: Irreversible loss of natural habitat</b>	Remaining natural habitat < biodiversity target	Remaining natural habitat < biodiversity target + 15%	Remaining natural habitat < 60% of the original area
<b>A2: Ecosystem degradation and loss of integrity</b>	> 60% of ecosystem significantly degraded	> 40% of ecosystem significantly degraded	> 20% of ecosystem significantly degraded
<b>C: Limited extent and imminent threat</b>	-	Ecosystem extent < 3000ha and imminent threat	Ecosystem extent < 6000ha and imminent threat
<b>D: Threatened plant species associations</b>	> 80 threatened Red List plant species	> 60 threatened Red List plant species	> 40 threatened Red List plant species
<b>F: Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan</b>	Very high irreplaceability and high threat	Very high irreplaceability and medium threat	Very high biodiversity and low threat

There are four main types of implications of listed ecosystems on development:

- Planning related implications, linked to the requirement in the National Environmental Management Biodiversity Act (NEM: BA) for listed ecosystems to be considered in municipal Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs);
- Environmental authorisation implications, especially in terms of NEMA and EIA regulations;
- Proactive management implications, in terms of the Biodiversity Act; and
- Monitoring and reporting implications, in terms of the Biodiversity Act.

The project area falls within the Marikana Thornveld (SVcb 6) (original extent) which is currently listed as Vulnerable (VU) (Figure 6-4). According to the description in GN 1002, the Marikana Thornveld falls under Criterion A1, which identifies ecosystems that have undergone loss of natural habitat, impacting on their structure, function, and composition. Loss of natural habitat includes outright loss, for example the removal of natural habitat for cultivation, building of infrastructure, mining etc., as well as severe degradation. An ecosystem is categorised as vulnerable if the extent of remaining natural habitat in the ecosystem is less than or equal to 60% of the original extent of the ecosystem. For this purpose, habitat is considered severely degraded if it would be unable to recover to a natural or near-natural state following the removal of the cause of the degradation (e.g., invasive aliens, over-grazing), even after very long time periods. For EIAs, the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the NEMA. However, the updated 2018 ecosystem threat status has been considered in the assessment of impact significance in EIAs. The purpose of listing threatened, or protected ecosystems is primarily to preserve sites of exceptionally high conservation value.



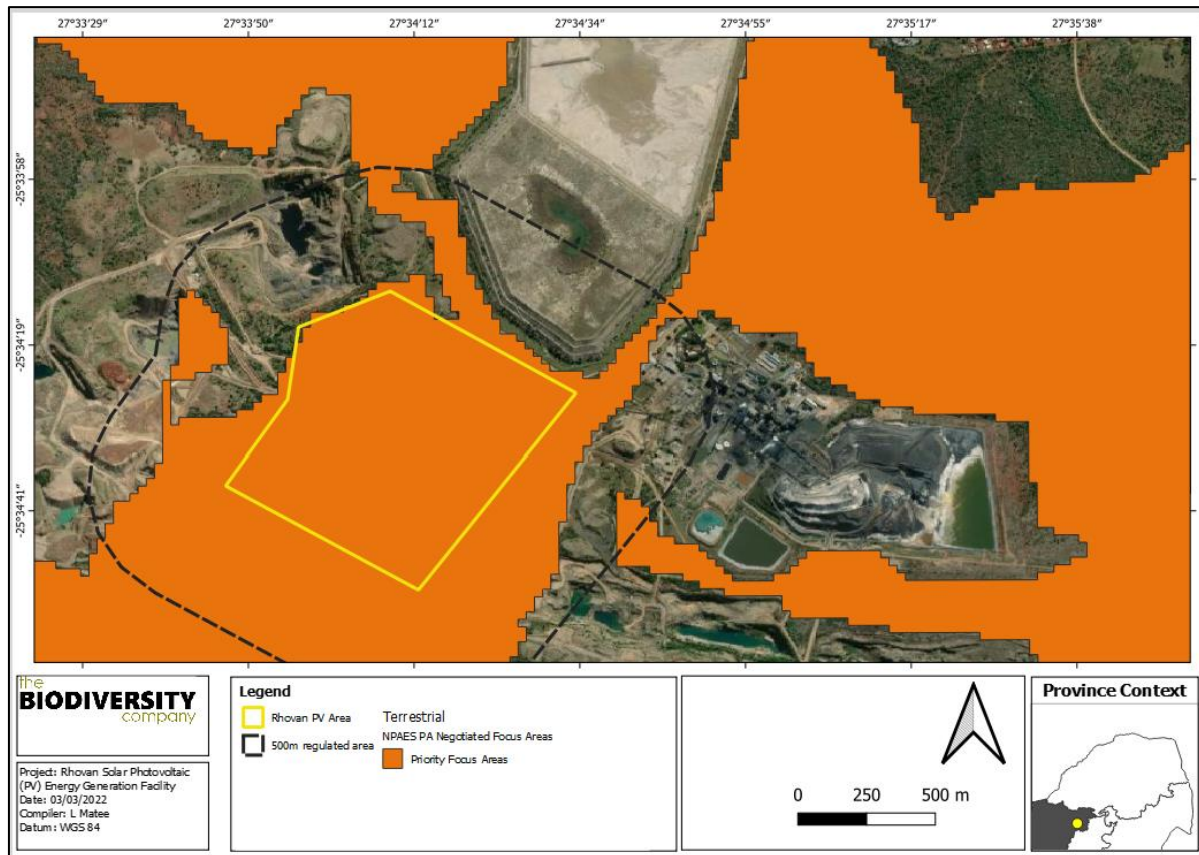


**Figure 6-4** Map illustrating the locations of National Threatened Ecosystems proximal to the Rhovan Solar Photovoltaic (PV) area.

#### 6.2.1.4 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning which may identify a range of different priority sites based on local requirements, constraints, and opportunities (NPAES, 2016).

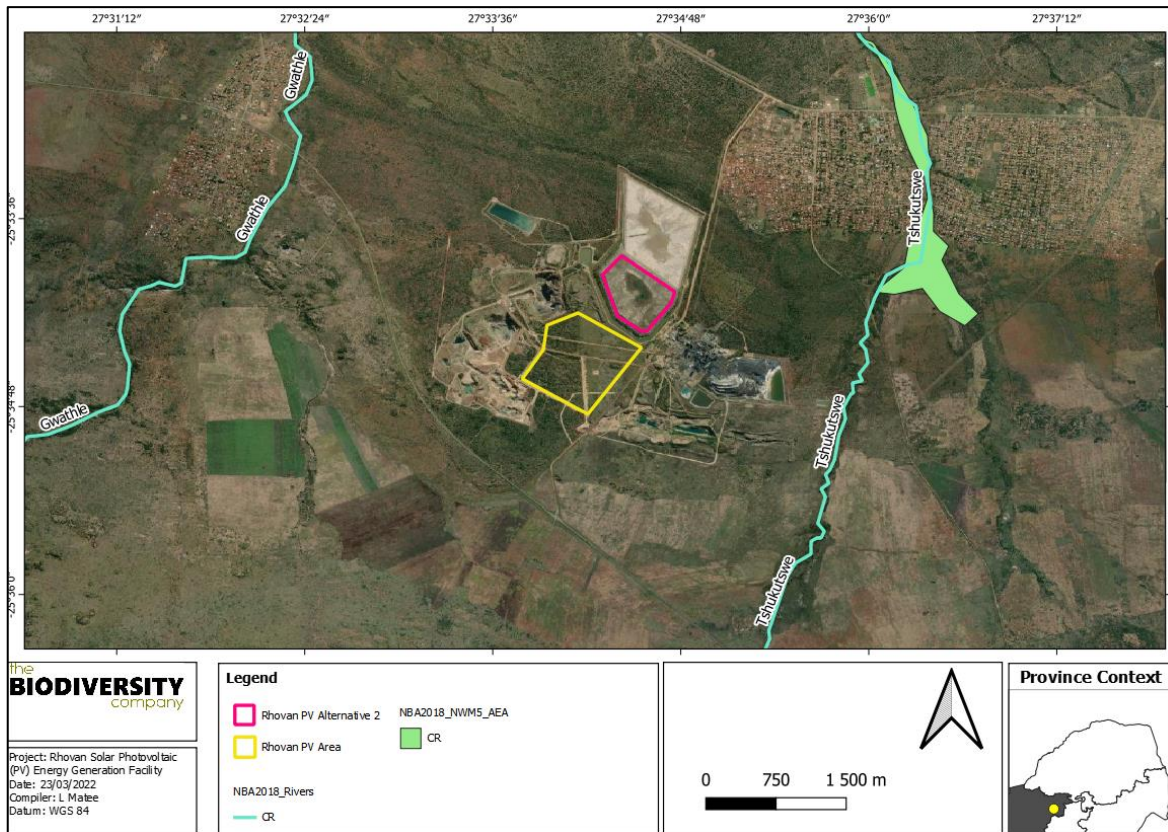
The project area majorly overlaps with a Priority Focus Area as can be seen in Figure 6-5.



**Figure 6-5** The project area in relation to the National Protected Area Expansion Strategy (2016)

#### 6.2.1.5 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. The ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.*, 2019; Skowno *et al.*, 2019). The project area does not overlap or traverse any NBA River or NBA wetlands, it is however close to CR Rivers and CR wetlands (ca. 3 km) (Figure 6-6).



**Figure 6-6** Map illustrating ecosystem threat status of river and wetland ecosystems in the project area.

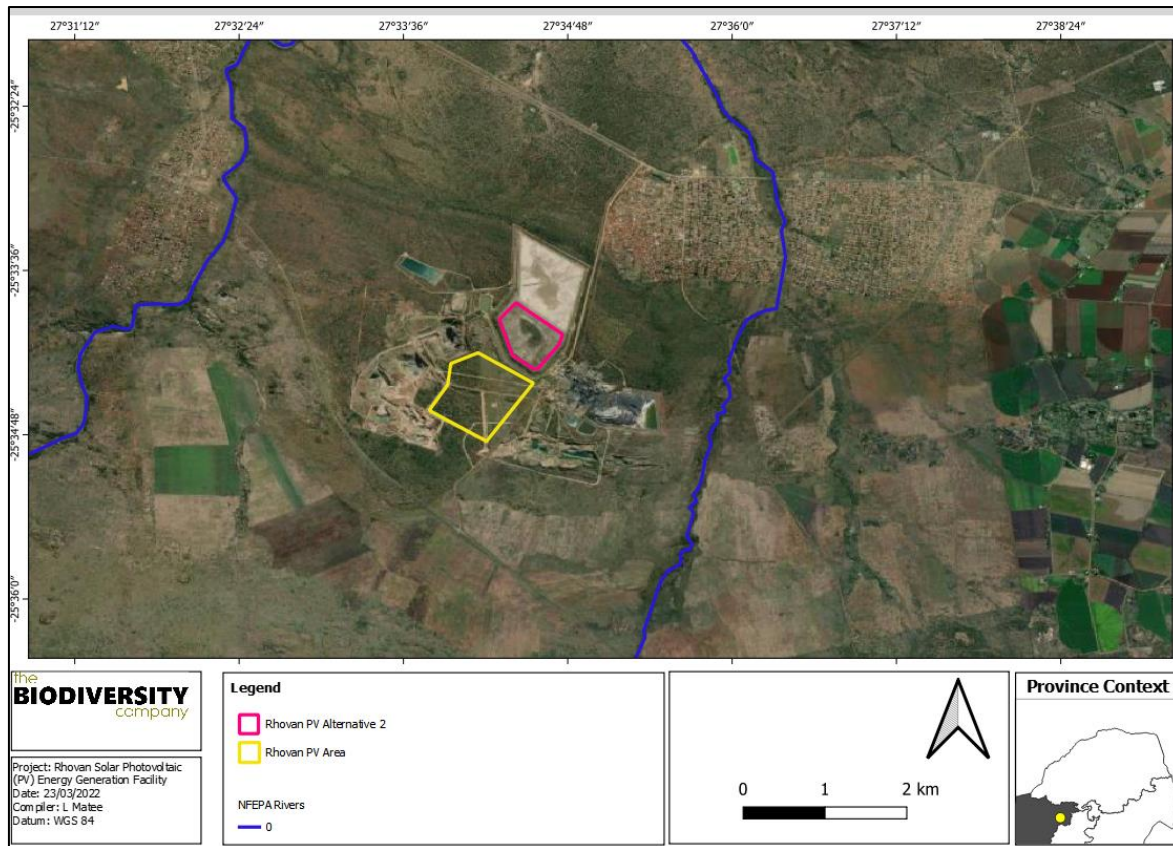
#### 6.2.1.6 National Freshwater Ecosystem Priority Area Status

The NFEPA spatial data has been incorporated in the above mentioned SAIIAE spatial data set. However, to ensure that these data sets are considered we included them as the Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM: BA) biodiversity goals (Nel *et al.*, 2011). The NFEPA programme provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas, or FEPAs. The system comprises a hierarchical classification process of defining a wetland based on the principles of the hydro-geomorphic (HGM) approach at higher levels, with structural features being included at the finer levels (SANBI, 2009). Wetland ecosystem types were used by NFEPA for representing natural examples of the diversity of wetland ecosystem types across South Africa. Wetlands of the same ecosystem type are expected to share similar functionality and ecological characteristics. The biodiversity target for freshwater ecosystems in South Africa is 20%, which means that we should keep at least 20% of each wetland ecosystem type in a natural or near-natural condition. This serves to conserve many common species and communities, and the habitats in which they evolve. Information used to classify wetlands as FEPAs included:

- Ramsar status;
- Known threatened frog and water bird occurrences; and
- Expert knowledge on biodiversity importance.



The NFEPA spatial data indicates that no FEPA wetlands were identified within the project area and the closest river is more than 2 km from the project area (NFEPA 0= None) (Figure 6-7).



**Figure 6-7** The project area in relation to the National Freshwater Ecosystem Priority Areas.

### 6.2.1.7 Protected Area

The Department of Environmental Affairs maintains a spatial database on Protected Areas and Conservation Areas. Protected Areas and Conservation Areas (PACA) Database scheme that is used for classifying protected areas (South Africa Protected Areas Database-SAPAD) and conservation areas (South Africa Conservation Areas Database-SACAD) into types and sub-types in South Africa.

The definition of protected areas used in these documents follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas:

- Special nature reserves;
- National parks;
- Nature reserves;
- Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003);
- World heritage sites declared in terms of the World Heritage Convention Act;
- Marine protected areas declared in terms of the Marine Living Resources Act;

- Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and
- Mountain catchment areas are declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

The types of conservation areas that are currently included in the database are the following:

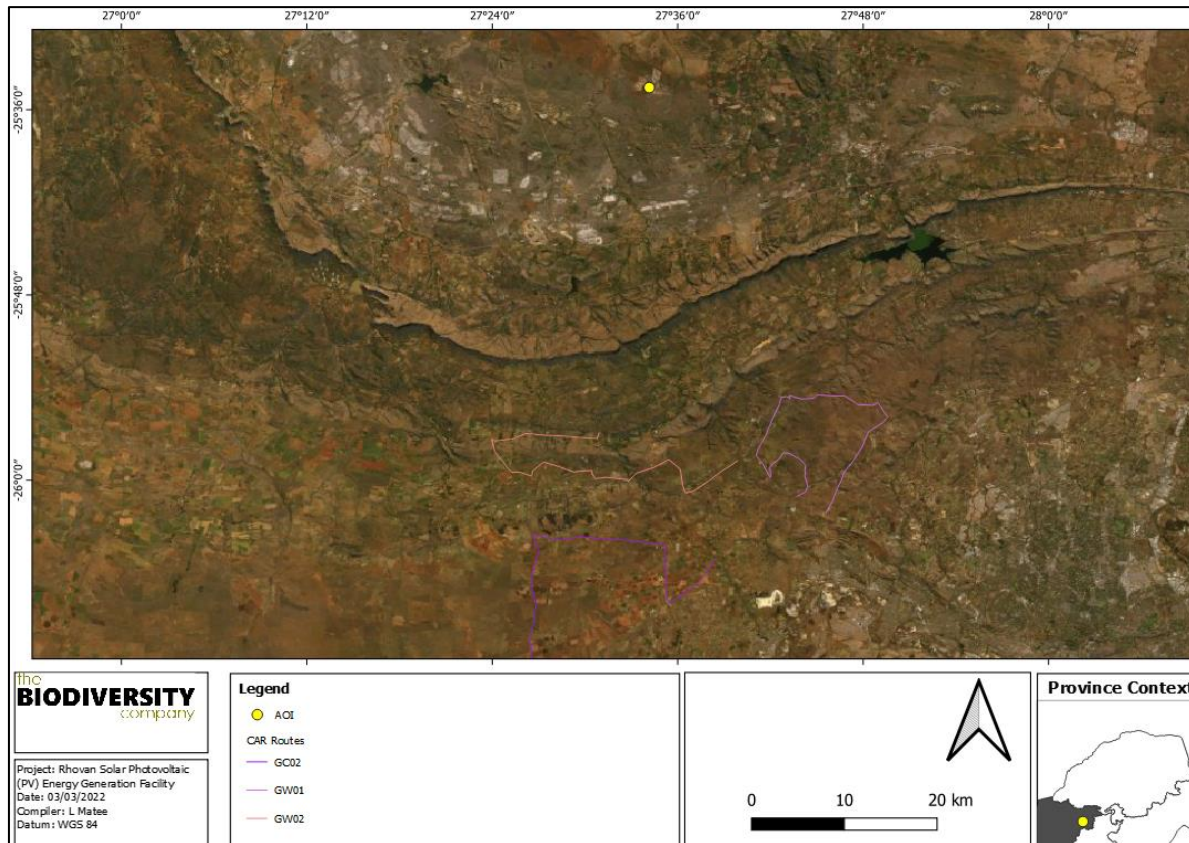
- Biosphere reserves;
- Ramsar sites;
- Stewardship agreements (other than nature reserves and protected environments);
- Botanical gardens;
- Transfrontier conservation areas;
- Transfrontier parks;
- Military conservation areas and
- Conservancies.

The project area does not overlap with any Protected Area.

#### **6.2.1.8 Coordinated Avifaunal Roadcount (CAR)**

The ADU/Cape bird club pioneered avifaunal Roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane *Anthropoides paradiseus* and Denham's/Stanley's Bustard *Neotis denhami*. Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), Roadcount are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 6-8 shows that the project area is 50 km away from the closest CAR routes.





**Figure 6-8** The project area in relation to the Coordinated Avifaunal Roadcount route

#### 6.2.1.9 Coordinated Waterbird Count

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to International waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC please refer to <http://cwac.birdmap.africa/about.php>. The Coordinated Avifaunal Road-count (CAR) and Coordinated Waterbird Count (CWAC) areas data were reviewed and revealed that there are no CAR routes or (CWAC) areas through the project area. The nearest Coordinated Waterbird Counts (CWAC) site is Vaalkop Dam (25202728) which is situated 30.56 km northeast of the project area. Figure 6-9 illustrates the area that were focused on in the count. Table 6-3 shows the reporting rate of the water bird species associated with the Vaalkop dam system.

**Table 6-3 Species recorded at the Vaalkop dam during the CWAC during the period 1993-2019**

Common name	Taxonomic name	Avg	IBA	Subregional	RAMSAR
				IBA	
Hamerkop	<i>Scopus umbretta</i>	4.09			
Ruff	<i>Calidris pugnax</i>	38.79			
Avocet, Pied	<i>Recurvirostra avosetta</i>	8.40			
Bittern, Little	<i>Ixobrychus minutus</i>	2.40			
Coot, Red-knobbed	<i>Fulica cristata</i>	554.95		2500	
Cormorant, Reed	<i>Microcarbo africanus</i>	257.00			
Cormorant, White-breasted	<i>Phalacrocorax lucidus</i>	327.43			130

<b>Crake, Black</b>	<i>Zapornia flavirostra</i>	7.31			
<b>Darter, African</b>	<i>Anhinga rufa</i>	91.84		250	
<b>Duck, African Black</b>	<i>Anas sparsa</i>	2.56			
<b>Duck, Domestic</b>	<i>Anas platyrhynchos</i>	1.00			
<b>Duck, Fulvous Whistling</b>	<i>Dendrocygna bicolor</i>	5.67			
<b>Duck, Knob-billed</b>	<i>Sarkidiornis melanotos</i>	67.05			
<b>Duck, Maccoa</b>	<i>Oxyura maccoa</i>	3.00			
<b>Duck, Unidentified</b>	N/A N/A	6.00			
<b>Duck, White-backed</b>	<i>Thalassornis leuconotus</i>	1.75			
<b>Duck, White-faced Whistling</b>	<i>Dendrocygna viduata</i>	135.39			
<b>Duck, Yellow-billed</b>	<i>Anas undulata</i>	33.88			
<b>Eagle, African Fish</b>	<i>Haliaeetus vocifer</i>	9.05			
<b>Egret, Great</b>	<i>Ardea alba</i>	16.93			
<b>Egret, Intermediate</b>	<i>Ardea intermedia</i>	9.18			
<b>Egret, Little</b>	<i>Egretta garzetta</i>	32.00			
<b>Egret, Slaty</b>	<i>Egretta vinaceigula</i>	1.00			
<b>Egret, Western Cattle</b>	<i>Bubulcus ibis</i>	209.79			
<b>Flamingo, Greater</b>	<i>Phoenicopterus roseus</i>	12.30			
<b>Flamingo, Lesser</b>	<i>Phoeniconaias minor</i>	4.50			
<b>Flufftail, Red-chested</b>	<i>Sarothrura rufa</i>	2.00			
<b>Godwit, Black-tailed</b>	<i>Limosa limosa</i>	4.00			
<b>Goose, Egyptian</b>	<i>Alopochen aegyptiaca</i>	262.33			
<b>Goose, Spur-winged</b>	<i>Plectropterus gambensis</i>	62.98			
<b>Grebe, Great Crested</b>	<i>Podiceps cristatus</i>	21.48	50	25	100
<b>Grebe, Little</b>	<i>Tachybaptus ruficollis</i>	113.00	500	250	
<b>Greenshank, Common</b>	<i>Tringa nebularia</i>	5.09			
<b>Gull, Grey-headed</b>	<i>Chroicocephalus cirrocephalus</i>	30.47			
<b>Gull, Unidentified</b>	N/A N/A	1.00			
<b>Heron, Black</b>	<i>Egretta ardesiaca</i>	15.80			
<b>Heron, Black-crowned Night</b>	<i>Nycticorax nycticorax</i>	3.75			
<b>Heron, Black-headed</b>	<i>Ardea melanocephala</i>	8.19			
<b>Heron, Goliath</b>	<i>Ardea goliath</i>	4.88			
<b>Heron, Grey</b>	<i>Ardea cinerea</i>	36.46			
<b>Heron, Purple</b>	<i>Ardea purpurea</i>	3.65			
<b>Heron, Squacco</b>	<i>Ardeola ralloides</i>	8.11			
<b>Heron, Striated</b>	<i>Butorides striata</i>	4.54			
<b>Ibis, African Sacred</b>	<i>Threskiornis aethiopicus</i>	21.33			
<b>Ibis, Glossy</b>	<i>Plegadis falcinellus</i>	5.71			
<b>Ibis, Hadada</b>	<i>Bostrychia hagedash</i>	5.42			

Jacana, African	<i>Actophilornis africanus</i>	26.03			
Kingfisher, Giant	<i>Megaceryle maxima</i>	1.61			
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>	1.00			
Kingfisher, Malachite	<i>Corythornis cristatus</i>	5.67			
Kingfisher, Pied	<i>Ceryle rudis</i>	29.71			
Lapwing, African Wattled	<i>Vanellus senegallus</i>	4.75			
Lapwing, Blacksmith	<i>Vanellus armatus</i>	72.63			
Martin, Brown-throated	<i>Riparia paludicola</i>	1.00			
Moorhen, Common	<i>Gallinula chloropus</i>	7.14			
Osprey, Western	<i>Pandion haliaetus</i>	1.14			
Painted-snipe, Greater	<i>Rostratula benghalensis</i>	1.00			
Plover, Common Ringed	<i>Charadrius hiaticula</i>	2.50			
Plover, Kittlitz's	<i>Charadrius pecuarius</i>	21.48			
Plover, Three-banded	<i>Charadrius tricollaris</i>	18.15			
Pochard, Southern	<i>Netta erythrophthalma</i>	9.86			
Pratincole, Black-winged	<i>Glareola nordmanni</i>	579.00	100	50	
Rail, African	<i>Rallus caerulescens</i>	1.00			-1
Sandpiper, Common	<i>Actitis hypoleucos</i>	4.17			
Sandpiper, Curlew	<i>Calidris ferruginea</i>	5.29			
Sandpiper, Marsh	<i>Tringa stagnatilis</i>	7.13			
Sandpiper, Wood	<i>Tringa glareola</i>	6.38			
Shelduck, South African	<i>Tadorna cana</i>	2.20			
Shoveler, Cape	<i>Spatula smithii</i>	5.70			
Snipe, African	<i>Gallinago nigripennis</i>	3.11			
Spoonbill, African	<i>Platalea alba</i>	49.94	150	75	
Stilt, Black-winged	<i>Himantopus himantopus</i>	18.93			
Stint, Little	<i>Calidris minuta</i>	26.45			
Stork, Marabou	<i>Leptoptilos crumenifer</i>	8.20			
Stork, Yellow-billed	<i>Mycteria ibis</i>	11.27			
Swamphen, African	<i>Porphyrio madagascariensis</i>	1.50			
Swan, Black	<i>Cygnus atratus</i>	1.00			
Teal, Blue-billed	<i>Spatula hottentota</i>	5.17			
Teal, Cape	<i>Anas capensis</i>	3.30			
Teal, Red-billed	<i>Anas erythrorhyncha</i>	33.09			
Tern, Caspian	<i>Hydroprogne caspia</i>	14.00			20
Tern, Unidentified	N/A N/A	77.20			
Tern, Whiskered	<i>Chlidonias hybrida</i>	27.00	150	75	85
Tern, White-winged	<i>Chlidonias leucopterus</i>	269.03		1000	
Thick-knee, Water	<i>Burhinus vermiculatus</i>	2.90			

Wader, Unidentified	N/A N/A	20.92			
Wagtail, African Pied	<i>Motacilla aguimp</i>	3.17			
Wagtail, Cape	<i>Motacilla capensis</i>	9.38			



**Figure 6-9 Vaalkop Dam (25202728) Coordinated Water bird count location (CWAC, 2022)**

#### 6.2.1.10 The Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa

This Phase 2 SEA follows the Phase 1 Wind and Solar SEA (completed in 2015), which identified eight REDZs in South Africa. These were gazetted for implementation by the Minister of Environmental Affairs, in February 2018. The objective of the SEAs is to identify areas in the country that are best suited for wind and solar PV energy projects, based on a holistic assessment of technical, strategic planning, environmental and socioeconomic criteria. The project area does not fall within a Renewable Energy Zone (REDZ).

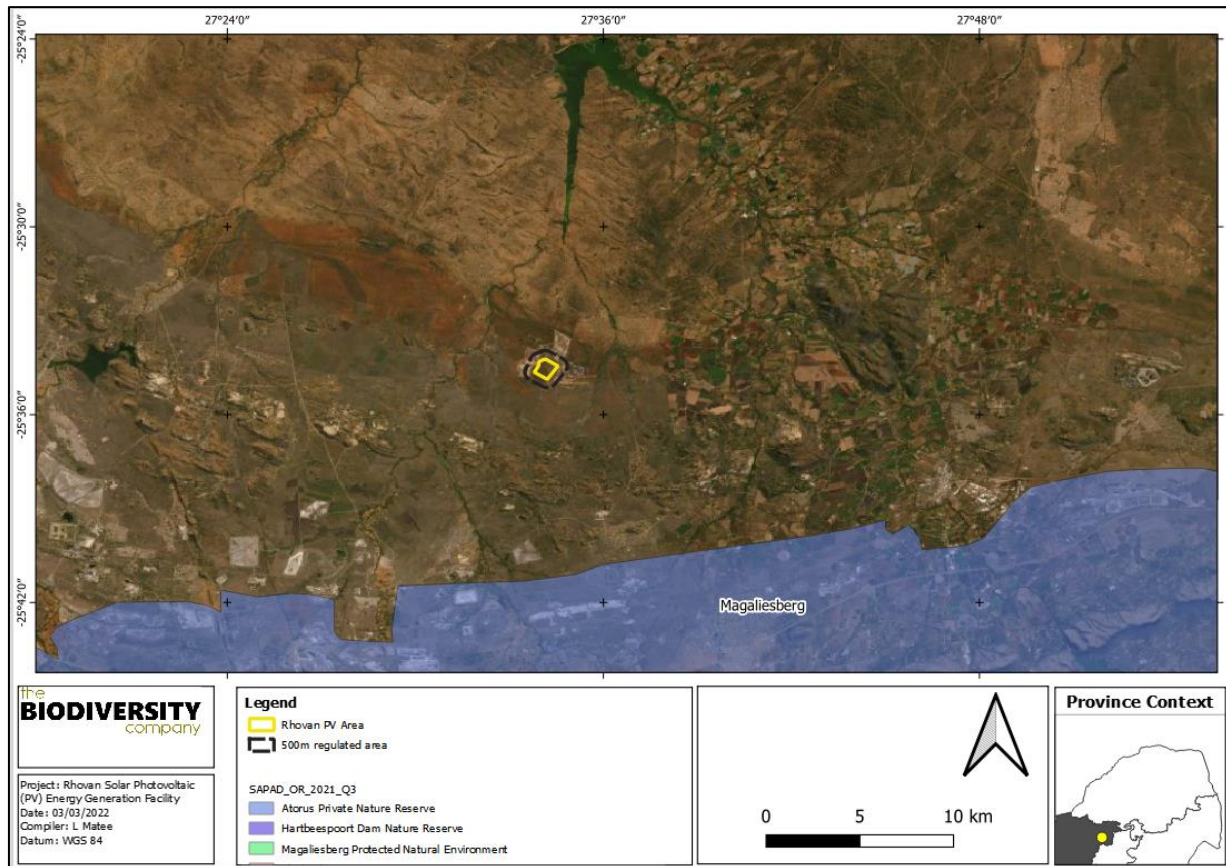
#### 6.2.1.11 Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental, and global levels.

No Important Bird and Biodiversity Areas (IBAs) are situated within the project area. The proposed project area is however located approximately 12 km north of the Magaliesberg IBA, previously known as the Magaliesberg and Witwatersberg IBA. This large IBA consists mainly of the Magaliesberg range, which extends in an arc from just northwest of Rustenburg in the west to the N1 in the east near Pretoria. To the south, the Witwatersberg range runs parallel to the Magaliesberg, extending from the town of Magaliesberg in the west to Hartbeespoort Dam in the east.





**Figure 6-10 The project area in relation to the Magaliesberg IBA.**

#### 6.2.1.11.1 Trigger Species

The table below shows the trigger species (species listed globally by the IUCN), and the presence of EN and VU species puts this IBA into the highest A1 ("Globally Threatened Species") classification. This means the site is known, estimated, or thought to hold a population of a species categorized by the IUCN Red List as CR, EN or VU. Globally threatened species are Cape Vulture, Kori Bustard, Lappet-faced Vulture, Secretarybird, Melodious Lark and White-backed Vulture. Regionally threatened species are Lanner Falcon and Short-clawed Lark. Biome-restricted species commonly found are Barred Wren-Warbler, Kalahari Scrub-Robin, White-throated Robin-Chat and White-bellied Sunbird, while less common species are Burchell's Starling and Sociable Weaver.

Table 6-4 lists SSC species that occur within the Magaliesberg IBA and may be found at the proposed project area (located approximately 12 km to the north-west).

**Table 6-4 Important birds found within the Magaliesberg IBA (Source: Marnewick et al. (2015))**

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Podica senegalensis</i>	Finfoot, African	VU	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	EN

<i>Tyto capensis</i>	Grass-owl, African	VU	LC
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## 6.2.2 Flora Assessment

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

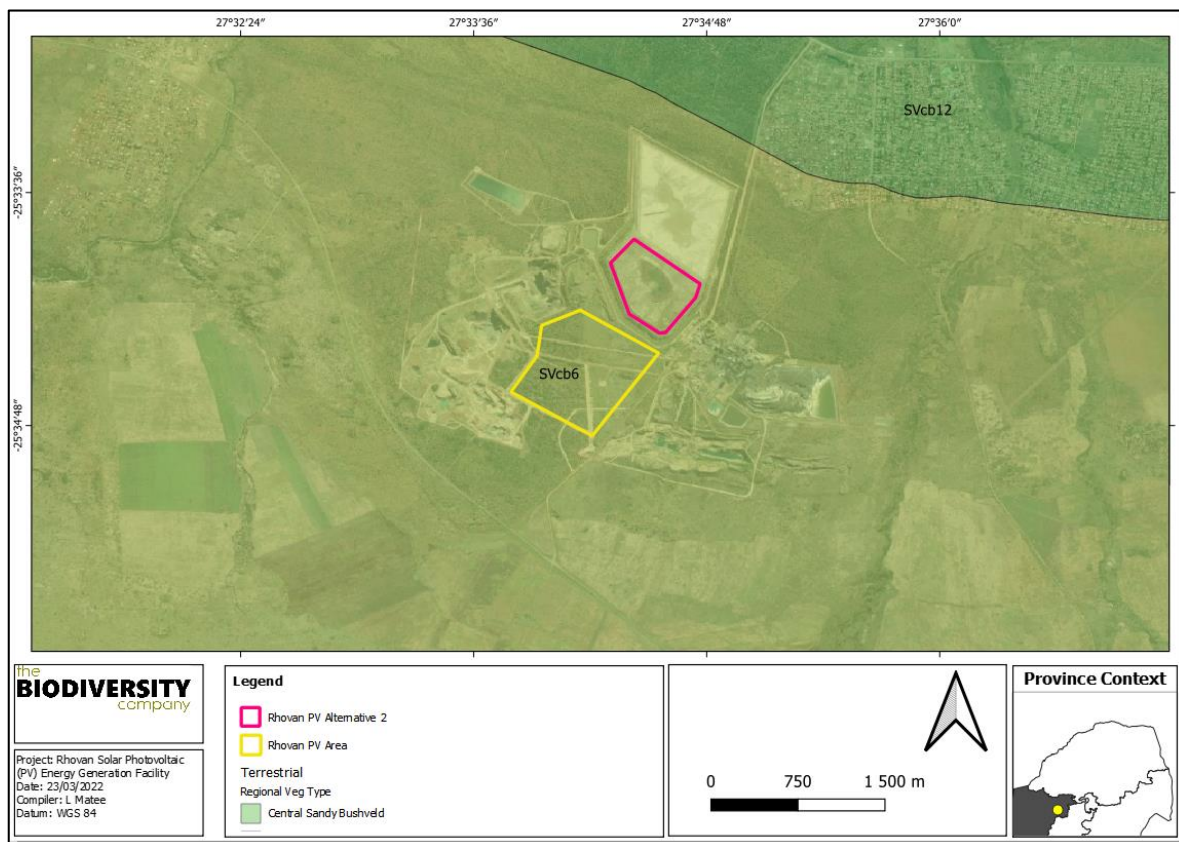
### 6.2.2.1 Vegetation Type

The project area is situated within 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:

- Seasonal precipitation; and
- (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by an herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest 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. 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 and a generally dense herbaceous layer (Scholes & Walker, 1993). On a fine-scale vegetation type, the project area overlaps with one vegetation type: the Marikana Thornveld (Figure 6-11).



**Figure 6-11** Map illustrating the vegetation type associated with the project area

#### 6.2.2.1.1 Marikana Thornveld (SVcb 6)

Marikana Thornveld extends on the broad plains from Rustenburg in the west, through Marikana and Brits, 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. Fire protected habitats, such as drainage lines, rocky outcrops and termitaria are typically dominated by denser, shrub-dominated vegetation (Mucina & Rutherford, 2006).

##### 6.2.2.1.1.1 Important Plant Taxa

Based on Mucina & 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*, *Rhus 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*.

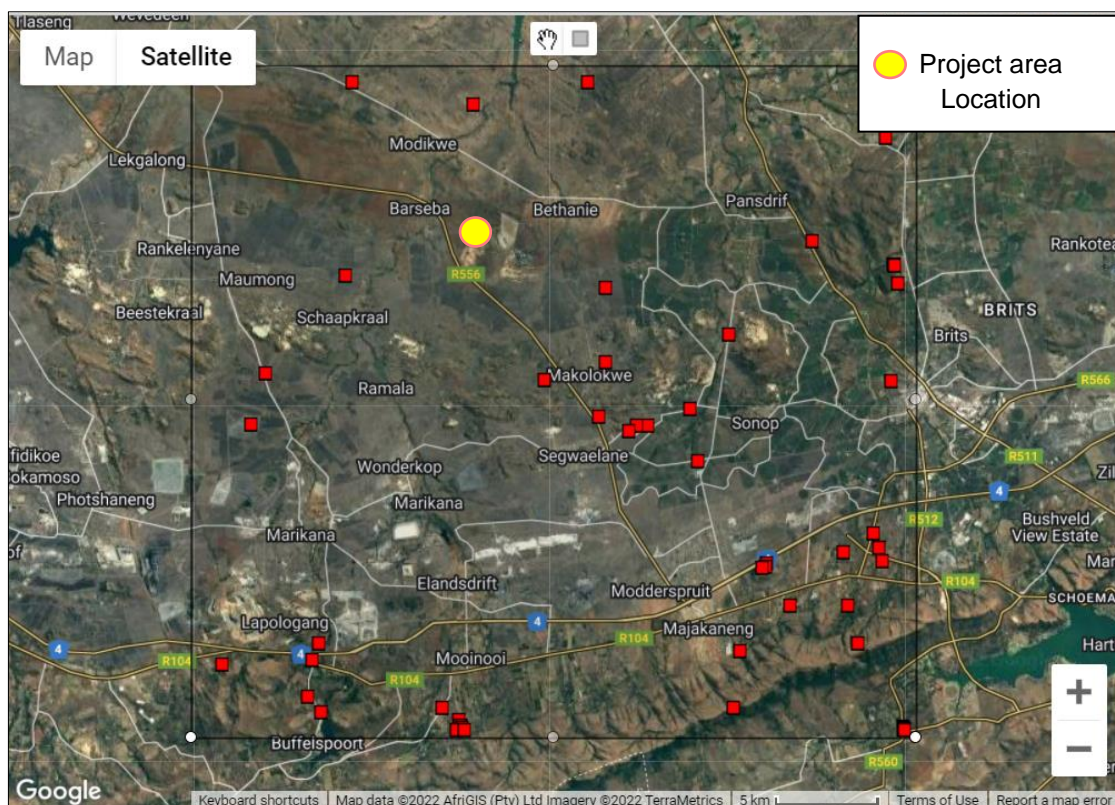
##### 6.2.2.1.1.2 Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006), this vegetation type is classified as EN, with its national conservation target being 19%. More than 48% has already been transformed by urban expansion and cultivation.

#### 6.2.2.2 Expected Flora Species

The POSA database indicates that 340 species of indigenous plants are expected to occur within the project area. The area has not been well sampled based on the POSA website and this might not be a true reflection on the species diversity found in the area. Appendix A provides the list of species and their respective conservation status and endemism. The SANBI PRECIS database, listed only a single species of conservation concern (SCC) for the QDS as per Table 6-5 below (according to the relevant POSA Grid Squares(2527DA). Furthermore, one floral SCC are expected to occur within either of the habitat units of the project area, due to the high levels of disturbance





**Figure 6-12** Map showing the grid drawn to compile an expected species list (BODATSA-POSA, 2016)

**Table 6-5** Protected flora species that may occur within the project area

Family	Scientific Name	IUCN	Ecology
Apocynaceae	<i>Stenostelma umbelluliferum</i> (Schltr.) Bester & Nicholas	NT	Indigenous; Endemic

## 6.2.3 Faunal Assessment

### 6.2.3.1 Herpetofauna (Reptiles & Amphibians)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2019) 81 reptile species have the potential to occur in the project areas (Appendix B). Three (3) of the expected species are SCCs (IUCN, 2017). Based on the lack of large perennial rivers in the project areas the Nile Crocodile were given a low likelihood of occurrence.

**Table 6-6: Reptiles SCCs expected in the project area.**

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	Low
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	LC	Moderate
<i>Kinixys lobatsiana</i>	Lobatse hinged-back Tortoise	LC	VU	High

*Homoroselaps dorsalis* (Striped Harlequin Snake) is partially fossorial and known to inhabit old termitaria in grassland habitat (IUCN, 2017). Most of its range is at moderately high altitudes, reaching 1,800 m in Mpumalanga and Swaziland, but it is also found at elevations as low as about 100 m in KwaZulu-Natal. The likelihood of occurrence was rated as moderate.



*Kinixys lobatsiana* (Lobatse Hinged Tortoise) is listed as VU on a global scale. This tortoise is a savanna species that inhabits rocky hillsides in habitats of mixed woodlands, tropical Bushveld and Thornveld where vegetation ranges from dense, short shrubland to open tree savanna. In South Africa it is protected by provincial nature conservation ordinances and biodiversity laws at a regional level, but the species is not protected at a national level by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004). The likelihood of occurrence of this species in the area is regarded as high as suitable habitat can be found in the project areas.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2020) 26 amphibian species have the potential to occur in the project areas (Appendix B). None of the species are species of conservation concern.

### 6.2.3.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 85 mammal species that could be expected to occur within the project areas. Species limited to nature reserves in South Africa were removed from the expected species list (Appendix D). Fifteen species of conservation concern have a potential to occur in the project areas (Table 6-7). All these species have a low likelihood of occurrence, mainly as a result of lack of suitable habitat and the disturbed nature of the project area.

**Table 6-7: List of mammal Species of Conservation Concern that may occur in the project areas as well as their global and regional conservation statuses.**

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	Low
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC	Low
<i>Cloeotis percivali</i>	Short-eared Trident Bat	EN	LC	Low
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	NT	LC	Low
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT	Low
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Low
<i>Hydricis maculicollis</i>	Spotted-necked Otter	VU	NT	Low
<i>Leptailurus serval</i>	Serval	NT	LC	Low
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN	Low
<i>Ourebia ourebi</i>	Oribi	EN	LC	Low
<i>Panthera pardus</i>	Leopard	VU	VU	Low
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	Low
<i>Pelea capreolus</i>	Grey Rhebok	NT	NT	Low
<i>Poecilogle albinucha</i>	African Striped Weasel	NT	LC	Low
<i>Redunca fulvorufula</i>	Mountain Reedbuck	EN	LC	Low

### 6.2.3.3 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 252 bird species have the potential to occur in the vicinity of the project areas. The full list of potential bird species is provided in Appendix E.

Of the potential bird species, 5 species are listed as SCC either on a regional or global scale (Table 6-8). Two species have a low likelihood of occurrence in the project areas due to a lack of suitable habitat.

**Table 6-8: List of bird species of regional or global conservation importance that are expected to occur in close vicinity to the project areas.**

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC	Low
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC	Moderate
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN	Moderate
<i>Phoenicopterus minor</i>	Flamingo, Lesser	NT	NT	Low
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	EN	Moderate

*Aquila verreauxii* (Verreaux's Eagle) is listed as VU on a regional scale and LC on a global scale. This species is locally persecuted in southern Africa where it coincides with livestock farms, but because the species does not take carrion, is little threatened by poisoned carcasses. Where hyraxes are hunted for food and skins, eagle populations have declined (IUCN, 2017). Based on the expected habitat, the close proximity of the Magaliesberg mountains and the availability of prey items, the likelihood of occurrence of this species at the project areas are rated as moderate.

*Gyps coprotheres* (Cape Vulture) is listed as EN on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). This species has a moderate likelihood of foraging in the area.

*Polemaetus bellicosus* (Martial Eagle) is listed as EN on a regional scale and EN on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). This species has a moderate likelihood of utilising the area for hunting.

## 6.3 Field Assessment

### 6.3.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area. A total of 58 trees, shrubs, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 6-9). Plants listed as Category 1 alien or invasive species under the NEMBA appear in green text.

The list of plant species recorded is by no means comprehensive, a survey conducted under guard may likely yield up to 40% additional flora species for the project area. However, floristic analysis conducted to date is regarded as a sound representation of the local flora for the project area.

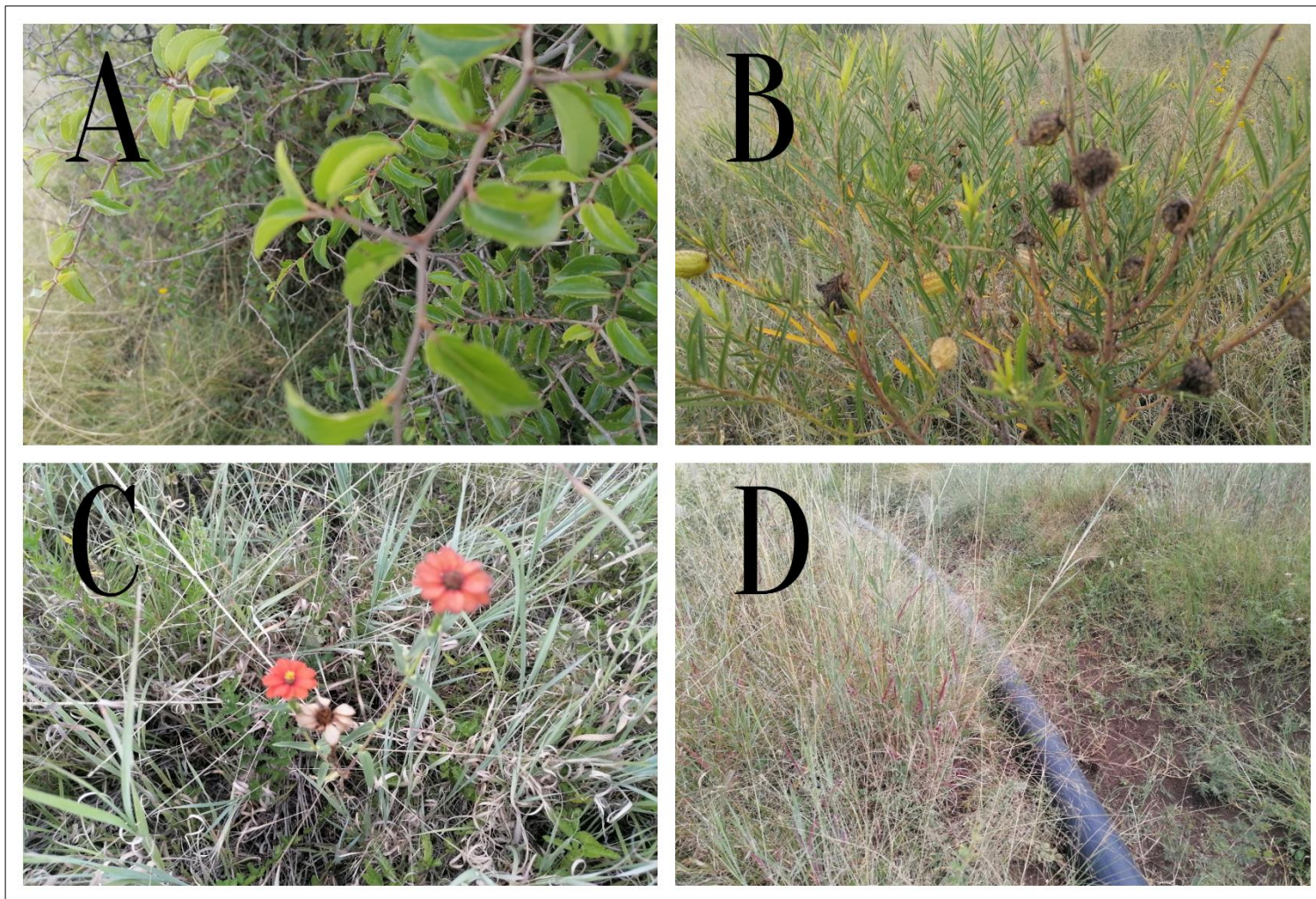
**Table 6-9 Trees, shrubs and herbaceous plant species recorded in the project area**

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Aloe greatheadii</i>	Spotted Aloe	LC	Indigenous, Not Endemic	
<i>Argemone mexicana</i>	Mexican Prickly Poppy	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Aristida bipartita</i>	Rolling grass	LC	Indigenous, Not Endemic	
<i>Aristida congesta subsp. barbicollis</i>	Spreading Three-awn	LC	Indigenous, Not Endemic	
<i>Aristida congesta subsp. congesta</i>	Tassel Three-awn	LC	Indigenous, Not Endemic	
<i>Asparagus laricinus</i> Burch.	Cluster-leaf asparagus	LC	Indigenous, Not Endemic	
<i>Bidens pilosa</i>	Blackjack	NE	Not Indigenous; Naturalized exotic weed	
<i>Bothriochloa insculpta</i>	Pinhole Grass	LC	Indigenous, Not Endemic	
<i>Buddleja saligna</i>	Olive Sagewood	LC	Indigenous, Not Endemic	
<i>Celtis africana</i>	White Stinkwood, Witstinkhout	LC	Indigenous, Not Endemic	
<i>Cenchrus ciliaris</i>	Foxtail Buffalo Grass, African Foxtail	LC	Indigenous, Not Endemic	
<i>Cenchrus setaceus (Pennisetum setaceum)</i>	Fountain Grass	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Chloris gayana</i>	Rhodes grass	LC	Indigenous, Not Endemic	
<i>Conyza bonariensis</i>	Flax-leaf Fleabane	NE	Not Indigenous; Naturalized exotic weed	
<i>Cynodon dactylon</i>	Couch grass	LC	Indigenous, Not Endemic	
<i>Datura ferox</i>	Large Thorn Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Dichrostachys cinerea subsp. nyassana</i>	Sickle Bush, Kalahari Christmas Tree	LC	Indigenous, Not Endemic	
<i>Digitaria eriantha</i>	Finger Grass	LC	Indigenous, Not Endemic	
<i>Eragrostis chloromelas</i>	Blue Love Grass	LC	Indigenous, Not Endemic	
<i>Eragrostis curvula</i>	Weeping Love Grass	LC	Indigenous, Not Endemic	
<i>Eragrostis lehmanniana var. lehmanniana</i>	Eastern Province Vlei Grass, Land-Grass, Lehman Love Grass	LC	Indigenous, Not Endemic	
<i>Eragrostis superba</i>	Wilman Lovegrass	LC	Indigenous, Not Endemic	

<i>Flaveria bidentis</i>	Speedy weed	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Gomphocarpus tomentosus</i> Burch. subsp. <i>Tomentosus</i>	Woolly Milkweed	LC	Indigenous, Not Endemic	
<i>Grass Loudetia simplex</i>	Common Russet	LC	Indigenous, Not Endemic	
<i>Grewia flava</i>	Velvet Raisin	LC	Indigenous, Not Endemic	
<i>Grewia monticola</i>	Grey Raisin	LC	Indigenous, Not Endemic	
<i>Heteropogon contortus</i>	Tanglehead, Spear Grass	LC	Indigenous, Not Endemic	
<i>Hyparrhenia hirta</i>	Common Thatching Grass, Blougras (a)	LC	Indigenous, Not Endemic	
<i>Hypoxis rigidula</i>	Hypoxis	LC	Indigenous, Not Endemic	
<i>Ipomoea papilio</i> Hallier f.	Morning Glory	LC	Indigenous, Not Endemic	
<i>Lantana camara</i>	Lantana	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Ledebouria revoluta</i>	Common African Hyacinth	LC	Indigenous, Not Endemic	
<i>Melia azedarach</i>	Chinaberry	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Melinis repens</i>	Natal Red Top	LC	Indigenous, Not Endemic	
<i>Ozoroa paniculosa</i>	Bushveld Ozoroa	LC	Indigenous, Not Endemic	
<i>Panicum maximum</i>	Guinea Grass	LC	Indigenous, Not Endemic	
<i>Panicum natalense</i>	Natal Buffalo Grass	LC	Indigenous, Not Endemic	
<i>Pogonarthria squarrosa</i>	Herringbone Grass	LC	Indigenous, Not Endemic	
<i>Schkuhria pinnata</i>	Dwarf Marigold	NE	Not Indigenous; Naturalized exotic weed	
<b>Searsia lancea</b>	Karee	LC	Indigenous, Not Endemic	
<i>Senegalia mellifera</i>	Black Thorn	LC	Indigenous, Not Endemic	
<i>Senna didymobotrya</i>	Peanut butter cassia	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Sesbania bispinosa</i>	Spiny Sesbania	NE	Indigenous, Not Endemic	
<i>Setaria sphacelata</i> var. <i>sphacelata</i>	Common bristle grass; Golden Timothy Grass	LC	Indigenous, Not Endemic	
<i>Solanum aculeatissimum</i>	Love-apple Nightshade	NE	Not Indigenous; Naturalized exotic weed	

<i>Solanum sisymbriifolium</i>	Wild Tomato, Dense; Thorned Bitter Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Sporobolus africanus</i>	Ratstail Dropseed; Rush Grass	LC	Not Endemic	
<i>Tagetes minuta</i>	Khaki Bush, Khaki Weed, African Marigold	NE	Not Indigenous; Naturalized exotic weed	
<i>Themeda triandra</i>	Angle Grass	LC	Indigenous, Not Endemic	
<i>Urochloa brachyura</i>	Annual tail grass	LC	Indigenous, Not Endemic	
<i>Vachellia karroo</i>	Sweet Thorn, Cape Gum	LC	Indigenous, Not Endemic	
<i>Vachellia sieberiana</i>	Paperbark Thorn	LC	Indigenous, Not Endemic	
<i>Vachellia tortilis</i> subsp. <i>heteracantha</i>	Curly-pod Acacia	LC	Indigenous, Not Endemic	
<i>Zinnia peruviana</i>	Peruvian Zinnia	NE	Not Indigenous; Naturalized exotic weed	
<i>Ziziphus mucronata</i> subsp. <i>mucronata</i>	Buffalo Thorn, Wait-a-bit	LC	Indigenous, Not Endemic	
<i>Ziziphus zeyheriana</i>	Dwarf Buffalothorn	LC	Indigenous, Not Endemic	





**Figure 6-13** A collage of images illustrating some of the species recorded in the project area, A) *Ziziphus mucronata* subsp. *mucronata* (Buffalo Thorn), B) *Gomphocarpus tomentosus* Burch. subsp. *tomentosus* (Woolly Milkweed), C) *Zinnia peruviana* (Peruvian Zinnia) D) *Cynodon dactylon* (Couch grass) and D) *Themeda triandra* (Angle Grass/ Red Grass).

### 6.3.2 Invasive Alien Plants

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, these plants must be controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182 on, 24th of February 2021. The legislation calls for the removal and/or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- *Category 1a:* Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- *Category 1b:* Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government-sponsored invasive species management programme. No permits will be issued.
- *Category 2:* Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- *Category 3:* Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
  - Section 75 of the NEMBA;
  - The relevant invasive species management programme developed in terms of regulation 4; and
  - Any directive issued in terms of section 73(3) of the NEMBA.

Nine (9) IAP species were recorded within the project area. These species are listed under the Alien and Invasive Species List 2021, Government Gazette No. 44182 as Category 1b. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

**Table 6-10 IAP species recorded in the project area**

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Argemone mexicana</i>	Mexican Prickly Poppy	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Bidens pilosa</i>	Blackjack	NE	Not Indigenous; Naturalized exotic weed	
<i>Cenchrus setaceus (Pennisetum setaceum)</i>	Fountain Grass	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Conyza bonariensis</i>	Flax-leaf Fleabane	NE	Not Indigenous; Naturalized exotic weed	
<i>Datura ferox</i>	Large Thorn Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Flaveria bidentis</i>	Speedy weed	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Lantana camara</i>	Lantana	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Melia azedarach</i>	Chinaberry	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Mirabilis jalapa</i>	Marvel of Peru	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Schkuhria pinnata</i>	Dwarf Marigold	NE	Not Indigenous; Naturalized exotic weed	
<i>Senna didymobotrya</i>	Peanut butter cassia	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Solanum aculeatissimum</i>	Love-apple Nightshade	NE	Not Indigenous; Naturalized exotic weed	
<i>Solanum sisymbriifolium</i>	Wild Tomato, Dense; Thorned Bitter Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Tagetes minuta</i>	Khaki Bush, Khaki Weed, African Marigold	NE	Not Indigenous; Naturalized exotic weed	
<i>Zinnia peruviana</i>	Peruvian Zinnia	NE	Not Indigenous; Naturalized exotic weed	



### 6.3.3 Ethnobotanical and Red Data Listed Plant Species

Ethnobotany is a branch of botany that places focus on the use of plants for medicines and other practical purposes. The use of native plants for ethnobotanical uses can be detrimental to populations that are overexploited. According to the Department of Agriculture, Forestry and Fisheries (DAFF) medicinal plants are those used in herbalism and thought to have certain extractable/compounds in their leaves, stems, flowers and fruit and used as inputs in the pharmaceutical, nutraceutical, insecticide and other chemical industries (DAFF, 2013). It is estimated that more than 750 plant species in South Africa are actively utilised for their medicinal attributes (Van Wyk and Prinsloo, 2018). Plant species of medicinal importance that were recorded on site are listed in Table 6-11

Species of conservation concern are either categorized as Red Data Listed species (RDL species), according to specific scientifically researched criteria and administered by the South African National Biodiversity Institute (SANBI), as protected trees by the National Forests Act (NFA)(Act No. 84 of 1998), or as Protected Trees and Plants by The NEMBA Threatened or Protected Species Regulations 152 of 2007 ("TOPS Regulations") and the Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (TOPS Lists) and the provincial nature conservation legislation, in the context of this report the North West Biodiversity Management Act (Act No. 4 of 2016)(NWBMA). No species of conservation concern nationally or under the NWBMA (2016) or the Transvaal Nature Conservation Ordinance (Ordinance 12 of 1983) or globally were recorded during the infield assessment.

**Table 6-11 Plant species of ethnobotanical importance that were recorded in the project area**

Scientific Name	Common Name	Medicinal uses
<i>Datura ferox</i>	Large Thorn Apple	Datura plant as a whole has several characteristic properties including anti-spasmodic, analgesic, sleep-inducing, expectorant, sedative, hypnotic, intoxicant, uterine stimulant and bronchodilator properties
<i>Dichrostachys cinerea subsp. africana</i>	Small-leaved Sickle Bush	The bark, roots, and leaves are used in the treatment of dysentery, headaches, toothaches, elephantiasis, snakebites and scorpion stings, leprosy, syphilis, coughs, epilepsy, gonorrhoea, boils, and sore eyes. It can also be used as a contraceptive for women, as a laxative, and for massage of fractures
<i>Tagetes minuta</i>	Khaki Bush	The repellent properties of essential oil have been known for a long time and were found to be effective in preventing sheep from becoming infected with blow-fly larvae. Many gardeners use warm water extracts of the fresh plant to keep roses and other garden plants free from insects and fungal diseases. The essential oil is used in perfumery and as a flavourant in food, beverages and tobacco.
<i>Ziziphus mucronata</i>	Buffalo thorn	Warm bark infusions (sometimes together with roots or leaves added) are used as expectorants (also as emetics) in cough and chest problems, while root infusions are a popular remedy for diarrhoea and dysentery. Decoctions of roots and leaves (or chewed leaves) are applied externally to boils, sores and glandular swellings, to promote healing and as an analgesic.

### 6.3.4 Faunal Assessment

Herpetofauna, mammal and avifauna observations and recordings are addressed in this section.

#### 6.3.4.1 Amphibians and Reptiles

Surveys relied on opportunistic sightings as opposed to intensive and appropriate sampling methods. The only other method utilised was refuge examinations using visual scanning of terrains to record smaller herpetofauna species that often conceal themselves under rocks, in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, this method was also not intensively applied in the field. Only two common reptile species were observed (Table 6-12), and no SCC species

were recorded thus herpetofauna diversity was considered low. The lack of species was likely due to the combination of the disturbed nature of the site, the inherently secretive nature of reptile species, the seasonality and limited time available for fieldwork. Seasonal fluctuations in amphibian population sizes occur depending on certain environmental parameters such as amount of rainfall, temperature and humidity. Precipitation strongly influences amphibian activity, distribution and dispersion patterns, reproductive cycles, and rates of growth and development. Many species remain underground or in aboveground retreats except during wet periods. Therefore, the best time to survey an area is often during the wet season or following heavy rain

**Table 6-12 Summary of herpetofauna species recorded within the project area.**

Species	Common Name	Conservation Status		
		Regional (SANBI, 2016)	SARCA	IUCN (2021)
<i>Trachylepis varia</i>	Variable Skink	LC	LC (SARCA 2014)	LC
<i>Trachylepis striata</i>	Striped Skink	LC	LC (SARCA 2014)	Unlisted

#### 6.3.4.2 Mammals

Two mammal species were observed during the survey based on either direct observation or the presence of visual tracks and signs, these were namely, the Chacma Baboon (*Papio ursinus*) and the Scrub Hare (*Lepus saxatilis*). The lack of species recorded was likely due to limited time available for fieldwork, as groups such as rodents and shrews require trapping over an extensive period, with a night survey required for chiropterans. As no nocturnal survey was undertaken this also influenced the number of observations recorded due to the solitary and nocturnal habits of certain mammal species that may occur in the project area. The greatest cause of the low diversity recorded on site may be the disturbed nature of the site due to direct and edge effects of mining resulting in the project area being in a degraded state.

#### 6.3.4.3 Avifauna

##### 6.3.4.3.1 Avifauna Species

Twenty-seven (27) species were recorded across three habitats covering both the project area and to a limited extent, the surrounding area (Table 6-13 and Figure 6-14). All observations were of small passerine and game bird species that are common to the area and these species persisted despite the existing disturbance within the project area. This resilience, coupled with the fact that similar avifaunal habitats are available throughout the broader area suggests that displacement impacts might not be of a regional or national significance. In addition to this, no raptor nests or other possible Red Listed breeding sites were recorded during the infield assessment. Approximately 48 % of the species recorded on site were found to be insectivorous species that catch their prey in the air during the day (IAD), 33 % of the species omnivorous species that feed during the day (OMD), whilst granivorous ground dwelling diurnal species (GGD) make up 18 % of the total species composition. No nests of SCC species was recorded and the only collision risk species recorded was the Pied crows which does not pose a risk to the approval of the development. No nocturnal studies were performed as there was limited time available for the surveys and nocturnal surveys were not part of the scope.

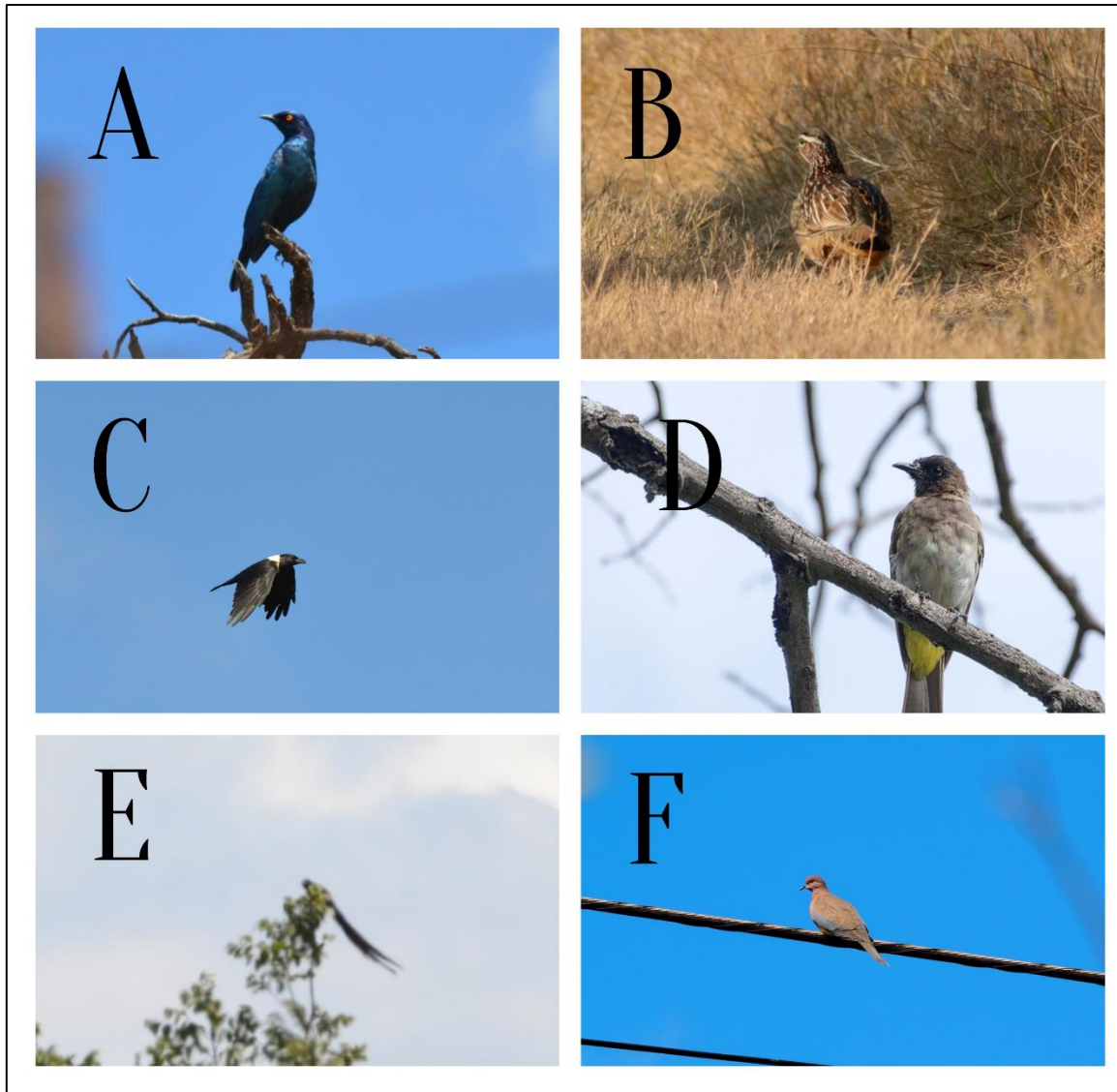
**Table 6-13 Avifaunal species recorded in the project area**

Species	Common Name	Conservation Status		Guild
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Acridotheres tristis</i>	Indian, Myna	Not evaluated	LC	OMD
<i>Batis molitor</i>	Batis, Chinspot	Unlisted	LC	IAD
<i>Batis pririt</i>	Batis, Pririt	LC	LC	IAD



<b><i>Cercotrichas leucophrys</i></b>	Scrub-Robin, Red-backed	LC	LC	IAD
<b><i>Cisticola chiniana</i></b>	Rattling Cisticola	LC	LC	IAD
<b><i>Cisticola juncidis</i></b>	Cisticola, Zitting	Unlisted	LC	IAD
<b><i>Corvinella melanoleuca</i></b>	Shrike, Magpie	LC	LC	IAD
<b><i>Corvus albus</i></b>	Crow, Pied	Not Evaluated	LC	OMD
<b><i>Dendroperdix sephaena</i></b>	Francolin, Crested	Unlisted	LC	OMD
<b><i>Euplectes progne</i></b>	Widowbird, Long-tailed	Unlisted	LC	OMD
<b><i>Hirundo dimidiata</i></b>	Swallow, Pearl-breasted	LC	LC	IAD
<b><i>Lagonosticta rhodopareia</i></b>	Firefinch, Jameson's	LC	LC	GGD
<b><i>Lamprotornis nitens</i></b>	Starling, Cape Glossy	LC	LC	OMD
<b><i>Lybius torquatus</i></b>	Barbet, Black-collared	Unlisted	LC	OMD
<b><i>Melaenornis pammelaina</i></b>	Flycatcher , Southern Black	LC	LC	IAD
<b><i>Merops bullockoides</i></b>	Bee-eater, White-fronted	Unlisted	LC	IAD
<b><i>Mirafra africana</i></b>	Lark, Rufous-naped	LC	LC	IAD
<b><i>Muscicapa striata</i></b>	Flycatcher, Spotted	LC	LC	IAD
<b><i>Onychognathus morio</i></b>	Starling, Red-winged	Unlisted	LC	IAD
<b><i>Ploceus velatus</i></b>	Masked-weaver, Southern	Unlisted	LC	OMD
<b><i>Pycnonotus barbatus</i></b>	Bulbul, Common	LC	LC	OMD
<b><i>Pycnonotus tricolor</i></b>	Bulbul, Dark-capped	Unlisted	Unlisted	OMD
<b><i>Quelea quelea</i></b>	Quelea, Red-billed	LC	LC	GGD
<b><i>Streptopelia capicola</i></b>	Dove, Ring-necked	LC	LC	GGD
<b><i>Streptopelia senegalensis</i></b>	Dove , Laughing	LC	LC	GGD
<b><i>Tchagra australis</i></b>	Tchagra, Brown-crowned	LC	LC	IAD
<b><i>Vidua regia</i></b>	Whydah, Shaft-tailed	LC	LC	GGD

Note: CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal; CAN, carnivore air nocturnal; CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal; OGD, omnivore ground diurnal.



**Figure 6-14** Some of the avifauna recorded in the project area: A) Cape glossy starling (*Lamprotornis nitens*), B) Crested Francolin (*Dendroperdix sephaena*), C) Pied crow (*Corvus albus*), D) Dark-capped bulbul (*Pycnonotus tricolor*), E) Long-tailed widowbird (*Euplectes progne*), F) Laughing Dove (*Streptopelia senegalensis*).

#### 6.3.4.3.2 Fine-Scale Habitat Use

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities. The assessment area overlaps with three avifaunal habitat types namely transformed habitat, secondary grassland and degraded bushveld.

##### Transformed Habitat

This area represents areas which are dominated by completely transformed vegetation with limited habitat diversity and where vegetation was cleared to make way for powerlines, build roads, make way for the conveyor belt as well as areas that have been cleared due to other mining related activities. The transformed habitat unit is essentially areas that have experienced severe anthropogenic disturbances (e.g., areas of historical and current disturbance and infrastructure development). This habitat is regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state. Avifaunal species that were found in this habitat include, Pied

Crow (*Corvus albus*), Laughing dove (*Streptopelia senegalensis*) and Common Myna (*Acridotheres tristis*).

### Secondary Grassland

Secondary vegetation develops when primary undisturbed vegetation was removed is cleared or removed. After such disturbances cease, pioneer grass and woody species, as well as weedy plants, colonise the disturbed areas. Over time, additional species will colonise the pioneer state leading to a secondary state with a lower species diversity as opposed to the primary (climax) state prior to any disturbances. The Secondary Grasslands in the project area represent habitats where land has the rest is either semi transformed thus transforming an area that was primarily bushveld into secondary successional grasslands. These grasslands typically do not follow natural succession when left to recover. Trees are very scarce in this habitat unit and what remains is a grassy layer that has established but the plant community does not represent that of the natural vegetation. Avifaunal species that were found in this habitat include Crested fFrancolin (*Dendroperdix sephaena*), Laughing Dove (*Streptopelia senegalensis*), Chinspot Batis (*Batis molitor*), Red-winged Starling (*Onychognathus morio*), Southern masked Weaver (*Ploceus velatus*) and the Dark-capped Bulbul (*Pycnonotus tricolor*). Both granivorous and insectivorous species occurred in high numbers in this vegetation type.

### Disturbed Busveld/ Degraded Bushveld

The Degraded Bushveld habitat unit., mainly dominated by pioneer tree species such as *Vachellia* species and *Dichrostachys cinerea*. The grass layer included a number of *Eragrostis* species, *Hyparrhenia hirta* (common thatching grass), *Cenchrus ciliaris* and *Themeda triandra*. Typical bushveld species such as *Searsia lancea*, *Buddleja saligna* and *Grewia* were also recorded in the project area. Although not completely transformed the habitat integrity of the vegetation unit is degraded largely due to anthropogenic activities associated with the project area, such as pollution, clearing for linear infrastructure (pipelines and powerlines), and other mining related infrastructure. This has resulted in a decrease in floral species diversity and abundance as well as the occurrence of several exotic and alien invasive species. Avifaunal species that were found in this habitat include Chin-spot Batis (*Batis molitor*), Zitting Cisticola (*Cisticola juncidis*), Southern Black Flycatcher (*Melaenornis pammelaina*), Cape glossy Starling (*Lamprotornis nitens*), the White-fronted Bee-eater (*Merops bullockoides*), Long-tailed widowbird (*Euplectes progne*), Laughing Dove (*Streptopelia senegalensis*) and Southern Masked Weaver (*Ploceus velatus*) to name a few.

#### 6.3.5 Freshwater

No natural wetlands were identified within the proposed footprint areas, nor within the 500m regulated area. Similar to the findings stated in the CHEMC Environmental (2020) report, no wetlands are present within the mining area. Wetland and riparian areas are associated with the Tshukutswe Stream and the Gwatlhe River, but these areas are beyond the 500 m regulated area. Wet areas within the project area are as a result run-off from road surfaces and mining activities, these areas are classified as artificial systems.

## 7 Habitat Assessment and Site Ecological Importance

### 7.1 Habitat Assessment

#### Transformed Habitat

This area represents areas which are dominated by completely transformed vegetation with limited habitat diversity and where vegetation was cleared to make way for powerlines, build roads, make way for the conveyor belt as well as areas that have been cleared due to other mining related activities. The transformed habitat unit is essentially areas that have experienced severe anthropogenic disturbances (e.g., areas of historical and current disturbance and infrastructure development). This habitat is

regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state.

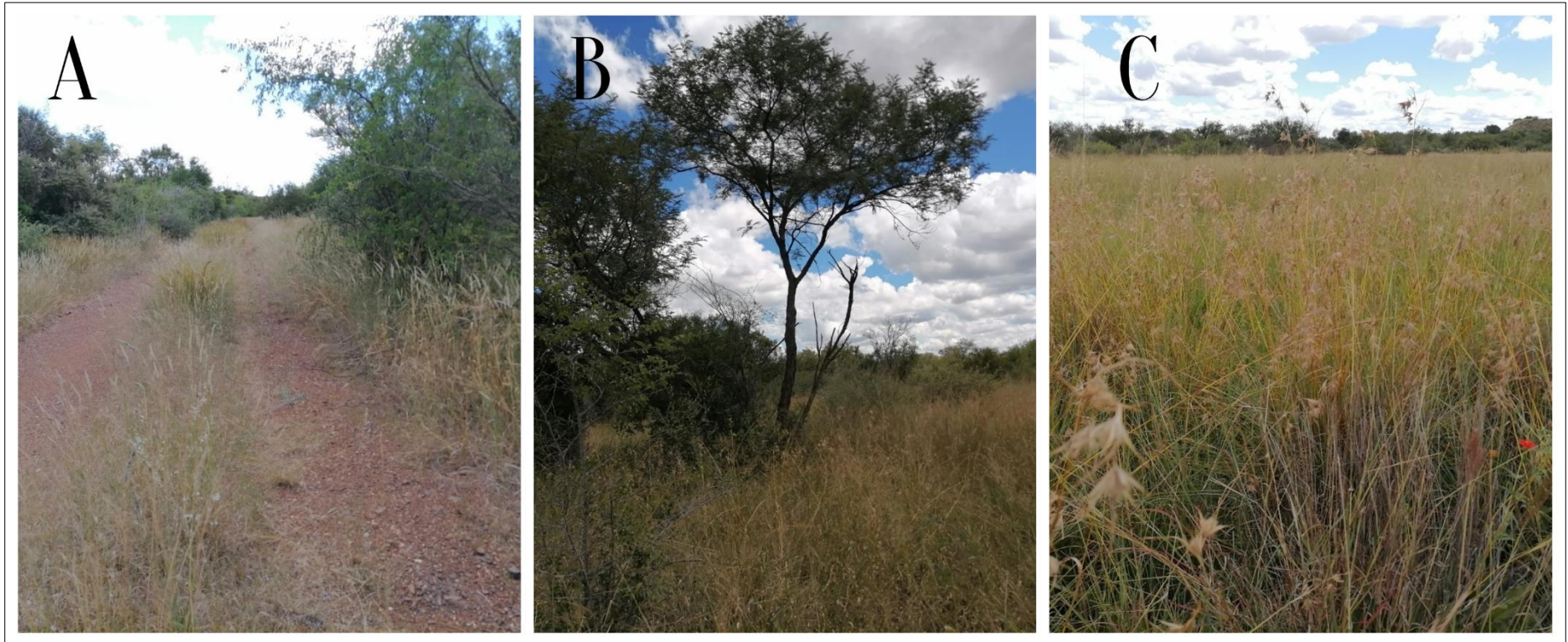
### **Secondary Grassland**

Secondary vegetation develops when primary undisturbed vegetation was removed is cleared or removed. After such disturbances cease, pioneer grass and woody species, as well as weedy plants, colonise the disturbed areas. Over time, additional species will colonise the pioneer state leading to a secondary state with a lower species diversity as opposed to the primary (climax) state prior to any disturbances. The Secondary Grasslands in the project area represent habitats where island has been either completely denude of vegetation or trees been removed thus leaving the area semi transformed thus transforming an area that was primarily bushveld into secondary successional grasslands. These grasslands typically do not follow natural succession when left to recover. Trees are very scarce in this habitat unit and what remains is a grassy layer that has established but the plant community does not represent that of the natural vegetation.

### **Disturbed Bushveld/ Degraded Bushveld**

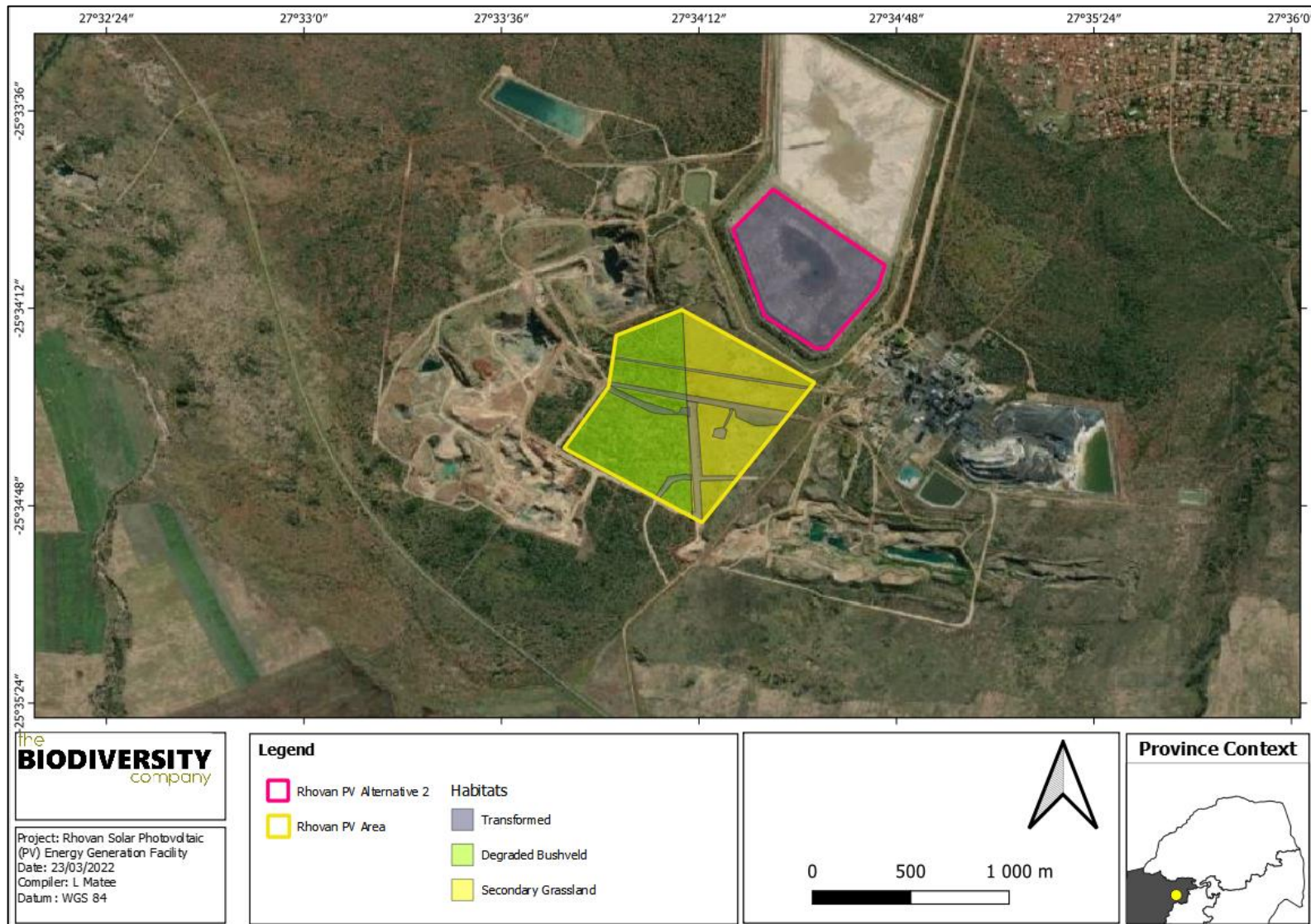
The Degraded Bushveld habitat unit, mainly dominated by pioneer tree species such as *Vachellia* species and *Dichrostachys cinerea*. The grass layer included a number of *Eragrostis* species, *Hyparrhenia hirta* (common thatching grass), *Cenchrus ciliaris* and *Themeda triandra*. Typical bushveld species such as *Searsia lancea*, *Buddleja saligna* and *Grewia* were also recorded in the project area. Although not completely transformed the habitat integrity of the vegetation unit is degraded largely due to anthropogenic activities associated with the project area, such as pollution, clearing for linear infrastructure (pipelines and powerlines), and other mining related infrastructure. This has resulted in a decrease in floral species diversity and abundance as well as the occurrence of several exotic and alien invasive species.





**Figure 7-1** Collage illustrating examples of the habitats recorded in the project area, A) Transformed, B) Degraded Bushveld, C) Secondary Grassland.



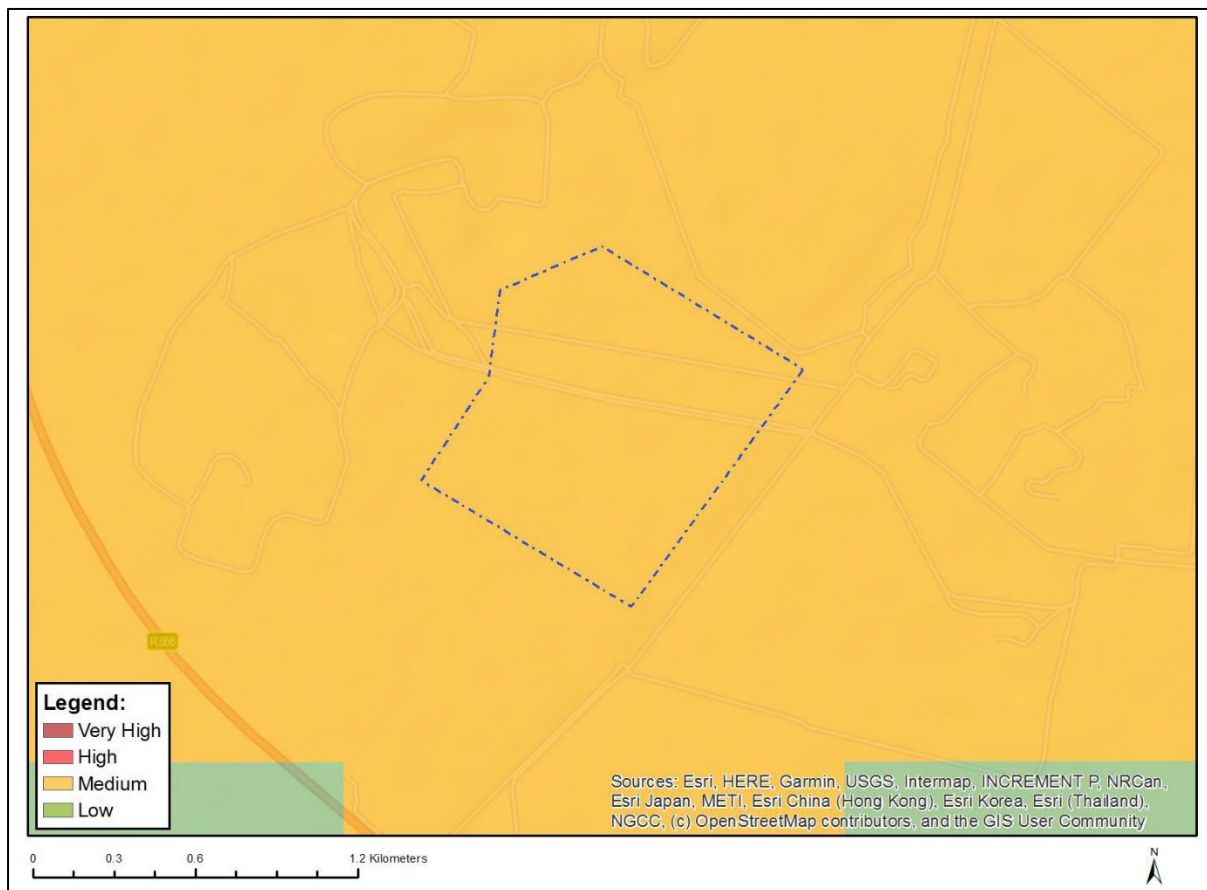


**Figure 7-2** Habitats identified in the project area

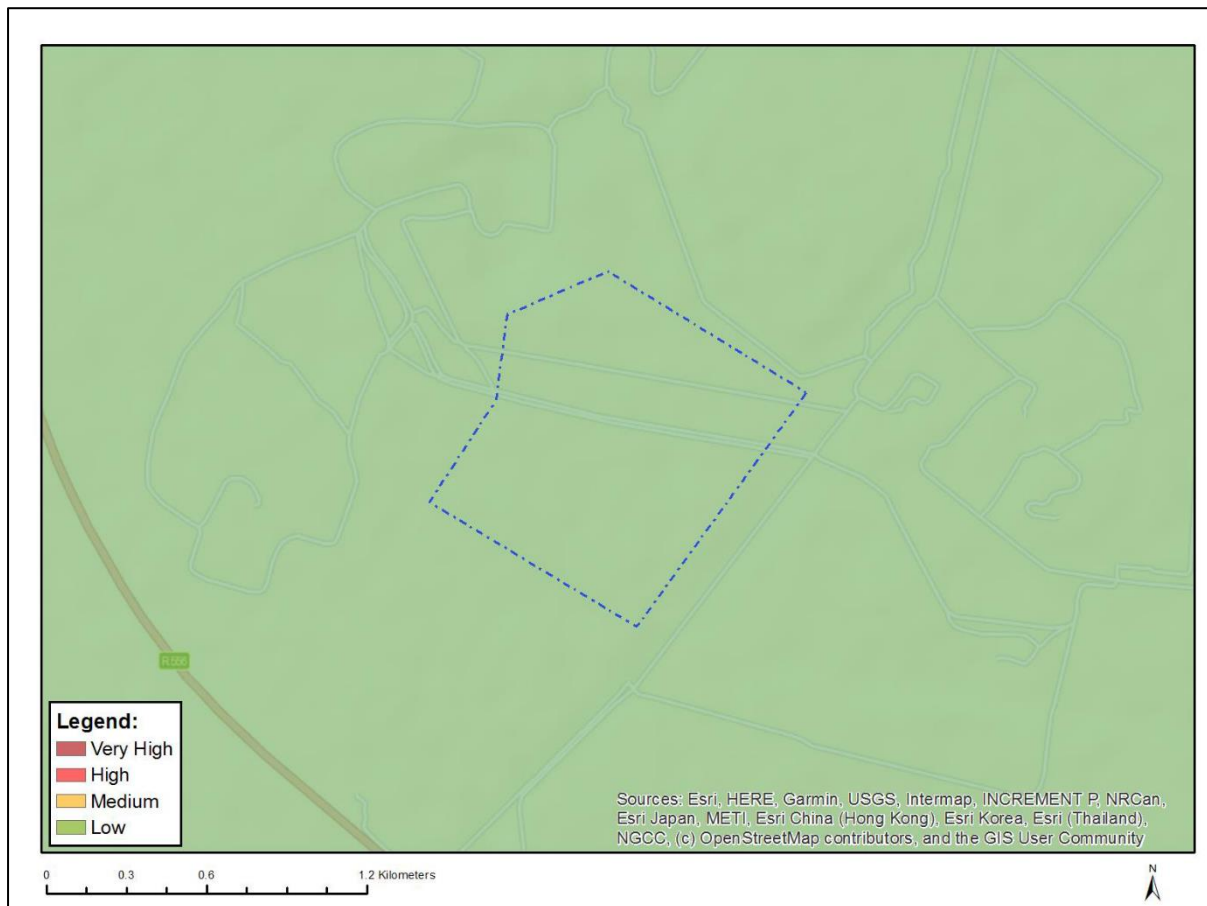
### 7.1.1 Areas of Concern

The following concerns are associated with the two feasibility areas:

- According to the spatial dataset, the proposed development overlaps with an EN ecosystem, traverses a threatened ecosystem and overlaps with a CBA2 area thus making it very high terrestrial biodiversity sensitivity;
- The project area falls in a “Poorly Protected” area;
- The project area is low plant species sensitivity;
- The avian theme sensitivity as indicated in the screening report was derived to be very High due to being within 50 km of breeding Cape vulture colonies; and
- It is medium animal species sensitivity due to sensitive species being possibly present including the Makwassie musk shrew (*Crocidura maquassiensis*) which is listed as Vulnerable on the national red list.

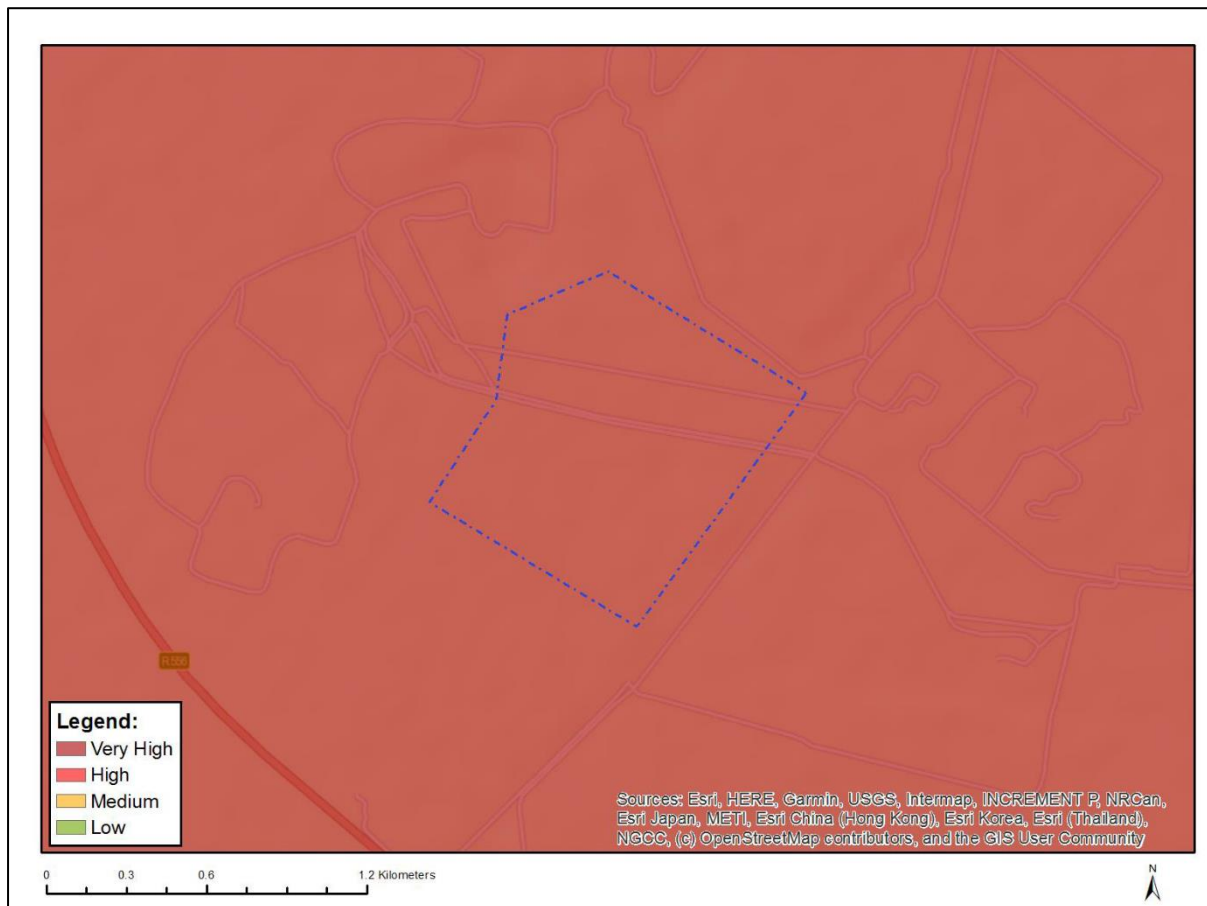


**Figure 7-3** Animal species Theme Sensitivity, National Web based Environmental Screening Tool.

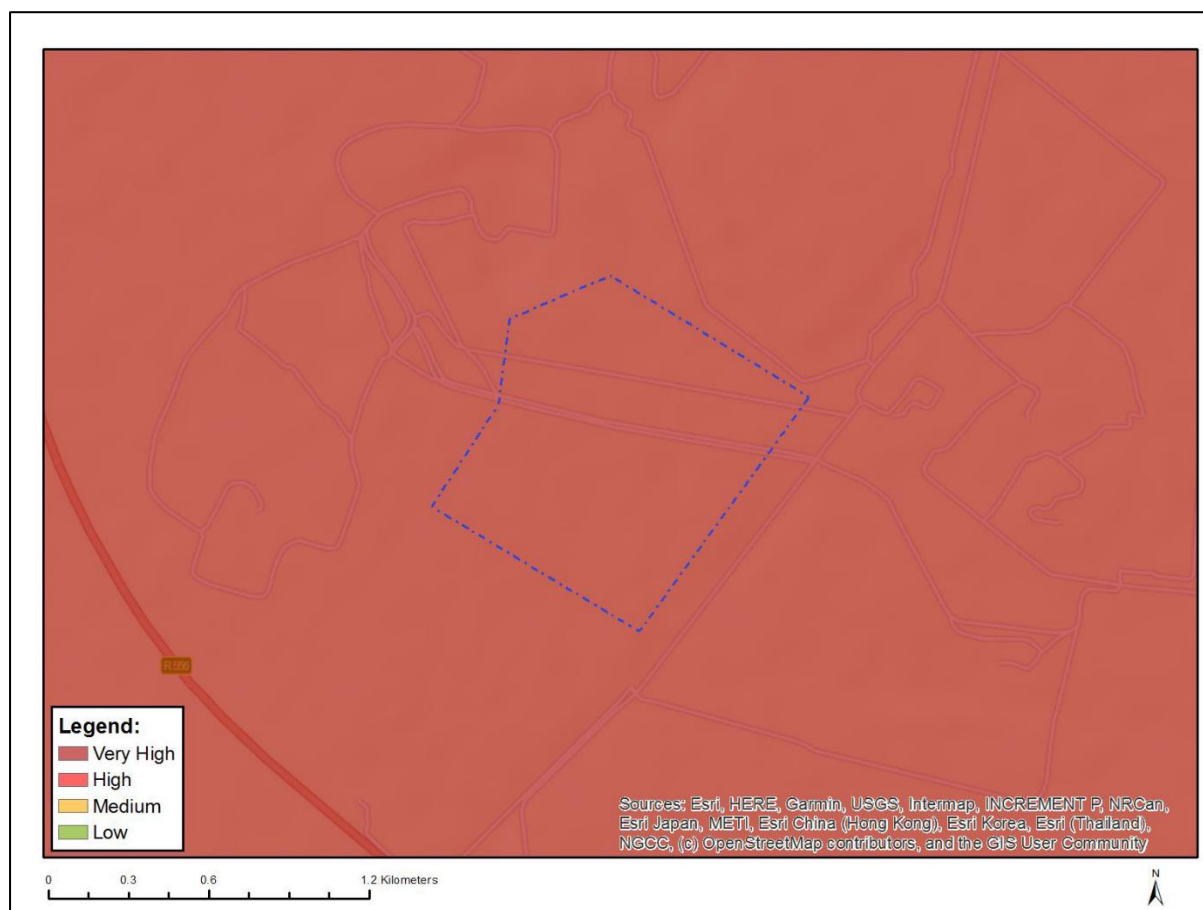


**Figure 7-4** Plant species Theme Sensitivity, National Web based Environmental Screening Tool.





**Figure 7-5** *Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.*



**Figure 7-6 Avian Theme Sensitivity, TBC Screening Report**

#### 7.1.1.1 Confirmation of Site Sensitivity

The low sensitivity for the Plant Species Theme is confirmed for a large portion of the project area, areas presented in the specialist sensitivity map (Figure 7-2) indicates the true sensitivity confirmed on site. The medium Animal Species Theme sensitivity is disputed as no sensitive faunal species or signs of any were recorded in the project area and faunal diversity was reported to be low. The completion of the avifaunal assessment does not corroborate this High sensitivity rating. The high sensitivity terrestrial biodiversity for the entire project area also disputed. As stated above the vegetation structure and species composition of the three habitats have either been either degraded or completely altered as such, has a very low conservation value and ecological sensitivity from both a faunal and floral perspective with the exception of the Degraded Bushveld Habitat which has a medium sensitivity due to the habitat intactness as well as being located within an EN ecosystem.

#### 7.1.1.2 Site Ecological Importance

The location and extent of all habitats are illustrated in Figure 7-2 below. Based on the criteria provided in Section 5.1.5.1 of this report, all habitats within the assessment area of the project were allocated a sensitivity category (Table 9 1). The sensitivities of the habitat types delineated are illustrated in Figure 9 6 below. Table 9 2 provides guidelines for interpreting Site Ecological Importance in the context of the development activities.

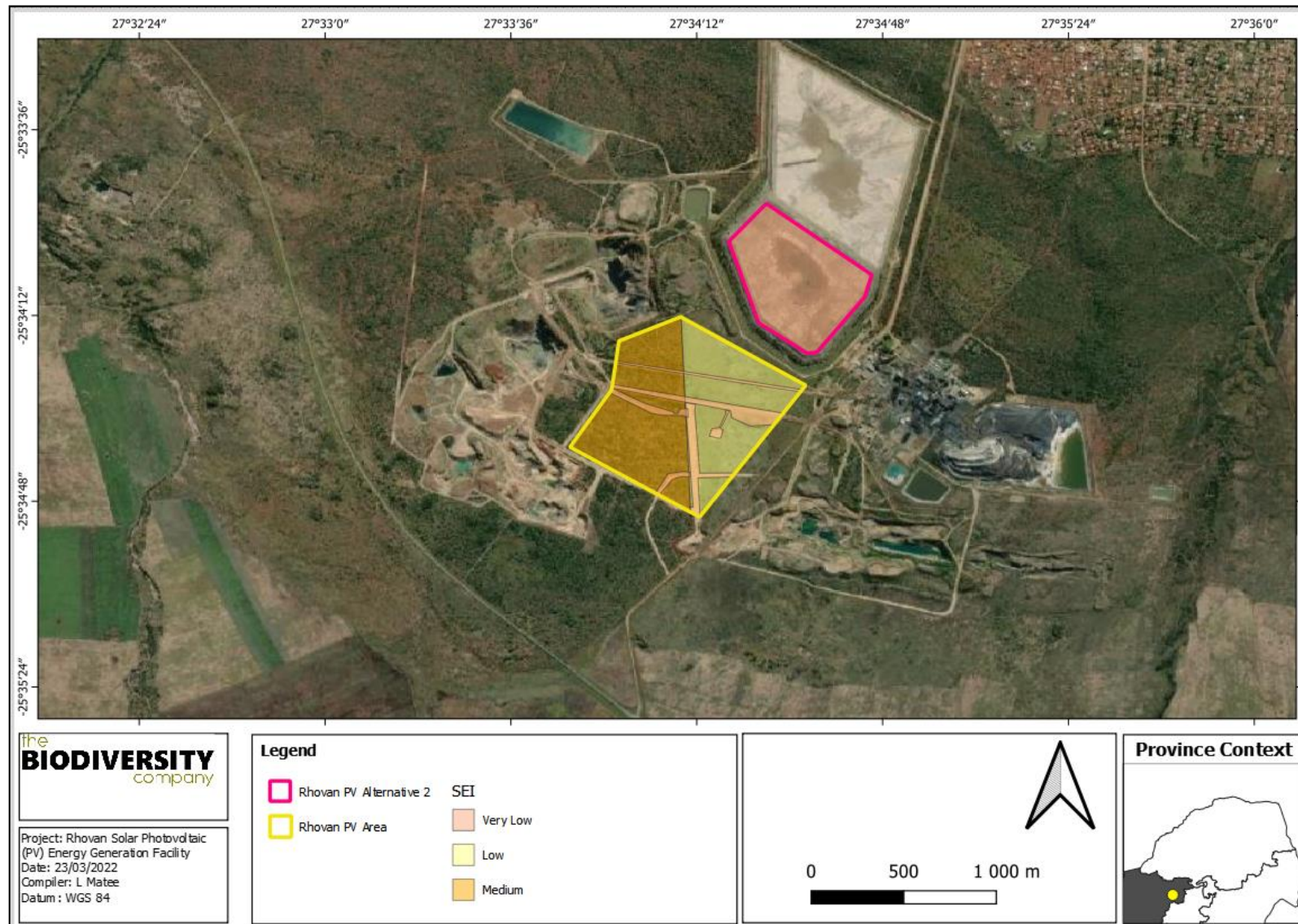
**Table 7-1 Summary of habitat types delineated within the field assessment area of the Rhovan Solar Photovoltaic (PV) Project and their respective SEI**

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
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Secondary Grassland	High	Medium	Medium	High	Low
Transformed	High	Medium	Medium	Very High	Very Low
Degraded Bushveld	High	Medium	Medium	Medium	Medium

**Table 7-2**      ***Guidelines for interpreting Site Ecological Importance in the context of the development activities***

Site Ecological Importance	Interpretation in relation to development 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.



**Figure 7-7** Ecological sensitivity map of the project area.



## 8 Impact Risk Assessment

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the project area, specifically the proposed development footprint area. The relevant impacts were then subjected to a prescribed impact assessment methodology. The details of this methodology can be provided on request.

### 8.1 Current Impacts

Multitemporal aerial imagery as well as site observations were used to record current and historical impacts in the project area. Both these show that the site has experienced quite a number of anthropogenically conditioned landscape changes, there is evidence of informal and mechanised prospective digging throughout the area as well as edge effects of mining as well as current mining related impacts. The current impacts observed during surveys are listed below. Photographic evidence of a selection of these impacts is shown in Figure 8-1.

- Mining and edge effects;
- Access roads and cleared areas;
- Footpaths and litter associated with the human infringement;
- Erosion;
- Alien and/or Invasive Plants (AIP);
- Servitudes and infrastructure (powerlines and conveyor belts)
- Litter and rubble dumping;
- Soil waste dumping; and
- Vegetation removal.



**Figure 8-1**     *Some of the identified impacts within the project area.*



## 8.2 Terrestrial Impact Assessment

Potential impacts were evaluated against the data captured during the desktop and field assessments to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology which is available on request.

## 8.3 Alternatives considered

Two alternatives were considered for this project as per Figure 3-2. Alternative one (1) in yellow is located within an undeveloped area whilst alternative two (2) in pink would entail constructing the PV facility on top of the mine's existing tailings storage facilities (TSF). Alternative 2 can be seen as the recommended option as the entire area is transformed and a large number of solar panel arrays can readily be installed on the surface of a tailings dam, provided that a suitable foundation solution be devised. This is not expected to be problematic should a suitable foundation solution be available and this alternative is the least sensitive site from an environmental perspective as impacts on the faunal habitats would be less as this option would require clearing of vegetation.

## 8.4 Loss of Irreplaceable Resources

A Critical Biodiversity Area two (CBA 2) area will be lost. In terms of managing the loss of natural habitat in CBAs, the NWBSP 2015 states, amongst others, that 'further loss of natural habitat should be avoided in CBA 1, whereas loss should be minimised in CBA 2 i.e., land in these two categories should be maintained as natural vegetation cover as far as possible. However, the project area is already in a degraded state and does not reflect that of a CBA2 area.

## 8.5 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 8-1 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 8-1 Summary of unplanned events for terrestrial biodiversity**

Unplanned Event	Potential Impact	Mitigation
Hydrocarbon spills into the surrounding environment	Contamination of habitat as well as water resources associated with the spillage.	A spill response kit must be available at all times. 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 grassland and ridges	Appropriate/Adequate fire management plan need to be implemented.
Wind erosion	Reduce habitat and remove topsoil layer	Rehabilitation and erosion monitoring plan

## 8.6 Identification of Potential Impacts

The impact significance for both alternatives were considered for the impact assessment. Table 8-2 presents alternative 1 whereas Table 8-3 presents alternative 2.

### 8.6.1 Pre-Construction

The impact considered for the pre-construction phase is the disturbance associated with specialist studies. This was rated as having a low impact before mitigations and an absent impact post mitigations

(Table 8-2). This can be mitigated successfully if the vehicle access around the site is restricted, and assessments mainly are conducted on foot.

### 8.6.2 Construction Phase

The following potential impacts on the biodiversity were considered for the construction phase. This phase refers to the period during construction when the proposed infrastructure is constructed. The impacts of construction phase on ecology can be both direct in terms of vegetation and habitat loss/displacement and indirect due to increased noise and heavy equipment and vehicular movement which will be limited to construction phase only. The clearing of vegetation will result in a further transformation of the already limited existing natural habitat, thus will ultimately lead to the proliferation of alien plant species along the roads and cleared areas as well as the severing of movement corridors for fauna, loss of fauna and flora SCCs and the fragmentation of habitat. The following potential impacts were considered:

- Collection of eggs and poaching;
- Roadkill;
- Destruction, fragmentation and degradation of habitats and ecosystems;
- Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna);
- Spread and/or establishment of alien and/or invasive species;
- Displacement of faunal community (Including several SCC) due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration);
- Mortalities and displacements of fauna and flora SCCs; and
- Chemical pollution associated with dust suppressants.

### 8.6.3 Operational phase

The operational phase of the impact of daily activities is anticipated to further spread the alien invasive plants, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts (Table 8-2). Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. The use of non-environmentally friendly chemical for the cleaning of the PV panels can lead to the pollution of water sources and ultimately death of fauna and flora. The following potential impacts were considered:

- Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species and erosion;
- Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species and erosion at corner 3 - alternative;
- Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors;
- Entrapment of fauna and avifauna in perimeter fences;
- Chemical pollution from cleaning panels;
- Collisions with PV and associated infrastructure;



- Electrocution by infrastructure and connections to PV;
- Increased anthropogenic disturbances (noise, human presence, litter and poaching/snaring); and
- Loss of faunal species due to road mortalities and vehicle collisions.

#### **8.6.4 Decommissioning phase**

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until the activity reduces and the rehabilitation measures are implemented. The following potential impacts were considered (Table 8-2):

- Continued fragmentation and degradation of habitats; and
- Displacement of the faunal community (including SCC) due to disturbance (road collisions, noise, dust, vibration, electrocution and collision).

**Table 8-2** *Assessment of the significance of potential impacts on terrestrial biodiversity associated with the project alternative 1*

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Confidence	Public	Cumulative	Irreplaceable	Priority Factor	Final score
Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.	Planning	-8,25	-4	High	1	1	1	1,00	-4,00
Destruction, further loss and fragmentation of the vegetation community	Construction	-14	-7,5	High	1	2	2	1,33	-10,00
Introduction of alien species, especially plants	Construction	-16	-8,25	High	1	2	2	1,33	-11,00
Mortalities and displacements of fauna and flora species	Construction	-14	-7,5	High	1	2	2	1,33	-10,00
Spilling of hazardous chemicals into the receiving environment and penetrating into sensitive habitats	Construction	-11,25	-6	High	1	2	3	1,50	-9,00
Chemical pollution associated with dust suppressants	Construction	-16	-9,75	High	1	2	2	1,33	-13,00
Spread and/or establishment of alien and/or invasive species	Construction	-15	-7,5	High	1	2	2	1,33	-10,00
Continued IAP encroachment into disturbed areas arising from construction activity	Operation	-15	-8,25	High	1	2	2	1,33	-11,00
Habitat fragmentation of habitats due to barrier effect of security fencing	Operation	-14	-7,5	High	1	2	2	1,33	-10,00
Continued mortalities and displacement of faunal species	Operation	-14	-7,5	High	1	2	2	1,33	-10,00
Chemical pollution associated with measures to keep PV clean	Operation	-16	-9	High	1	2	3	1,50	-13,50
Continued encroachment and establishment of IAPs into surrounding habitat that was disturbed	Decommissioning	-14	-7,5	Medium	1	1	1	1,00	-7,50
Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Decommissioning	-10,5	-4,5	Medium	1	1	1	1,00	-4,50

**Table 8-3**      **Assessment of the significance of potential impacts on terrestrial biodiversity associated with the project alternative 2 (preferred)**

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Confidence	Public	Cumulative	Irreplaceable	Priority Factor	Final score
Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.	Planning	-6	-2	High	1	1	1	1.00	-2.00
Destruction, further loss and fragmentation of the vegetation community	Construction	-10	-8	High	1	1	2	1.17	-9.33
Introduction of alien species, especially plants	Construction	-9	-4	High	1	2	1	1.17	-4.67
Mortalities and displacements of fauna and flora species	Construction	-6.75	-4	High	1	1	2	1.17	-4.67
Spilling of hazardous chemicals into the receiving environment and penetrating into sensitive habitats	Construction	-9	-4	High	1	2	2	1.33	-5.33
Chemical pollution associated with dust suppressants	Construction	-9.75	-4	High	1	2	2	1.33	-5.33
Spread and/or establishment of alien and/or invasive species	Construction	-9	-4	High	1	2	2	1.33	-5.33
Continued IAP encroachment into disturbed areas arising from construction activity	Operation	-9	-4	High	1	2	2	1.33	-5.33
Habitat fragmentation of habitats due to barrier effect of security fencing	Operation	-6.75	-3.5	High	1	1	2	1.17	-4.08
Continued mortalities and displacement of faunal species	Operation	-6.75	-4	High	1	1	2	1.17	-4.67
Chemical pollution associated with measures to keep PV clean	Operation	-9.75	-4	High	1	2	2	1.33	-5.33
Continued encroachment and establishment of IAPs into surrounding habitat that was disturbed	Decommissioning	-9	-4	Medium	1	2	2	1.33	-5.33
Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Decommissioning	-7.5	-4	Medium	1	1	2	1.17	-4.67

#### **8.6.5 Assessment of Impact Significance**

The assessment of impact significance considers pre-mitigation as well as implementation of post-mitigation scenarios. Mitigations are provided in section 9 of this report.

### **9 Specialist Management Plan**

The aim of the management outcomes is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 9-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the ecologically sensitive areas in the vicinity of the project area;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of faunal species and community (including potentially occurring species of conservation concern).



**Table 9-1 Mitigation measures including requirements for timeframes, roles and responsibilities for the terrestrial study**

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Operational and Decommissioning phase	Environmental Officer & Contractor	Woody material around footprint	During Phase
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. 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 leaking and entering the environment.	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
A carefully considered surface water/drainage management plan must be developed for the site including attention to the use of environmentally friendly cleaning chemicals for cleaning of panels during the operational phase	Life of operation	Environmental Officer & Design Engineer	Water Quality and presence of erosion	Ongoing
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing

prevent the spread of exotic or invasive species or the illegal collection of plants.				
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Rocks removed in the construction phased may not be dumped, but can be used in areas where erosion control needs to be performed	Operational phase	Environmental Officer & Contractor	Rock piles	During Phase
The Solar panel surfaces may not have reflective surfaces which can lead to veld fires	Operational phase	Environmental Officer & Contractor	Fire Management	During Phase

## Management outcome: Fauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Heights of light columns to be minimised to reduce light spill. Baffles, hoods or louvres to also be used to reduce light spill	Construction Phase	Environmental Officer & Design Engineer	Light pollution	Ongoing
Facility lighting during construction & operation should be kept to a minimum and should make use of latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons, where feasible.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area, or their nest be found in	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation

the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. Any holes/deep excavations must be dug and planted in a progressive manner; Should the holes overnight they must be sloped to ensure small fauna can exit.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
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 and construction	Environmental Officer & Contractor, Engineer	Fauna movement corridor	Ongoing
Use environmentally friendly cleaning and dust suppressant products	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Fencing mitigations: <ul style="list-style-type: none"> <li>Top 2 strands must be smooth wire</li> <li>Routinely retention loose wires</li> <li>Minimum 30cm between wires</li> </ul> Place markers on fences	Planning, construction and operation	Environmental Officer & Contractor, Engineer	Monitor fences for slack wires	Ongoing
Any exposed electrical wiring parts must be covered (insulated) to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Management outcome: Alien species				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
An alien management plan must be implemented quarterly for 2 years after the construction phase	Construction phase and Decommissioning phase	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly for 2 years after phase
Management outcome: Dust				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces.	Life of operation	Contractor	Dustfall	Dust monitoring program.

- No non environmentally friendly suppressants may be used as this could result in pollution of water sources

## Management outcome: Waste management

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
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	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 30 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

## Management outcome: Environmental awareness training

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

## Management outcome: Erosion

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
<ul style="list-style-type: none"> <li>Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit;</li> <li>Signs must be put up to enforce this.</li> </ul>				



Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

## 10 Conclusion and Impact Statement

It is the opinion of the ecologists that this study provides the relevant information required in order to implement an Integrated Environmental Management plan. As well as to ensure that the best long-term use of the ecological resources in the project area are made in support of the principle of sustainable development. The construction and operation of the infrastructure are not anticipated to pose significant threats to the receiving environment provided the mitigation measures are effectively applied, thus the proposed development can obtain approval.

Through the analysis of various database and satellite imagery as well as the infield screening assessment it was determined that although the majority of the project area is highly degraded or transformed it still possesses a number of sensitive ecological receptors. These sensitivity receptors relate to being within a EN ecosystem, traversing a threatened ecosystem (VU) and marginally overlapping with a Priority Focus Area. Other than that, the majority of the project area (Transformed area) is in a highly degraded state as the vegetation structure and species composition has been completely altered as such, has a very low conservation value and ecological sensitivity from a floral perspective.

Three habitat units were recorded in the project area, Transformed, Secondary Grassland and Degraded Bushveld. The vegetation and ecology within the development areas have been heavily disturbed for a long time, both currently and historically. The only significant patch of intact natural vegetation that remains within the project area is the Degraded Bushveld. Overall, the terrestrial botanical diversity within the project areas is very low. The Transformed habitat unit and Secondary Grassland were assigned a very low sensitivity and low sensitivity respectively due to the impacted nature of these areas collectively. Degraded Bushveld was assigned a medium sensitivity due to being relatively intact and being located within an Endangered ecosystem. The degraded bushveld is not entirely transformed but in a constant disturbed state, as they can't recover to a more natural state due to ongoing disturbances and impacts received from AIP encroachment, active mining practices and edge effects from the adjacent mining activities. Although the habitat units are not entirely transformed, ongoing and historic disturbances have resulted in the plant community no longer being fully representative of the reference vegetation.

Based on desktop data and the infield assessment the project area is home to a total of 71 species of which one is a SCC the yellow-throated sandgrouse (*Pterocles gutturalis*) (EN), although this species was not recorded during the 2022 assessment. However, this species frequents open plains with short grass, often near rivers or swamps; favours recently burnt areas; also found in ploughed land and on fallow, which is a habitat that is lacking in the project area. This species is thus considered moderately likely to occur in the project area in its current state. No nests of SCC species was recorded and the only collision risk species recorded was the Pied crow which does not pose a risk to the approval of the development.

The greatest impact on the overall habitat is expected to be an increase in alien plant infestations as a result of the construction disturbances, through the implementation of an alien management plan this impact can successfully be mitigated. The greatest impact on the avifauna is envisioned to be electrocution and collisions these can be mitigated with changes in the design and the installation of bird flappers. All the impacts can be successfully mitigated, it is therefore imperative that the mitigations and recommendations be considered by the issuing authority.

Alternative 2 is the least sensitive site from an environmental perspective as impacts on the faunal habitats would be less as this option would require clearing of vegetation. The entire area is transformed, and a large number of solar panel arrays can readily be installed on the surface of a tailings dam, provided that a suitable foundation solution be devised. This is not expected to be problematic should a suitable foundation solution be available.

## 10.1 Impact Statement

The main expected impacts of the proposed infrastructure will include the following:

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Entrapment in perimeter fences
- Collision and electrocution;
- Sensory disturbance and possible extirpation of SCC
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable level.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinions of the specialists that the project, may be favourably considered, on condition that all prescribed mitigation measures and supporting recommendations are implemented. Further to this, no natural wetland systems were identified within the 500 m regulatory area, and based on this no water use authorisation for the proposed aspects is required.

## 11 References

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## 12 Appendix Items

### 12.1 Appendix A – Flora species expected to occur in the project area.

Family	Scientific Name	IU CN	Ecology
Oleaceae	<i>Olea capensis</i> L. subsp. <i>enervis</i> (Harv. ex C.H.Wright) I. Verd.	LC	Indigenous
Fabaceae	<i>Rhynchosia albissima</i> Gand.	LC	Indigenous
Asteraceae	<i>Helichrysum stenopterum</i> DC.	LC	Indigenous
Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	LC	Indigenous
Rhamnaceae	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	LC	Indigenous
Cyperaceae	<i>Kyllinga alba</i> Nees	LC	Indigenous
Aneuraceae	<i>Riccardia fastigiata</i> (Lehm.) Trevis.		Indigenous
Sapotaceae	<i>Mimusops zeyheri</i> Sond.	LC	Indigenous
Poaceae	<i>Bothriochloa insculpta</i> (Hochst. ex A.Rich.) A. Camus	LC	Indigenous
Fabaceae	<i>Crotalaria laburnifolia</i> L. subsp. <i>australis</i> (Baker f.) Polhill	LC	Indigenous
Apocynaceae	<i>Ancylobothrys capensis</i> (Oliv.) Pichon	LC	Indigenous
Rubiaceae	<i>Canthium suberosum</i> Codd	LC	Indigenous
Ebenaceae	<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC	Indigenous
Malvaceae	<i>Sida cordifolia</i> L. subsp. <i>cordifolia</i>	LC	Indigenous
Iridaceae	<i>Freesia grandiflora</i> (Baker) Klatt subsp. <i>grandiflora</i>	LC	Indigenous
Oleandraceae	<i>Oleandra distenta</i> Kunze	LC	Indigenous
Urticaceae	<i>Obetia tenax</i> (N.E.Br.) Friis	LC	Indigenous
Asteraceae	<i>Xanthium strumarium</i> L.		Not indigenous; Naturalised; Invasive
Brachytheciaceae	<i>Squamidium brasiliense</i> (Hornsch.) Broth.		Indigenous
Poaceae	<i>Chloris virgata</i> Sw.	LC	Indigenous
Rhamnaceae	<i>Helinus</i> sp.		
Cucurbitaceae	<i>Peponium caledonicum</i> (Sond.) Engl.	LC	Indigenous
Ochnaceae	<i>Ochna holstii</i> Engl.	LC	Indigenous
Asteraceae	<i>Erigeron primulifolius</i> (Lam.) Greuter		Not indigenous; Naturalised; Invasive
Vitaceae	<i>Cyphostemma sandersonii</i> (Harv.) Desc.	LC	Indigenous
Oleaceae	<i>Olea europaea</i> L. subsp. <i>cuspidata</i> (Wall. ex G.Don) Cif.		Indigenous
Lycopodiaceae	<i>Palhinhaea cernua</i> (L.) Vasc. & Franco		Indigenous
Ochnaceae	<i>Ochna pulchra</i> Hook.f.	LC	Indigenous
Celastraceae	<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	LC	Indigenous
Geraniaceae	<i>Monsonia</i> sp.		
Pylaisiadelpheaceae	<i>Isopterygium leucophanes</i> (Hampe ex Mull.Hal.) A. Jaeger		Indigenous
Fabaceae	<i>Senegalia erubescens</i> (Welw. ex Oliv.) Kyal. & Boatwr.	LC	Indigenous
Poaceae	<i>Eragrostis heteromera</i> Stapf	LC	Indigenous
Apocynaceae	<i>Pachycarpus concolor</i> E.Mey. subsp. <i>concolor</i>	LC	Indigenous
Poaceae	<i>Digitaria ternata</i> (A.Rich.) Stapf	LC	Indigenous
Santalaceae	<i>Viscum rotundifolium</i> L.f.	LC	Indigenous
Fabaceae	<i>Dumasia villosa</i> DC. var. <i>villosa</i>	LC	Indigenous
Convolvulaceae	<i>Ipomoea magnusiana</i> Schinz	LC	Indigenous

<b>Vitaceae</b>	<i>Cyphostemma sulcatum</i> (C.A.Sm.) A.E.van der Merwe	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Setaria lindenberiana</i> (Nees) Stapf	LC	Indigenous
<b>Malpighiaceae</b>	<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC	Indigenous
<b>Fissidentaceae</b>	<i>Fissidens sciophyllus</i> Mitt.		Indigenous
<b>Celastraceae</b>	<i>Salacia rehmannii</i> Schinz	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Cineraria parvifolia</i> Burt Davy	LC	Indigenous; Endemic
<b>Pteridaceae</b>	<i>Cheilanthes hirta</i> Sw. var. <i>brevipilosa</i> Jacobsen & N.H.G.Jacobsen forma <i>laxa</i> (Kunze) W.Jacobsen & N.H.G.Jacobsen		Indigenous
<b>Malvaceae</b>	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC	Indigenous
<b>Dennstaedtiaceae</b>	<i>Microlepia speluncae</i> (L.) T.Moore	LC	Indigenous
<b>Asteraceae</b>	<i>Conyza ulmifolia</i> (Burm.f.) Kuntze		Indigenous
<b>Asteraceae</b>	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>oxyphyllum</i> (DC.) Beentje	LC	Indigenous
<b>Poaceae</b>	<i>Paspalum urvillei</i> Steud.	NE	Not indigenous; Naturalised; Invasive
<b>Rosaceae</b>	<i>Rubus rigidus</i> Sm.	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia</i> sp.		
<b>Leucobryaceae</b>	<i>Campylopus robillardii</i> Besch.		Indigenous
<b>Fabaceae</b>	<i>Rhynchosia monophylla</i> Schltr.	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Euphorbia cooperi</i> N.E.Br. ex A.Berger var. <i>cooperi</i>		Indigenous
<b>Poaceae</b>	<i>Hyparrhenia hirta</i> (L.) Stapf	LC	Indigenous
<b>Salicaceae</b>	<i>Dovyalis zeyheri</i> (Sond.) Warb.	LC	Indigenous
<b>Leucobryaceae</b>	<i>Campylopus pilifer</i> Brid. var. <i>pilifer</i>		Indigenous
<b>Lamiaceae</b>	<i>Syncolostemon pretoriae</i> (Gurke) D.F.Otieno	LC	Indigenous
<b>Vitaceae</b>	<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>cuneifolia</i> (Eckl. & Zeyh.) Urton	NE	Indigenous
<b>Poaceae</b>	<i>Chrysopogon serrulatus</i> Trin.	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Tragia incisifolia</i> Prain	LC	Indigenous
<b>Cyperaceae</b>	<i>Coleochloa setifera</i> (Ridl.) Gilly	LC	Indigenous
<b>Polygonaceae</b>	<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	LC	Indigenous
<b>Asparagaceae</b>	<i>Asparagus angusticladus</i> (Jessop) J.-P.Lebrun & Stork	LC	Indigenous
<b>Verbenaceae</b>	<i>Lippia javanica</i> (Burm.f.) Spreng.	LC	Indigenous
<b>Asteraceae</b>	<i>Callilepis lancifolia</i> Burt Davy	LC	Indigenous; Endemic
<b>Poaceae</b>	<i>Diandrochloa namaquensis</i> (Nees) De Winter	LC	Indigenous
<b>Cyperaceae</b>	<i>Schoenoplectus brachyceras</i> (Hochst. ex A.Rich.) Lye	LC	Indigenous
<b>Fabaceae</b>	<i>Abrus laevigatus</i> E.Mey.	LC	Indigenous
<b>Rutaceae</b>	<i>Zanthoxylum capense</i> (Thunb.) Harv.	LC	Indigenous
<b>Polygonaceae</b>	<i>Persicaria madagascariensis</i> (Meisn.) S.Ortiz & Paiva		Indigenous
<b>Vitaceae</b>	<i>Rhoicissus revouillii</i> Planch.	LC	Indigenous
<b>Cyperaceae</b>	<i>Lipocarpha chinensis</i> (Osbeck) J.Kern	LC	Indigenous
<b>Polygonaceae</b>	<i>Rumex sagittatus</i> Thunb.	LC	Indigenous
<b>Convolvulaceae</b>	<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC	Indigenous
<b>Scrophulariaceae</b>	<i>Zaluzianskya elongata</i> Hilliard & B.L.Burt	LC	Indigenous
<b>Cannabaceae</b>	<i>Trema orientalis</i> (L.) Blume	LC	Indigenous

<b>Asteraceae</b>	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. & J.Wen forma <i>leptodictya</i>	NE	Indigenous
<b>Fabaceae</b>	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>venulosa</i> (Hiern) Verdc.		Indigenous
<b>Asparagaceae</b>	<i>Asparagus transvaalensis</i> (Oberm.) Fellingham & N.L.Mey.	LC	Indigenous
<b>Amaranthaceae</b>	<i>Aerva lanata</i> (L.) Juss. ex Schult.	LC	Indigenous
<b>Lamiaceae</b>	<i>Plectranthus ramosior</i> (Benth.) Van Jaarsv.	LC	Indigenous; Endemic
<b>Xyridaceae</b>	<i>Xyris congensis</i> Buttner	LC	Indigenous
<b>Combretaceae</b>	<i>Combretum hereroense</i> Schinz		Indigenous
<b>Malvaceae</b>	<i>Abutilon galpinii</i> A.Meeuse	LC	Indigenous
<b>Convolvulaceae</b>	<i>Ipomoea transvaalensis</i> A.Meeuse	LC	Indigenous
<b>Poaceae</b>	<i>Aristida adscensionis</i> L.	LC	Indigenous
<b>Asteraceae</b>	<i>Nidorella auriculata</i> DC.	LC	Indigenous
<b>Poaceae</b>	<i>Andropogon eucomus</i> Nees	LC	Indigenous
<b>Cyperaceae</b>	<i>Isolepis costata</i> Hochst. ex A.Rich.	LC	Indigenous
<b>Passifloraceae</b>	<i>Adenia digitata</i> (Harv.) Engl.	LC	Indigenous
<b>Pteridaceae</b>	<i>Pellaea calomelanos</i> (Sw.) Link var. <i>calomelanos</i>	LC	Indigenous
<b>Ruscaceae</b>	<i>Sansevieria aethiopica</i> Thunb.	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia quartiniana</i> A.Rich.	LC	Indigenous
<b>Cleomaceae</b>	<i>Cleome</i> sp.		
<b>Poaceae</b>	<i>Andropogon schirensis</i> Hochst. ex A.Rich.	LC	Indigenous
<b>Poaceae</b>	<i>Alloteropsis semialata</i> (R.Br.) Hitchc. subsp. <i>semialata</i>	LC	Indigenous
<b>Plumbaginaceae</b>	<i>Plumbago zeylanica</i> L.		Indigenous
<b>Anthocerotaceae</b>	<i>Anthoceros natalensis</i> Steph.		Indigenous
<b>Pittosporaceae</b>	<i>Pittosporum viridiflorum</i> Sims	LC	Indigenous
<b>Fabaceae</b>	<i>Rhynchosia sordida</i> (E.Mey.) Schinz	LC	Indigenous
<b>Pteridaceae</b>	<i>Pellaea dura</i> (Willd.) Hook. var. <i>dura</i>	LC	Indigenous
<b>Anemiaceae</b>	<i>Mohria vestita</i> Baker	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia</i> sp.		
<b>Anacardiaceae</b>	<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	LC	Indigenous
<b>Pilotrichaceae</b>	<i>Callicostella tristis</i> (Mull.Hal.) Broth.		Indigenous
<b>Poaceae</b>	<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	LC	Indigenous
<b>Ricciaceae</b>	<i>Riccia atropurpurea</i> Sim		Indigenous
<b>Verbenaceae</b>	<i>Chascanum hederaceum</i> (Sond.) Moldenke var. <i>hederaceum</i>	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Tragia rupestris</i> Sond.	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia depressa</i> N.E.Br.	LC	Indigenous
<b>Combretaceae</b>	<i>Combretum zeyheri</i> Sond.	LC	Indigenous
<b>Poaceae</b>	<i>Hyparrhenia tamba</i> (Steud.) Stapf	LC	Indigenous
<b>Lamiaceae</b>	<i>Rotheca louwalbertsii</i> (P.P.J.Herman) P.P.J.Herman & Retief	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus albostratus</i> Schrad.	LC	Indigenous
<b>Pteridaceae</b>	<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>obscura</i> (N.C.Anthony) N.C.Anthony	LC	Indigenous
<b>Santalaceae</b>	<i>Osyris lanceolata</i> Hochst. & Steud.	LC	Indigenous

<b>Poaceae</b>	<i>Phragmites australis</i> (Cav.) Steud.	LC	Indigenous
<b>Amaryllidaceae</b>	<i>Scadoxus puniceus</i> (L.) Friis & Nordal	LC	Indigenous
<b>Solanaceae</b>	<i>Solanum campylacanthum</i> Hochst. ex A.Rich.		Indigenous
<b>Asteraceae</b>	<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	NE	Indigenous
<b>Thelypteridaceae</b>	<i>Thelypteris confluens</i> (Thunb.) C.V.Morton	LC	Indigenous
<b>Orobanchaceae</b>	<i>Striga asiatica</i> (L.) Kuntze	LC	Indigenous
<b>Lamiaceae</b>	<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC	Indigenous
<b>Solanaceae</b>	<i>Solanum aculeatissimum</i> Jacq.		Not indigenous; Naturalised
<b>Lamiaceae</b>	<i>Vitex zeyheri</i> Sond.	LC	Indigenous
<b>Rubiaceae</b>	<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	LC	Indigenous
<b>Convolvulaceae</b>	<i>Ipomoea gracilispala</i> Rendle	LC	Indigenous
<b>Malvaceae</b>	<i>Triumfetta annua</i> L. forma <i>piliger</i> Sprague & Hutch.	NE	Indigenous
<b>Pottiaceae</b>	<i>Trichostomum brachydontium</i> Bruch		Indigenous
<b>Malvaceae</b>	<i>Hibiscus</i> sp.		
<b>Poaceae</b>	<i>Eragrostis nindensis</i> Ficalho & Hiern	LC	Indigenous
<b>Geraniaceae</b>	<i>Pelargonium luridum</i> (Andrews) Sweet	LC	Indigenous
<b>Apocynaceae</b>	<i>Rauvolfia caffra</i> Sond.	LC	Indigenous
<b>Iridaceae</b>	<i>Gladiolus sericeovillosus</i> Hook.f. subsp. <i>calvatus</i> (Baker) Goldblatt	LC	Indigenous
<b>Juncaceae</b>	<i>Juncus</i> sp.		
<b>Proteaceae</b>	<i>Protea welwitschii</i> Engl.	LC	Indigenous
<b>Talinaceae</b>	<i>Talinum</i> sp.		
<b>Anacardiaceae</b>	<i>Lannea discolor</i> (Sond.) Engl.	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia flava</i> DC.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	LC	Indigenous
<b>Cyperaceae</b>	<i>Rhynchospora brownii</i> Roem. & Schult.	LC	Indigenous
<b>Moraceae</b>	<i>Ficus abutilifolia</i> (Miq.) Miq.	LC	Indigenous
<b>Poaceae</b>	<i>Paspalum distichum</i> L.	LC	Not indigenous; Naturalised; Invasive
<b>Poaceae</b>	<i>Cynodon dactylon</i> (L.) Pers.	LC	Indigenous
<b>Cucurbitaceae</b>	<i>Coccinia adoensis</i> (A.Rich.) Cogn.	LC	Indigenous
<b>Amaryllidaceae</b>	<i>Haemanthus humilis</i> Jacq. subsp. <i>humilis</i>	LC	Indigenous; Endemic
<b>Chrysobalanaceae</b>	<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia dentata</i> (Thunb.) F.A.Barkley	LC	Indigenous
<b>Asparagaceae</b>	<i>Asparagus flavicaulis</i> (Oberm.) Fellingham & N.L.Mey. subsp. <i>flavicaulis</i>	LC	Indigenous
<b>Poaceae</b>	<i>Hyparrhenia dregeana</i> (Nees) Stapf ex Stent	LC	Indigenous
<b>Amaranthaceae</b>	<i>Salsola glabrescens</i> Burt Davy	LC	Indigenous
<b>Cyperaceae</b>	<i>Carex sparteae</i> Wahlenb.		Indigenous
<b>Poaceae</b>	<i>Brachiaria xantholeuca</i> (Schinz) Stapf	LC	Indigenous
<b>Dipsacaceae</b>	<i>Scabiosa columbaria</i> L.	LC	Indigenous
<b>Juncaceae</b>	<i>Juncus exsertus</i> Buchenau	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Croton gratissimus</i> Burch. var. <i>subgratissimus</i> (Prain) Burt Davy	LC	Indigenous
<b>Rhamnaceae</b>	<i>Phylla paniculata</i> Willd.	LC	Indigenous



<b>Cyperaceae</b>	<i>Cyperus denudatus</i> L.f.	LC	Indigenous
<b>Asteraceae</b>	<i>Tarchonanthus camphoratus</i> L.	LC	Indigenous
<b>Fabaceae</b>	<i>Tylosema esculentum</i> (Burch.) A.Schreib.	LC	Indigenous
<b>Achariaceae</b>	<i>Kiggelaria africana</i> L.	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Dalechampia</i> sp.		
<b>Poaceae</b>	<i>Urochloa mosambicensis</i> (Hack.) Dandy	LC	Indigenous
<b>Cyperaceae</b>	<i>Fimbristylis dichotoma</i> (L.) Vahl subsp. <i>dichotoma</i>	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus subreniformis</i> Burtt Davy	LC	Indigenous
<b>Santalaceae</b>	<i>Viscum</i> sp.		
<b>Gleicheniaceae</b>	<i>Gleichenia polypodioides</i> (L.) Sm.	LC	Indigenous
<b>Stereophyllaceae</b>	<i>Stereophyllum radiculosum</i> (Hook.) Mitt.		Indigenous
<b>Malvaceae</b>	<i>Sida dregei</i> Burtt Davy	LC	Indigenous
<b>Hyacinthaceae</b>	<i>Ledebouria ovatifolia</i> (Baker) Jessop		Indigenous
<b>Commelinaceae</b>	<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B.Clarke	LC	Indigenous
<b>Poaceae</b>	<i>Hyparrhenia anamesa</i> Clayton	LC	Indigenous
<b>Santalaceae</b>	<i>Thesium gracilarioides</i> A.W.Hill	LC	Indigenous
<b>Moraceae</b>	<i>Ficus thonningii</i> Blume		Indigenous
<b>Meliaceae</b>	<i>Turraea floribunda</i> Hochst.	LC	Indigenous
<b>Osmundaceae</b>	<i>Osmunda regalis</i> L.	LC	Indigenous
<b>Combretaceae</b>	<i>Combretum molle</i> R.Br. ex G.Don	LC	Indigenous
<b>Acanthaceae</b>	<i>Barleria</i> sp.		
<b>Poaceae</b>	<i>Eragrostis barrelieri</i> Daveau	NE	Not indigenous; Naturalised
<b>Asteraceae</b>	<i>Tarchonanthus parvicapitulatus</i> P.P.J.Herman	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia subspathulata</i> N.E.Br.	LC	Indigenous
<b>Malvaceae</b>	<i>Pavonia</i> sp.		
<b>Fabaceae</b>	<i>Vachellia karroo</i> (Hayne) Banfi & Galasso	LC	Indigenous
<b>Apocynaceae</b>	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	LC	Indigenous
<b>Malvaceae</b>	<i>Corchorus aspleniifolius</i> Burch.	LC	Indigenous
<b>Fabaceae</b>	<i>Sesbania transvaalensis</i> J.B.Gillett	LC	Indigenous
<b>Fabaceae</b>	<i>Indigofera melanadenia</i> Benth. ex Harv.	LC	Indigenous
<b>Apocynaceae</b>	<i>Ceropegia barberae</i> (Harv. ex Hook.f.) Bruyns		Indigenous
<b>Poaceae</b>	<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	LC	Indigenous
<b>Malvaceae</b>	<i>Corchorus argillicola</i> M.J.Moeaha & P.J.D.Winter		Indigenous
<b>Anacardiaceae</b>	<i>Searsia pyroides</i> (Burch.) Moffett var. <i>gracilis</i> (Engl.) Moffett	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia lancea</i> (L.f.) F.A.Barkley	LC	Indigenous
<b>Orobanchaceae</b>	<i>Striga forbesii</i> Benth.	LC	Indigenous
<b>Fabaceae</b>	<i>Rhynchosia nitens</i> Benth. ex Harv.	LC	Indigenous
<b>Ricciaceae</b>	<i>Riccia albolimbata</i> S.W.Arnell		Indigenous
<b>Salicaceae</b>	<i>Scolopia zeyheri</i> (Nees) Harv.	LC	Indigenous
<b>Celastraceae</b>	<i>Gymnosporia polyacantha</i> Szyszyl. subsp. <i>vaccinifolia</i> (P.Conrath) Jordaan	LC	Indigenous; Endemic
<b>Malvaceae</b>	<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC	Indigenous

<b>Malvaceae</b>	<i>Hermannia floribunda</i> Harv.	LC	Indigenous
<b>Velloziaceae</b>	<i>Xerophyta viscosa</i> Baker	LC	Indigenous
<b>Poaceae</b>	<i>Ischaemum afrum</i> (J.F.Gmel.) Dandy	LC	Indigenous
<b>Ptychomitria ceae</b>	<i>Ptychomitrium crispatum</i> (Hedw.) A.Jaeger		Indigenous
<b>Lythraceae</b>	<i>Ammannia sagittifolia</i> (Sond.) S.A.Graham & Gandhi var. <i>sagittifolia</i>		Indigenous
<b>Pedaliaceae</b>	<i>Sesamum triphyllum</i> Welw. ex Asch. var. <i>triphyllum</i>	LC	Indigenous
<b>Urticaceae</b>	<i>Pouzolzia mixta</i> Solms var. <i>mixta</i>	LC	Indigenous
<b>Proteaceae</b>	<i>Protea caffra</i> Meisn.		Indigenous
<b>Cyperaceae</b>	<i>Cyperus leptocladus</i> Kunth	LC	Indigenous
<b>Poaceae</b>	<i>Leptochloa eleusine</i> (Nees) Cope & N.Snow	LC	Indigenous
<b>Malvaceae</b>	<i>Hermannia burkei</i> Burt Davy	LC	Indigenous
<b>Cyperaceae</b>	<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B.Clarke	LC	Indigenous
<b>Phyllanthaceae</b>	<i>Bridelia mollis</i> Hutch.	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia monticola</i> Sond.	LC	Indigenous
<b>Fabaceae</b>	<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt var. <i>africana</i>	NE	Indigenous
<b>Asteraceae</b>	<i>Helichrysum polycladum</i> Klatt	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus sphaerospermus</i> Schrad.	LC	Indigenous
<b>Acanthaceae</b>	<i>Blepharis leendertziae</i> Oberm.	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum kraussii</i> Sch.Bip.	LC	Indigenous
<b>Commelinaceae</b>	<i>Aneilema hockii</i> De Wild.	LC	Indigenous
<b>Fabaceae</b>	<i>Melolobium microphyllum</i> (L.f.) Eckl. & Zeyh.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus cyperoides</i> (L.) Kuntze subsp. <i>pseudoflavus</i> (Kuk.) Lye	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia zeyheri</i> (Sond.) Moffett	LC	Indigenous; Endemic
<b>Asteraceae</b>	<i>Gnaphalium filagopsis</i> Hilliard & B.L.Burt	LC	Indigenous
<b>Malvaceae</b>	<i>Pavonia burchellii</i> (DC.) R.A.Dyer	LC	Indigenous
<b>Verbenaceae</b>	<i>Lippia scaberrima</i> Sond.	LC	Indigenous
<b>Begoniaceae</b>	<i>Begonia cucullata</i> Willd.		Not indigenous; Naturalised
<b>Loganiaceae</b>	<i>Strychnos pungens</i> Soler.	LC	Indigenous
<b>Cyperaceae</b>	<i>Isolepis fluitans</i> (L.) R.Br. var. <i>fluitans</i>	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Acalypha angustata</i> Sond.	LC	Indigenous
<b>Rubiaceae</b>	<i>Pentanisia angustifolia</i> (Hochst.) Hochst.	LC	Indigenous
<b>Aspleniaceae</b>	<i>Asplenium phillipsianum</i> (Kummerle) Bir, Fraser-Jenk. & Lovis	LC	Indigenous
<b>Melastomataceae</b>	<i>Antherotoma debilis</i> (Sond.) Jacq.-Fel.	LC	Indigenous
<b>Proteaceae</b>	<i>Faurea saligna</i> Harv.	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Acalypha villicaulis</i> Hochst. ex A.Rich.	LC	Indigenous
<b>Fabaceae</b>	<i>Erythrina</i> sp.		
<b>Rubiaceae</b>	<i>Vangueria parvifolia</i> Sond.	LC	Indigenous
<b>Fabaceae</b>	<i>Senegalia caffra</i> (Thunb.) P.J.H.Hurter & Mabb.	LC	Indigenous
<b>Iridaceae</b>	<i>Gladiolus vinosomaculatus</i> Kies	LC	Indigenous; Endemic
<b>Peraceae</b>	<i>Clusia pulchella</i> L. var. <i>pulchella</i>	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia chirindensis</i> (Baker f.) Moffett	LC	Indigenous
<b>Pteridaceae</b>	<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>glauca</i> (Sim) Schelpe & N.C.Anthony	LC	Indigenous

<b>Asparagaceae</b>	<i>Asparagus plumosus</i> Baker	LC	Indigenous
<b>Sapotaceae</b>	<i>Englerophytum magalismontanum</i> (Sond.) T.D.Penn.	LC	Indigenous
<b>Rubiaceae</b>	<i>Psydrax livida</i> (Hiern) Bridson	LC	Indigenous
<b>Convolvulaceae</b>	<i>Convolvulus aschersonii</i> Engl.	LC	Indigenous
<b>Acanthaceae</b>	<i>Justicia anagalloides</i> (Nees) T.Anderson	LC	Indigenous
<b>Fabaceae</b>	<i>Albizia anthelmintica</i> (A.Rich.) Brongn.	LC	Indigenous
<b>Apiaceae</b>	<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schtdl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H.Wolff	LC	Indigenous
<b>Lamiaceae</b>	<i>Plectranthus montanus</i> Benth.		Indigenous
<b>Euphorbiaceae</b>	<i>Jatropha</i> sp.		
<b>Meliaceae</b>	<i>Turraea</i> sp.		
<b>Aizoaceae</b>	<i>Khadia acutipetala</i> (N.E.Br.) N.E.Br.	LC	Indigenous; Endemic
<b>Selaginellaceae</b>	<i>Selaginella dregei</i> (C.Presl) Hieron.	LC	Indigenous
<b>Celastraceae</b>	<i>Pterocelastrus echinatus</i> N.E.Br.	LC	Indigenous
<b>Asteraceae</b>	<i>Bidens pilosa</i> L.		Not indigenous; Naturalised
<b>Rubiaceae</b>	<i>Empogona lanceolata</i> (Sond.) Tosh & Robbr.		Indigenous
<b>Sapindaceae</b>	<i>Pappea capensis</i> Eckl. & Zeyh.	LC	Indigenous
<b>Erpodiaceae</b>	<i>Erpodium coronatum</i> (Hook.f. & Wilson) Mitt. subsp. <i>transvaaliense</i> (Broth. & Wager) Magill		Indigenous
<b>Poaceae</b>	<i>Digitaria velutina</i> (Forssk.) P.Beauv.	LC	Indigenous
<b>Polygonaceae</b>	<i>Emex australis</i> Steinh.	LC	Indigenous
<b>Archidiaceae</b>	<i>Archidium acanthophyllum</i> Snider		Indigenous
<b>Orobanchaceae</b>	<i>Cycnium adonense</i> E.Mey. ex Benth.	LC	Indigenous
<b>Poaceae</b>	<i>Tragus berteronianus</i> Schult.	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus capensis</i> (Steud.) Endl.	LC	Indigenous; Endemic
<b>Lamiaceae</b>	<i>Ocimum americanum</i> L. var. <i>americanum</i>	LC	Indigenous
<b>Iridaceae</b>	<i>Gladiolus dalenii</i> Van Geel subsp. <i>dalenii</i>	LC	Indigenous
<b>Fabaceae</b>	<i>Otholobium nigricans</i> C.H.Stirt.	LC	Indigenous
<b>Cyperaceae</b>	<i>Carex spicatopaniculata</i> Boeckeler ex C.B.Clarke	LC	Indigenous
<b>Cyperaceae</b>	<i>Cyperus rupestris</i> Kunth var. <i>rupestris</i>	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia pyroides</i> (Burch.) Moffett var. <i>pyroides</i>	LC	Indigenous
<b>Meliaceae</b>	<i>Turraea obtusifolia</i> Hochst.	LC	Indigenous
<b>Cyatheaceae</b>	<i>Alsophila dregei</i> (Kunze) R.M.Tryon	LC	Indigenous
<b>Poaceae</b>	<i>Oplismenus hirtellus</i> (L.) P.Beauv.	LC	Indigenous
<b>Malvaceae</b>	<i>Abutilon angulatum</i> (Guill. & Perr.) Mast. var. <i>macrophyllum</i> (Baker f.) Hochr.	NE	Indigenous
<b>Lobeliaceae</b>	<i>Lobelia</i> sp.		
<b>Poaceae</b>	<i>Sorghum versicolor</i> Andersson	LC	Indigenous
<b>Ophioglossaceae</b>	<i>Ophioglossum polyphyllum</i> A.Braun var. <i>polyphyllum</i>	LC	Indigenous
<b>Bartramiaceae</b>	<i>Philonotis africana</i> (Mull.Hal.) Rehmann ex Paris		Indigenous
<b>Cyperaceae</b>	<i>Carex rhodesiaca</i> Nelm	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Tragia prionoides</i> Radcl.-Sm.	LC	Indigenous
<b>Malvaceae</b>	<i>Hibiscus engleri</i> K.Schum.	LC	Indigenous
<b>Poaceae</b>	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC	Indigenous

<b>Amaranthaceae</b>	<i>Cyphocarpa angustifolia</i> (Moq.) Lopr.	LC	Indigenous
<b>Pteridaceae</b>	<i>Pellaea pectiniformis</i> Baker	LC	Indigenous
<b>Xyridaceae</b>	<i>Xyris capensis</i> Thunb.	LC	Indigenous
<b>Malvaceae</b>	<i>Grewia flavescens</i> Juss.	LC	Indigenous
<b>Convolvulaceae</b>	<i>Evolvulus alsinoides</i> (L.) L.	LC	Indigenous
<b>Crassulaceae</b>	<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum difficile</i> Hilliard	LC	Indigenous
<b>Passifloraceae</b>	<i>Passiflora edulis</i> Sims		Not indigenous; Naturalised; Invasive
<b>Solanaceae</b>	<i>Solanum mauritianum</i> Scop.		Not indigenous; Naturalised; Invasive
<b>Malvaceae</b>	<i>Triumfetta rhomboidea</i> Jacq. var. <i>rhomboidea</i>	LC	Indigenous
<b>Cyperaceae</b>	<i>Kyllinga melanosperma</i> Nees	LC	Indigenous
<b>Anacardiaceae</b>	<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>margaretiae</i> (Burt Davy ex Moffett) Moffett	LC	Indigenous; Endemic
<b>Rutaceae</b>	<i>Vepris lanceolata</i> (Lam.) G.Don	LC	Indigenous
<b>Convolvulaceae</b>	<i>Ipomoea papilio</i> Hallier f.	LC	Indigenous
<b>Rubiaceae</b>	<i>Rubia horrida</i> (Thunb.) Puff	LC	Indigenous
<b>Loranthaceae</b>	<i>Agelanthus natalitius</i> (Meisn.) Polhill & Wiens subsp. <i>zeyheri</i> (Harv.) Polhill & Wiens	LC	Indigenous
<b>Malvaceae</b>	<i>Melhania prostrata</i> DC.	LC	Indigenous
<b>Asteraceae</b>	<i>Adenostemma caffrum</i> DC.	LC	Indigenous
<b>Pylaisiadelpheaceae</b>	<i>Isopterygium punctulatum</i> Broth. & Wager		Indigenous; Endemic
<b>Polygonaceae</b>	<i>Persicaria lapathifolia</i> (L.) Delarbre		Not indigenous; Naturalised; Invasive
<b>Pteridaceae</b>	<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	LC	Indigenous
<b>Asparagaceae</b>	<i>Asparagus virgatus</i> Baker	LC	Indigenous
<b>Leskeaceae</b>	<i>Lindbergia viridis</i> Dixon		Indigenous
<b>Gentianaceae</b>	<i>Sebaea</i> sp.		
<b>Scrophulariaceae</b>	<i>Jamesbrittenia burkeana</i> (Benth.) Hilliard	LC	Indigenous
<b>Rubiaceae</b>	<i>Rothmannia capensis</i> Thunb.	LC	Indigenous
<b>Lentibulariaceae</b>	<i>Utricularia livida</i> E.Mey.	LC	Indigenous
<b>Celastraceae</b>	<i>Pterocelastrus</i> sp.		
<b>Poaceae</b>	<i>Dichanthium annulatum</i> (Forssk.) Stapf var. <i>papillosum</i> (A.Rich.) de Wet & Harlan	LC	Indigenous
<b>Lamiaceae</b>	<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	NE	Indigenous
<b>Celastraceae</b>	<i>Maytenus undata</i> (Thunb.) Blakelock	LC	Indigenous
<b>Euphorbiaceae</b>	<i>Euphorbia heterophylla</i> L.	NE	Not indigenous; Naturalised
<b>Cyperaceae</b>	<i>Ascolepis capensis</i> (Kunth) Ridl.	LC	Indigenous
<b>Pallaviciniaceae</b>	<i>Symphyogyna brasiliensis</i> Nees & Mont.		Indigenous
<b>Verbenaceae</b>	<i>Lantana rugosa</i> Thunb.	LC	Indigenous
<b>Lamiaceae</b>	<i>Plectranthus hereroensis</i> Engl.	LC	Indigenous
<b>Poaceae</b>	<i>Echinochloa colona</i> (L.) Link	LC	Indigenous
<b>Hypoxidaceae</b>	<i>Hypoxis rigidula</i> Baker var. <i>pilosissima</i> Baker	LC	Indigenous
<b>Ricciaceae</b>	<i>Riccia okahandjana</i> S.W.Arnell		Indigenous

<b>Commelinaceae</b>	<i>Cyanotis lapidosa</i> E.Phillips	LC	Indigenous
<b>Orobanchaceae</b>	<i>Striga gesnerioides</i> (Willd.) Vatke	LC	Indigenous
<b>Apocynaceae</b>	<i>Stenostelma umbelluliferum</i> (Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
<b>Asteraceae</b>	<i>Helichrysum argyrosphaerum</i> DC.	LC	Indigenous
<b>Fabaceae</b>	<i>Ophrestia oblongifolia</i> (E.Mey.) H.M.L.Forbes var. <i>oblongifolia</i>	LC	Indigenous
<b>Bryaceae</b>	<i>Bryum argenteum</i> Hedw.		Indigenous
<b>Icacinales</b>	<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC	Indigenous
<b>Asteraceae</b>	<i>Helichrysum harveyanum</i> Wild	LC	Indigenous
<b>Celastraceae</b>	<i>Maytenus albata</i> (N.E.Br.) E.Schmidt bis & Jordaan	LC	Indigenous
<b>Solanaceae</b>	<i>Solanum retroflexum</i> Dunal	LC	Indigenous
<b>Pyrolaceae</b>	<i>Isopterygium leucopsis</i> (Mull.Hal.) Paris		Indigenous; Endemic
<b>Rubiaceae</b>	<i>Pavetta</i> sp.		
<b>Poaceae</b>	<i>Stipagrostis uniplumis</i> (Licht.) De Winter var. <i>neesii</i> (Trin. & Rupr.) De Winter	LC	Indigenous
<b>Celastraceae</b>	<i>Gymnosporia tenuispina</i> (Sond.) Szyszyl.	LC	Indigenous
<b>Aytoniaceae</b>	<i>Plagiochasma rupestre</i> (J.R.Forst. & G.Forst.) Steph. var. <i>volkii</i> Bischl.		Indigenous
<b>Euphorbiaceae</b>	<i>Dalechampia capensis</i> A.Spreng.	LC	Indigenous
<b>Stilbaceae</b>	<i>Halleria lucida</i> L.	LC	Indigenous



## 12.2 Appendix B – Herpetofauna species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<b>Amphibians</b>			
<i>Amietia delalandii</i>	Delalande's River Frog	LC	Unlisted
<i>Amietia fuscigula</i>	Common River Frog	LC	LC
<i>Amietia poyntoni</i>	Poynton's River Frog	LC	LC
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC	LC
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC
<i>Chiromantis xerampelina</i>	Southern Foam Nest Frog	LC	LC
<i>Hemisis marmoratus</i>	Mottled Shovel-nosed Frog	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	LC	LC
<i>Poyntonophrynus fenoulheti</i>	Northern Pygmy Toad	LC	LC
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC	LC
<i>Ptychadena mossambica</i>	Mozambique Ridged Frog	LC	LC
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	LC	LC
<i>Pyxicephalus edulis</i>	African Bullfrog	LC	LC
<i>Schismaderma carens</i>	African Red Toad	LC	LC
<i>Sclerophrys capensis</i>	Raucous Toad	LC	LC
<i>Sclerophrys garmani</i>	Olive Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Sclerophrys poweri</i>	Power's Toad	LC	LC
<i>Strongylopus fasciatus</i>	Striped Stream Frog	LC	LC
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC	LC
<i>Tomopterna krugerensis</i>	Knocking Sand Frog	LC	LC

<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	LC
<i>Xenopus laevis</i>	Common Platanna	LC	LC
<b>Reptiles</b>			
<i>Acanthocercus atricollis</i>	Southern Tree Agama	LC	LC
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	LC	LC
<i>Acontias occidentalis</i>	Savanna Legless Skink	LC	Unlisted
<i>Afroedura nivaria</i>	Drakensberg Flat Gecko	LC	LC
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	LC	LC
<i>Agama aculeata distantii</i>	Eastern Ground Agama	LC	LC
<i>Agama atra</i>	Southern Rock Agama	LC	LC
<i>Amblyodipsas polylepis</i>	Purple Gloss Snake	Unlisted	Unlisted
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	LC	Unlisted
<i>Bitis arietans arietans</i>	Puff Adder	LC	Unlisted
<i>Boaedon capensis</i>	Brown House Snake	LC	LC
<i>Causus rhombeatus</i>	Rhombic Night Adder	LC	LC
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Chondrodactylus turneri</i>	Turner's Gecko	LC	Unlisted
<i>Cordylus jonesii</i>	Jones' Girdled Lizard	LC	Unlisted
<i>Cordylus vittifer</i>	Common Girdled Lizard	LC	LC
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	Unlisted
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Dendroaspis polylepis</i>	Black Mamba	LC	LC
<i>Dispholidus typus</i>	Boomslang	LC	Unlisted

<i>Duberria lutrix</i>	Common Slug-eater	LC	LC
<i>Elapsoidea sundevallii</i>	Sundevall's Garter Snake	LC	Unlisted
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	LC	LC
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	LC	Unlisted
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	LC
<i>Ichnotropis capensis</i>	Ornate Rough-scaled Lizard	LC	Unlisted
<i>Kinixys lobatsiana</i>	Lobatse hinged-back Tortoise	LC	VU
<i>Kinixys spekii</i>	Speke's Hinged-Back Tortoise	LC	Unlisted
<i>Lamprophis aurora</i>	Aurora House Snake	LC	LC
<i>Leptotyphlops distantii</i>	Distant's Tread Snake	LC	LC
<i>Leptotyphlops incognitus</i>	Incognito Thread Snake	LC	Unlisted
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	LC	Unlisted
<i>Limaformosa capensis</i>	Common File Snake	LC	Unlisted
<i>Lycodonomorphus rufulus</i>	Brown Water Snake	LC	Unlisted
<i>Lycophidion capense capense</i>	Cape Wolf Snake	LC	Unlisted
<i>Lygodactylus capensis</i>	Cape dwarf gecko	LC	LC
<i>Lygodactylus ocellatus</i>	Spotted Dwarf Gecko	LC	LC
<i>Meroles squamulosus</i>	Common Rough-scaled Lizard	LC	Unlisted
<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	LC	LC
<i>Naja annulifera</i>	Snouted Cobra	LC	Unlisted
<i>Naja mossambica</i>	Mozambique Spitting Cobra	LC	Unlisted
<i>Nucras holubi</i>	Holub's Sandveld Lizard	LC	Unlisted
<i>Nucras intertexta</i>	Spotted Sandveld Lizard	LC	Unlisted
<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	LC	LC
<i>Nucras ornata</i>	Ornate Sandveld Lizard	LC	Unlisted

<i>Pachydactylus affinis</i>	Transvaal Gecko	LC	LC
<i>Pachydactylus capensis</i>	Cape Gecko	LC	Unlisted
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	LC	Unlisted
<i>Pedioplanis lineocellata lineocellata</i>	Spotted Sand Lizard	LC	Unlisted
<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	Unlisted
<i>Pelusios sinuatus</i>	Serrated Hinged Terrapin	LC	Unlisted
<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	LC	Unlisted
<i>Philothamnus occidentalis</i>	Western Natal Green Snake	Unlisted	Unlisted
<i>Philothamnus semivariegatus</i>	Spotted Bush Snake	LC	Unlisted
<i>Prosymna ambigua</i>	Angolan Shovel-snout	Unlisted	LC
<i>Prosymna bivittata</i>	Two-Striped Shovel-Snout	LC	Unlisted
<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	LC	LC
<i>Psammobates oculifer</i>	Serrated Tent Tortoise	LC	Unlisted
<i>Psammophis angolensis</i>	Dwarf Sand Snake	LC	Unlisted
<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	LC	Unlisted
<i>Psammophis crucifer</i>	Cross-marked Grass Snake	LC	LC
<i>Psammophis subtaeniatus</i>	Stripe-bellied Sand Snake	LC	LC
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC	Unlisted
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC	LC
<i>Pseudaspis cana</i>	Mole Snake	LC	Unlisted
<i>Pseudocordylus melanotus melanotus</i>	Common Crag Lizard	LC	LC
<i>Python natalensis</i>	Southern African Python	LC	Unlisted
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC	Unlisted
<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC	LC
<i>Telescopus semiannulatus semiannulatus</i>	Eastern Tiger Snake	LC	Unlisted
<i>Thelotornis capensis</i>	Southern Twig Snake	LC	LC

<b><i>Trachylepis capensis</i></b>	Cape Skink	LC	Unlisted
<b><i>Trachylepis damarana</i></b>	Damara skink	Unlisted	LC
<b><i>Trachylepis laevigata</i></b>	Variable Skink	DD	DD
<b><i>Trachylepis punctatissima</i></b>	Speckled Rock Skink	LC	LC
<b><i>Trachylepis varia</i></b>	Variable Skink	LC	LC
<b><i>Varanus albigularis albigularis</i></b>	Southern Rock Monitor	LC	Unlisted
<b><i>Varanus niloticus</i></b>	Water Monitor	LC	Unlisted



### 12.3 Appendix D – Mammal species expected to occur within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Aethomys ineptus</i>	Tete Veld Rat	LC	LC
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC
<i>Atilax paludinosus</i>	Water Mongoose	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Caracal caracal</i>	Caracal	LC	LC
<i>Civettictis civetta</i>	African Civet	LC	LC
<i>Cloeotis percivali</i>	Short-eared Trident Bat	EN	LC
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew	LC	LC
<i>Crocidura fuscomurina</i>	Tiny Musk Shrew	LC	LC
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	LC	LC
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	NT	LC
<i>Cryptomys hottentotus</i>	Common Mole-rat	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Dendromus melanotis</i>	Grey Climbing Mouse	LC	LC
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	LC	LC
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT
<i>Elephantulus brachyrhynchus</i>	Short-snouted Sengi	LC	LC
<i>Elephantulus myurus</i>	Eastern Rock Sengi	LC	LC
<i>Epomophorus wahlbergi</i>	Wahlberg's epauletted fruit bat	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	LC	LC
<i>Felis nigripes</i>	Black-footed Cat	VU	VU
<i>Felis silvestris</i>	African Wildcat	LC	LC
<i>Galago moholi</i>	Southern Lesser Galago	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	LC	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	LC
<i>Graphiurus microtis</i>	Large Savanna African Dormouse	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat	LC	LC
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC
<i>Ichneumia albicauda</i>	White-tailed Mongoose	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	LC	LC
<i>Kerivoula lanosa</i>	Lesser Woolly Bat	LC	LC
<i>Lemniscomys rosalia</i>	Single-striped Mouse	LC	LC
<i>Leptailurus serval</i>	Serval	NT	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC
<i>Lepus victoriae</i>	African Savanna Hare	LC	LC
<i>Mastomys coucha</i>	Multimammate Mouse	LC	LC
<i>Mellivora capensis</i>	Honey Badger	LC	LC
<i>Mungos mungo</i>	Banded Mongoose	LC	LC
<i>Mus indutus</i>	Desert Pygmy Mouse	LC	LC

<i>Myotis tricolor</i>	Temminck's Hairy Bat	LC	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN
<i>Neoromicia capensis</i>	Cape Serotine Bat	LC	LC
<i>Neoromicia zuluensis</i>	Aloe Bat	LC	LC
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	LC	LC
<i>Oreotragus oreotragus</i>	Klipspringer	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Otomys angoniensis</i>	Angoni Vlei Rat	LC	LC
<i>Otomys irroratus</i>	Vlei Rat (Fynbos type)	LC	LC
<i>Ourebia ourebi</i>	Oribi	EN	LC
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Papio ursinus</i>	Chacma Baboon	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT
<i>Pedetes capensis</i>	Springhare	LC	LC
<i>Pelea capreolus</i>	Grey Rhebok	NT	NT
<i>Phacochoerus africanus</i>	Common Warthog	LC	LC
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC
<i>Procavia capensis</i>	Rock Hyrax	LC	LC
<i>Proteles cristata</i>	Aardwolf	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rattus rattus</i>	House Rat	Exotic (Not listed)	LC
<i>Redunca arundinum</i>	Southern Reedbuck	LC	LC
<i>Redunca fulvorufula</i>	Mountain Reedbuck	EN	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	LC	LC
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	LC
<i>Rhinolophus simulator</i>	Bushveld Horseshoe Bat	LC	LC
<i>Saccostomus campestris</i>	Pouched Mouse	LC	LC
<i>Sauromys petrophilus</i>	Flat-headed Free-tail Bat	LC	LC
<i>Scotophilus dinganii</i>	Yellow House Bat	LC	LC
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	LC	LC
<i>Steatomys pratensis</i>	Fat Mouse	LC	LC
<i>Suncus varilla</i>	Lesser Dwarf Shrew	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	LC
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat	LC	LC
<i>Thallomys paedulus</i>	Tree Rat	LC	LC
<i>Tragelaphus scriptus</i>	Cape Bushbuck	LC	LC
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	LC
<i>Vulpes chama</i>	Cape Fox	LC	LC
<i>Xerus inauris</i>	Cape Ground Squirrel	LC	LC

## 12.4 Appendix E – Avifauna species expected to occur within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Accipiter badius</i>	Shikra	Unlisted	LC
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	Unlisted	LC
<i>Accipiter minullus</i>	Sparrowhawk, Little	Unlisted	LC
<i>Accipiter ovampensis</i>	Sparrowhawk, Ovambo	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Acrocephalus palustris</i>	Warbler, Marsh	Unlisted	LC
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Amadina fasciata</i>	Finch, Cut-throat	Unlisted	Unlisted
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	Unlisted
<i>Amaurornis flavirostris</i>	Crake, Black	Unlisted	LC
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	Unlisted	LC
<i>Anaplectes rubriceps</i>	Weaver, Red-headed	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Mallard	Unlisted	LC
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Anser anser</i>	Goose, Domestic	Unlisted	LC
<i>Anthus caffer</i>	Pipit, Bushveld	Unlisted	LC
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Anthus nicholsoni</i>	Nicholson's pipit	Unlisted	Unlisted
<i>Apalis thoracica</i>	Apalis, Bar-throated	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea goliath</i>	Heron, Goliath	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Aviceda cuculoides</i>	Hawk, African Cuckoo	Unlisted	LC
<i>Batis molitor</i>	Batis, Chinspot	Unlisted	LC

<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bradornis mariquensis</i>	Flycatcher, Marico	Unlisted	LC
<i>Bradypterus baboecala</i>	Rush-warbler, Little	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Buphagus erythrorhynchus</i>	Oxpecker, Red-billed	Unlisted	Unlisted
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Buteo rufofuscus</i>	Buzzard, Jackal	Unlisted	LC
<i>Buteo vulpinus</i>	Buzzard, Common	Unlisted	Unlisted
<i>Butorides striata</i>	Heron, Green-backed	Unlisted	LC
<i>Camaroptera brevicaudata</i>	Camaroptera, Grey-backed	Unlisted	Unlisted
<i>Campephaga flava</i>	Cuckoo-shrike, Black	Unlisted	LC
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	Unlisted	LC
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	Unlisted	LC
<i>Caprimulgus rufigena</i>	Nightjar, Rufous-cheeked	Unlisted	LC
<i>Centropus burchellii</i>	Coucal, Burchell's	Unlisted	Unlisted
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC
<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	Unlisted	LC
<i>Cinnyris afer</i>	Sunbird, Greater Double-collared	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC
<i>Circaetus cinereus</i>	Snake-eagle, Brown	Unlisted	LC
<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	Unlisted	LC
<i>Cisticola aberrans</i>	Cisticola, Lazy	Unlisted	LC
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levallant's	Unlisted	LC
<i>Clamator glandarius</i>	Cuckoo, Great Spotted	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC
<i>Clamator levallantii</i>	Cuckoo, Levallant's	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Corythaixoides concolor</i>	Go-away-bird, Grey	Unlisted	LC

<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Cossypha humeralis</i>	Robin-chat, White-throated	Unlisted	LC
<i>Creatorhina cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra flaviventris</i>	Canary, Yellow	Unlisted	LC
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	Unlisted	LC
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	Unlisted	LC
<i>Cuculus clamosus</i>	Cuckoo, Black	Unlisted	LC
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	Unlisted	LC
<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Delichon urbicum</i>	House-martin, Common	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced Whistling	Unlisted	LC
<i>Dendroperdix sephaena</i>	Francolin, Crested	Unlisted	LC
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Dendropicos namaquus</i>	Woodpecker, Bearded	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Egretta alba</i>	Egret, Great	Unlisted	LC
<i>Egretta ardesiaca</i>	Heron, Black	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Egretta intermedia</i>	Egret, Yellow-billed	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC
<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Euplectes ardens</i>	Widowbird, Red-collared	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	LC
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Glaucidium perlatum</i>	Owlet, Pearl-spotted	Unlisted	LC
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Halcyon chelicuti</i>	Kingfisher, Striped	Unlisted	LC
<i>Halcyon senegalensis</i>	Kingfisher, Woodland	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	Unlisted	LC
<i>Hirundo albigularis</i>	Swallow, White-throated	Unlisted	LC
<i>Hirundo cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Hirundo semirufa</i>	Swallow, Red-breasted	Unlisted	LC



<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Indicator minor</i>	Honeyguide, Lesser	Unlisted	LC
<i>Ispidina picta</i>	Pygmy-Kingfisher, African	Unlisted	LC
<i>Ixobrychus sturmii</i>	Bittern, Dwarf	Unlisted	LC
<i>Lagonosticta rhodopareia</i>	Firefinch, Jameson's	Unlisted	LC
<i>Lagonosticta rubricata</i>	Firefinch, African	Unlisted	LC
<i>Lagonosticta senegala</i>	Firefinch, Red-billed	Unlisted	LC
<i>Lamprolornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Laniarius atrococcineus</i>	Shrike, Crimson-breasted	Unlisted	LC
<i>Laniarius ferrugineus</i>	Boubou, Southern	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Malacothraupis blanchoti</i>	Bush-shrike, Grey-headed	Unlisted	LC
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melaenornis pammelaina</i>	Flycatcher, Southern Black	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops bullockoides</i>	Bee-eater, White-fronted	Unlisted	LC
<i>Merops pusillus</i>	Bee-eater, Little	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Mirafraga africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Mirafraga passerina</i>	Lark, Monotonous	Unlisted	LC
<i>Mirafraga rufocinnamomea</i>	Lark, Flappet	Unlisted	LC
<i>Monticola rupestris</i>	Rock-thrush, Cape	Unlisted	LC
<i>Motacilla alba</i>	Wagtail, African Pied	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Myioparus plumbeus</i>	Tit-flycatcher, Grey	Unlisted	LC
<i>Nectarinia famosa</i>	Sunbird, Malachite	Unlisted	LC
<i>Nilus afer</i>	Brubru	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Oriolus chinensis</i>	Oriole, Black-headed	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Otus senegalensis</i>	Scops-owl, African	Unlisted	LC
<i>Pandion haliaetus</i>	Osprey, Osprey	Unlisted	LC
<i>Parus niger</i>	Tit, Southern Black	Unlisted	Unlisted
<i>Passer domesticus</i>	Sparrow, Southern Grey-headed	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Pavo cristatus</i>	Peacock, Common	Unlisted	LC
<i>Peliperdix coqui</i>	Francolin, Coqui	Unlisted	LC
<i>Phalacrocorax africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	LC	LC
<i>Phoenicopterus minor</i>	Flamingo, Lesser	NT	NT

<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC
<i>Ploceus capensis</i>	Weaver, Cape	Unlisted	LC
<i>Ploceus cucullatus</i>	Weaver, Village	Unlisted	LC
<i>Ploceus intermedius</i>	Masked-weaver, Lesser	Unlisted	LC
<i>Ploceus velatus</i>	Masked-weaver, Southern	Unlisted	LC
<i>Pogoniulus chrysoconus</i>	Tinkerbird, Yellow-fronted	Unlisted	LC
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	EN
<i>Polyboroides typus</i>	Harrier-Hawk, African	Unlisted	LC
<i>Porphyrio madagascariensis</i>	Swamphen, African Purple	Unlisted	Unlisted
<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC
<i>Prinia subflava</i>	Prinia, Tawny-flanked	Unlisted	LC
<i>Prionops plumatus</i>	Helmet-shrike, White-crested	Unlisted	LC
<i>Prodotiscus regulus</i>	Honeybird, Brown-backed	Unlisted	LC
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis natalensis</i>	Spurfowl, Natal	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Ptilopsis granti</i>	Scops-owl, Southern White-faced	Unlisted	Unlisted
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Sarothrura rufa</i>	Flufftail, Red-chested	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Scleroptila levaillantoides</i>	Francolin, Orange River	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Spermestes cucullatus</i>	Mannikin, Bronze	Unlisted	Unlisted
<i>Sphenoeacus afer</i>	Grassbird, Cape	Unlisted	LC
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Sylvietta rufescens</i>	Crombec, Long-billed	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Tachymarpis melba</i>	Swift, Alpine	Unlisted	LC
<i>Tchagra australis</i>	Tchagra, Brown-crowned	Unlisted	LC
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	Unlisted	LC
<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Thamnolaea cinnamomeiventris</i>	Cliff-chat, Mocking	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC

<b><i>Tockus leucomelas</i></b>	Hornbill, Southern Yellow-billed	Unlisted	LC
<b><i>Tockus nasutus</i></b>	Hornbill, African Grey	Unlisted	LC
<b><i>Trachyphonus vaillantii</i></b>	Barbet, Crested	Unlisted	LC
<b><i>Treron calvus</i></b>	Green-pigeon, African	Unlisted	LC
<b><i>Tricholaema leucomelas</i></b>	Barbet, Acacia Pied	Unlisted	LC
<b><i>Turdoides jardineii</i></b>	Babbler, Arrow-marked	Unlisted	LC
<b><i>Turdus libonyanus</i></b>	Thrush, Kurrichane	Unlisted	Unlisted
<b><i>Turdus smithi</i></b>	Thrush, Karoo	Unlisted	LC
<b><i>Turtur chalcospilos</i></b>	Wood-dove, Emerald-spotted	Unlisted	LC
<b><i>Tyto alba</i></b>	Owl, Barn	Unlisted	LC
<b><i>Upupa africana</i></b>	Hoopoe, African	Unlisted	LC
<b><i>Uraeginthus angolensis</i></b>	Waxbill, Blue	Unlisted	LC
<b><i>Urocolius indicus</i></b>	Mousebird, Red-faced	Unlisted	LC
<b><i>Vanellus armatus</i></b>	Lapwing, Blacksmith	Unlisted	LC
<b><i>Vanellus coronatus</i></b>	Lapwing, Crowned	Unlisted	LC
<b><i>Vanellus senegallus</i></b>	Lapwing, African Wattled	Unlisted	LC
<b><i>Vidua chalybeata</i></b>	Indigobird, Village	Unlisted	LC
<b><i>Vidua funerea</i></b>	Indigobird, Dusky	Unlisted	LC
<b><i>Vidua macroura</i></b>	Whydah, Pin-tailed	Unlisted	LC
<b><i>Vidua purpurascens</i></b>	Indigobird, Purple	Unlisted	LC
<b><i>Zosterops virens</i></b>	White-eye, Cape	Unlisted	LC

## 12.5 Appendix F - Specialist Declarations

I, Lusanda Matee, 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.



Lusanda Matee

Terrestrial Ecologist

The Biodiversity Company

March 2022