PROPOSED NORTHAM PV SITE– BIODIVERSITY AND WETLAND BASELINE AND IMPACT ASSESSMENT

Northam, Limpopo Province

April 2021

CLIENT

Prepared by:

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Report Name	**PROPOSED NORTHAM PV SITE– BIODIVERSITY AND WETLAND BASELINE AND IMPACT ASSESSMENT**
Reference	**Northam PV site**
Submitted to	savannah environmental
Report Writer (Desktop)	**Lindi Steyn**  Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from basic Assessments to Environmental Impact Assessments following IFC standards.
Report Writer	**Marnus Erasmus**  Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015.
Report Writer / Reviewer	**Andrew Husted**  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.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

DECLARATION

I, Marnus Erasmus, 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.

Marnus Erasmus

Biodiversity Specialist

The Biodiversity Company

April 2021

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a fauna and flora baseline assessment for the development of a photovoltaic (PV) system. The following information is as per the project description provided by Savannah Environmental (Pty) Ltd (Savannah) (2021): "The proposed study area is located within Northam Platinum Limited's Zondereinde Mine Area, approximately 35 km south of the town of Thabazimbi and 18 km northwest of the town of Northam, between the R510 in the west and the R511 in the east, within the jurisdiction of the Thabazimbi Local Municipality, which forms part of the Waterberg District (Figure 1-1). The project area is proposed on Portion 2 of the Farm Zondereinde 384. The wider study area was assessed to evaluate alternatives and comprises the Project Area of Influence (PAOI).

The Northam PV development is located within a 30 km radius of two solar developments with an approved Environmental Authorisation. The Solar PV facility will have a contracted capacity of 10MW and use Fixed tilt, single or double axis tracking PV technology to harness the solar resource on the project site. A development area of up to 20ha in extent will be occupied by the PV panels and associated infrastructure (project area).

The purpose of the proposed project is to generate electricity for exclusive use by the Zondereinde Mine, following which any excess power produced will be distributed to the national grid, if applicable. The construction of the PV facility aims to reduce the Zondereinde Mine's dependency on direct supply from the Eskom's national grid for operation activities, while simultaneously decreasing the mine's carbon footprint.

In order to evacuate the generated power to the Zondereinde Mine, a grid connection needs to be established. An overhead power line will be established to connect the on-site substation on the Northam solar PV facility site to the existing substation at the Zondereinde Metallurgical Complex. The overhead power line will run for 500m from the PV site to the side of the Eskom yard and will be at a minimum height of 5.5m. The power line is designed to have a capacity of 33kV, but will be operated at 6.6kV.

Table 1-1 below provides the details of the Northam PV development, including the main infrastructure components and services that will be required during the project life cycle.

Table 1-1 Details of the Northam PV and associated infrastructure

Component	Description / Dimensions
District Municipality	Waterberg District Municipality
Local Municipality	Thabazimbi Local Municipality
Ward Number (s)	Ward 5
Nearest town(s)	Northam ~18km
Farm name(s) and number(s) of properties affected by the Solar Facility	Portion 2 of the Farm Zondereinde 384 (T0KQ00000000038400002).
Portion number(s) of properties affected by the Solar Facility	
SG 21 Digit Code (s)	
Current zoning	Agricultural
Site Coordinates (centre of development area)	24°50'9.05"S 27°21'27.77"E24
Total extent of the Affected Properties, also referred to as the project area	~126ha
Total extent of the Development area	Up to 20ha
Total extent of the Development footprint	Up to ~20ha
Contracted capacity of the facility	Up to 10MW
Technology	Fixed tilt, single or double axis tracking photovoltaic (PV) panel technology.
PV panels	» Height: ~3.5m from ground level (installed).

	» Constructed over an area of up to 15ha. » Between 80 000 – 110 000 panels required.
On-site Facility Substation	» Located within the development area and close to the site access point. » The substation will facilitate the connection between the solar PV facility and the mine's electricity grid.
Access gravel roads and internal roads	» Direct access to the study area is provided by the existing Mine Road, which is connected to the R510. » A 6m wide main paved access road will be constructed to provide direct access to the development area. » A network of 5m wide (with a total length of 8km) gravel internal access roads will be constructed to provide access to the various components of the Northam PV development.
Laydown area	» Up to 3ha (Temporary Laydown Area).
Other infrastructure	» Inverters and transformers » Cabling between project components » Combined gatehouse » Site offices » Storage facility
Services required	» *Waste* – waste generated from the construction activities will be handled in accordance with the Zondereinde Mine Waste Management Plan and collected by a private contractor and disposed of at a licensed waste disposal site off site. » *Sanitation* – since the project is located within the Zondereinde Mine Area, it is proposed that contractors utilise the existing toilet facilities available at the Mine. Alternatively, chemical toilets will be placed close to the project area. These facilities will be maintained and serviced regularly by an appropriate waste contractor. » *Water supply* – during construction, water will be required for concrete, washing of solar panels and associated equipment, dust suppression, potable water for construction workers, etc. Once the facility is operational, water will be required for various purposes, such as washing of the solar panels. This water will be sourced from municipal supply via the existing mine supply network; or from groundwater abstraction, utilising the already authorised boreholes at the Zondereinde Mine. » Electricity supply – Construction power will be sourced via a temporary overhead power line from the existing mine substation at the metallurgical complex which is adjacent to the site. Power generated by the solar power plant will be transferred to the metallurgical complex via , designed for 33kV and operated at 6,6kV at a minimum height of 5,5m..

Infrastructure associated with the solar PV facility will include the following:

- Solar PV array comprising PV modules and mounting structures;
- Inverters and transformers;
- Cabling between the project components;
- On-site facility substation to facilitate the connection between the solar PV facility and the internal Zondereinde electricity grid;
- Combined gatehouse, site offices and storage facility;
- A 33kV over-head power line for the distribution of the generated power which will be connected to the existing substation at the Zondereinde Metallurgical Complex;
- Temporary laydown areas; and

- Access paved road, internal roads and fencing around the development area.

This assessment was conducted in accordance with 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). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020) in terms of NEMA, dated 20 March and 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the terrestrial sensitivity of the study area as “very high”.

The wetland assessment has been completed in accordance with the requirements of the published GN 509 by the Department of Water and Sanitation (DWS). This notice was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 509 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 509 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM). This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

The purpose of the specialist studies is to provide relevant input into the basic assessment process and 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.

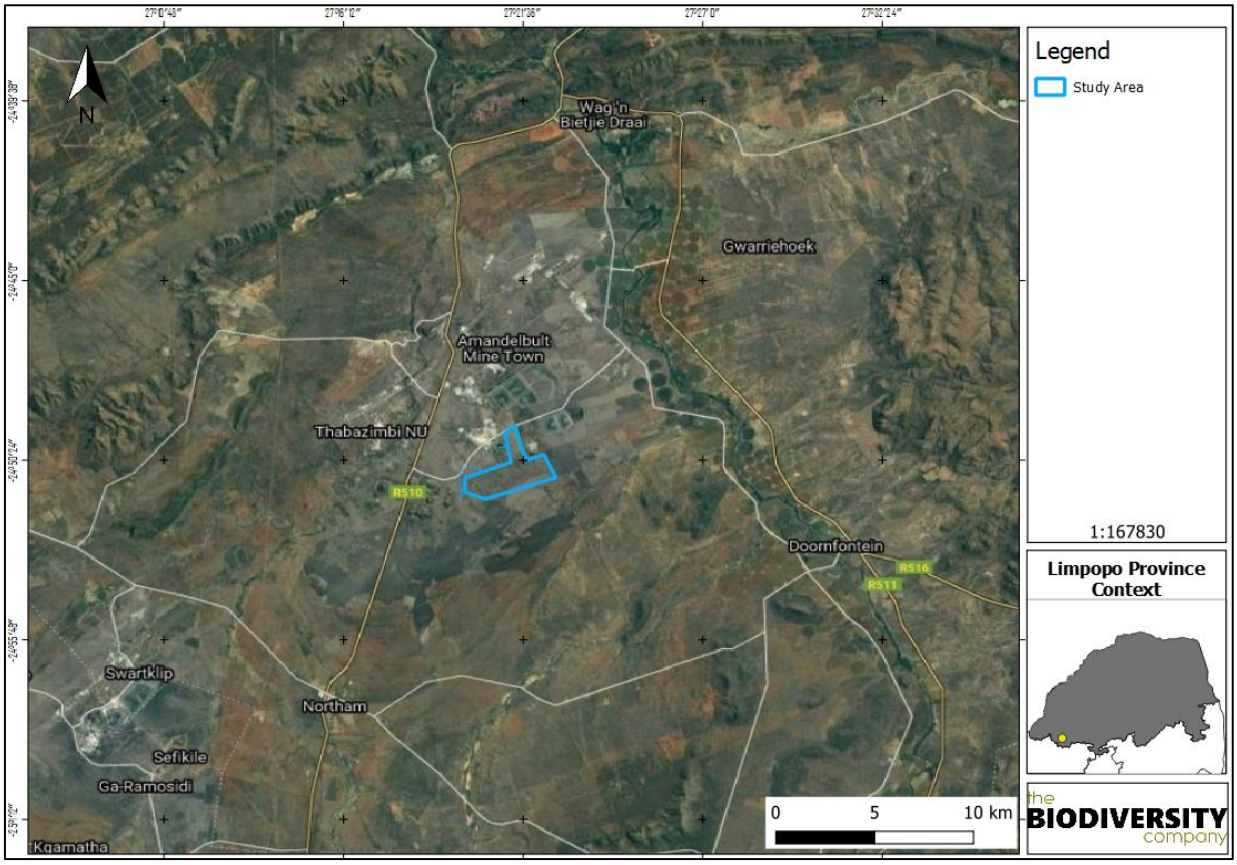

Figure 1-1 The study area in proximity to the nearby towns

1.2 Scope of Work

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

- Desktop assessment to identify the relevant ecologically important geographical features within the study area;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the study area;
- Field survey to ascertain the species composition of the present flora and fauna community within the study area;
- Delineate and map the habitats and their respective sensitivities that occur within the study area;
- Identify the manner that the proposed project impacts the flora and fauna community and evaluate the level of risk of these potential impacts; and
- The prescription of mitigation measures and recommendations for identified risks.

The aim of the wetland study was to provide information to guide the proposed project with respect to the current state of the associated wetlands in the study area. This was achieved through the following:

- The identification, deliniation and classiication of wetlands within the study area;
- Assessemnt of the present ecological state (pes) of the identified wetlands;
- Assessment of the wetland ecosystem services provided by the identified wetlands;
- Assessemnt of the ecological importance and sensitivity of the identified wetlands
- A risk assessment for the proposed project; and
- The prescription of mitigation measures and recommendations for identified risks.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the study 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 study area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends;
- Due to the time of sampling (summer) the vegetation was dry and most plants had already lost the green winter flush; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

1.4 Key Legislative Requirements

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

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

Region	Legislation / Guideline
International	Convention on Biological Diversity (CBD, 1993)

	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,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)
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	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), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	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 Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Limpopo Conservation Plan (2018)
	Limpopo Environmental Management Act (2003)
	Waterberg District Bioregional Plan (LEDET, 2019)

1.4.1 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations, as amended in April 2017, state that prior to certain listed activities taking place, an environmental authorisation application (EA) process needs to be followed. This could follow either the Basic Assessment (BA) process or the EIA process, depending on the scale of the impact. A BA process will be undertaken for the project.

GNR 1150 and a GNR 350 were gazetted on the 20 March and 30 October 2020, which have replaced the requirements of Appendix 6 of the EIA Regulations in respect of certain specialist reports. These regulations provide the criteria and minimum requirements for specialist's assessments, in order to consider the impacts on aquatic biodiversity for activities which require EA.

1.4.2 National Water Act (NWA, 1998)

The Department of Human Settlements Water and Sanitation (DHSWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The NWA allows for the protection of water resources, which includes the:

- Maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- Prevention of the degradation of the water resource; and
- Rehabilitation of the water resource.

A watercourse means;

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The NWA recognises that the entire ecosystem and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse, unless it is authorised by the DHSWS. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DHSWS in terms of Sections 21 (c) and (i) of the NWA.

2 Methods

2.1 Project Area

The proposed project area is situated within NHM's Zondereinde Mine Area, approximately 35km south of the town of Thabazimbi and 18km northwest of the town of Northam, between the R510 in the west and the R511 in the east. Presently, the project area is surrounded by game farms, mining areas and some areas of agriculture but to a lesser extent.

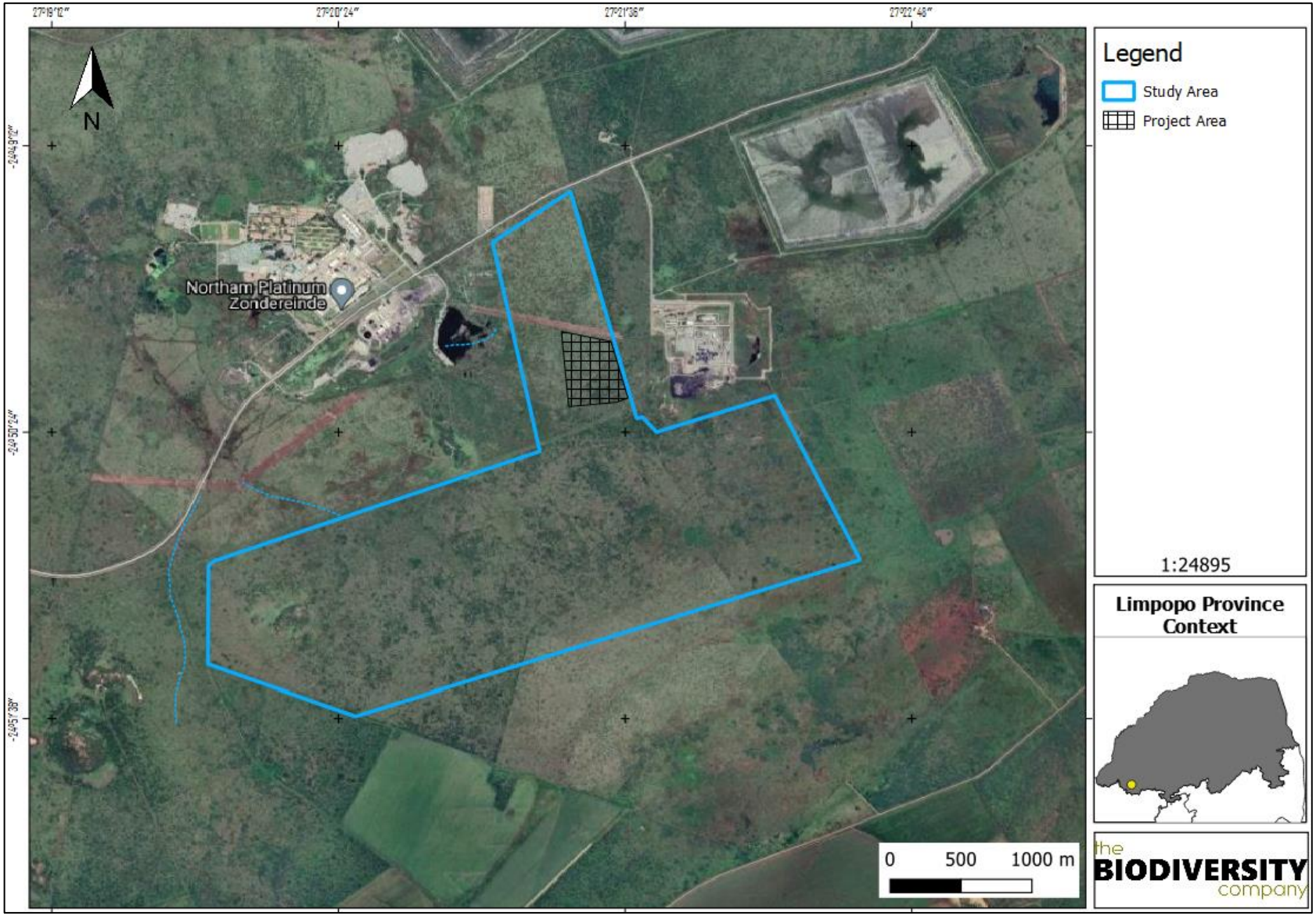

Figure 2-1 Map illustrating the location of the proposed Northam PV project area and study area

2.2 Desktop Assessment

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

2.2.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed 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 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* – 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* – 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, 2020)* – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
    - *National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010)* – 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 Limpopo Conservation Plan, Version 2 (LCPv2)*, was completed in 2018 for the Limpopo Department of Economic Development, Environment & Tourism (LEDET) (Desmet *et al.,* 2018). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas (CBA) and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet *et al.,* 2018). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories, based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:
    - CBA1;
    - CBA2;
    - Ecological Support Area (ESA) 1);
    - ESA2;
    - Other Natural Area (ONA);
    - Protected Area (PA); and
    - No Natural Remaining (NNR).

- 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 SAIIAE was established during the NBA of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types and pressures on these systems.

2.2.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) 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 study area (Figure 2-2). 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.

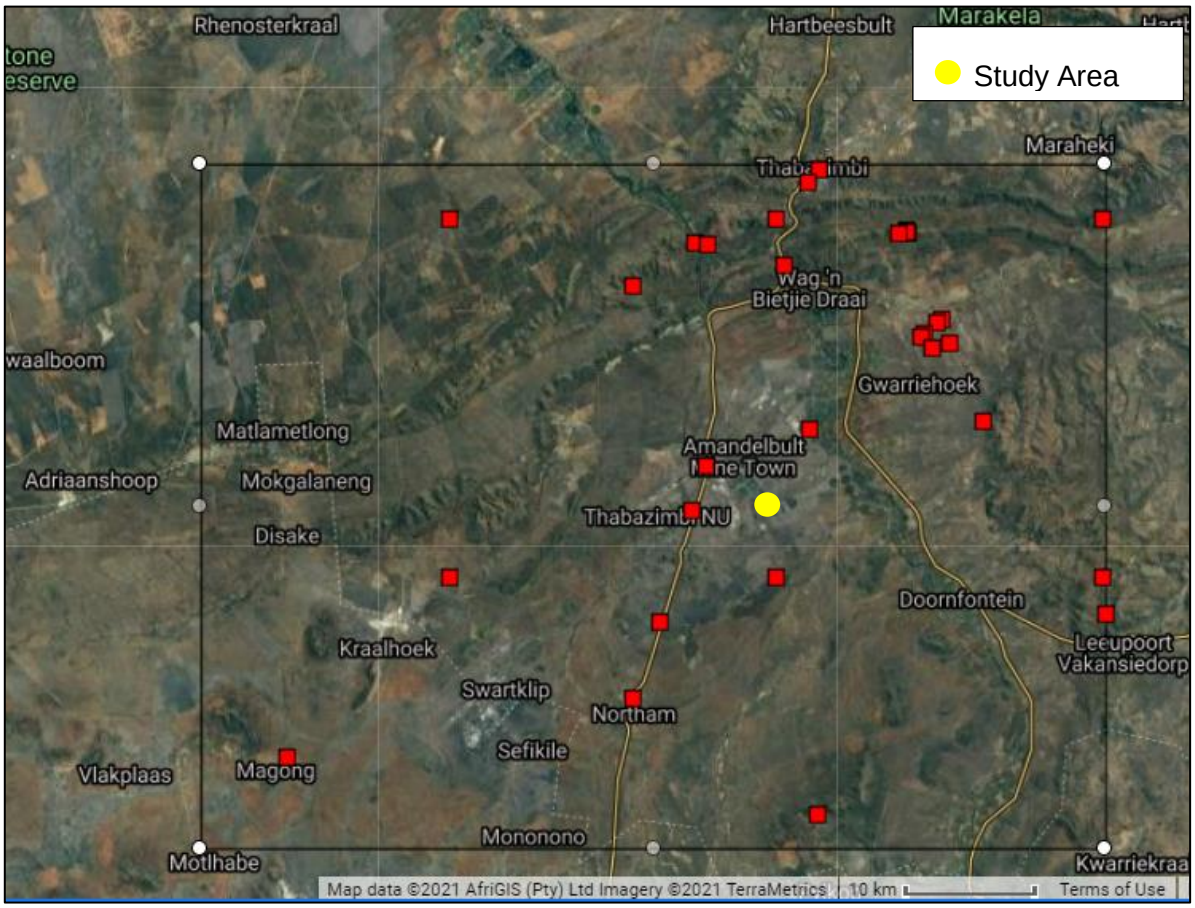

Figure 2-2 Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database.

Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.

2.2.3 Desktop Faunal Assessment

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

- Aamphibian list, generated from the IUCN spatial dataset (2017) and ReptileMap database (FitzPatrick Institute of African Ornithology, 2021a), using the 2427 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (FitzPatrick Institute of African Ornithology, 2021b), using the 2427 quarter degree square; and

- Mammal list from the IUCN spatial dataset (2017).

2.2.4 Desktop Wetland Assessment

2.2.4.1 Desktop Research

The following spatial datasets were utilised:

- Aerial imagery (Google Earth Pro);
- Land Type Data (Land Type Survey Staff, 1972 - 2006);
- South African Inventory of Inland Aquatic Ecosystems (Van Deventer *et al*., 2019);
- The National Freshwater Ecosystem Priority Areas (Nel *et al*., 2011);
- Contour data (5m);
- NASA Shuttle Radar Topography Mission Global 1 arc second digital elevation data; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer, H., *et al*., 2018).

2.3 Biodiversity Field Assessment

A single field survey was undertaken in March 2021 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access.

2.3.1 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 a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed 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 proposed 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 habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g. 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 study area.

2.3.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles) 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.);
- Three (3) camera traps were deployed for 48 hours; and
- Fifteen small mammal traps (Shermans) were deployed for 48 hours.

Relevant field guides and texts consulted for identification purposes included 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); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

2.4 Terrestrial Site Ecological Importance (SEI)

The different habitat types within the study 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 2-1 and Table 2-2, respectively.

Table 2-1 Summary of Conservation Importance (CI) criteria

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

Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

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

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

BI can be derived from a simple matrix of CI and FI as provided in Table 2-3.

Table 2-3 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 2-4.

Table 2-4 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.

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

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-5.

Table 2-5 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance (SEI)		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 proposed project is provided in Table 2-6.

Table 2-6 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

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

2.5 Wetland Assessment

2.5.1 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 2-3. 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;
- *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);
- *Soil Wetness Indicator* identifies the morphological "signatures" developed in the soil profile due to prolonged and frequent saturation; and
- *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.

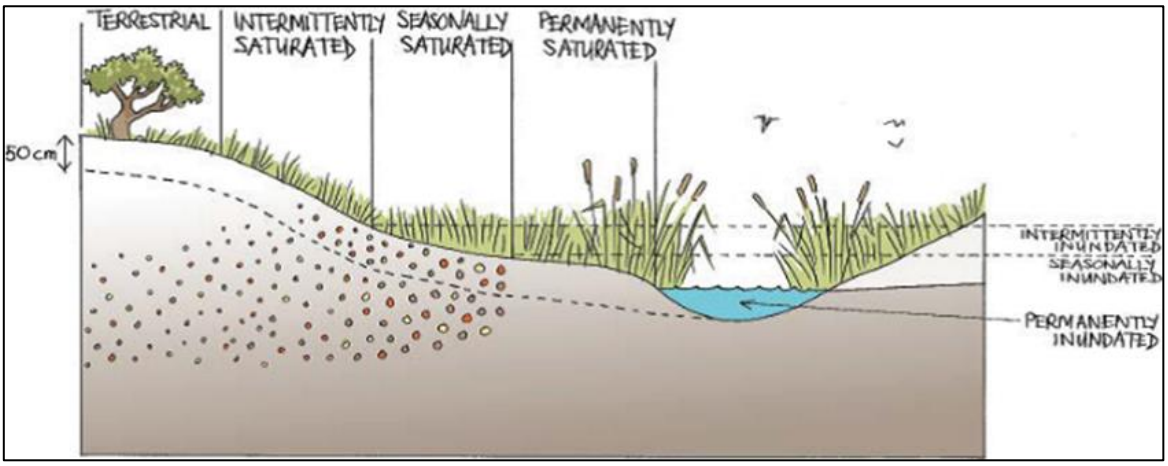

Figure 2-3 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al., 2013).

2.5.2 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands and humans. Eco Services 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 2-7).

Table 2-7 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

2.5.3 Present Ecological Status (PES)

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 2-8.

Table 2-8 The Present Ecological Status categories (Macfarlane et al., 2009)

Impact Category	Description	Impact Score Range	PES
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	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. 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	Critical Modification. 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

2.5.4 Importance and Sensitivity (IS)

The importance and sensitivity of water resources is determined to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category, as listed in Table 2-9 (Rountree and Kotze, 2013).

Table 2-9 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**

2.5.5 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.

2.5.6 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 2-10.

Table 2-10 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 notable 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.

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in Table 3-1.

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with Least Concern ecosystem	3.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Moderately Protected Ecosystem	3.1.1.2
Protected Areas	Relevant – Located 3 km from the Sharme Private Nature Reserve	3.1.1.3
National Protected Areas Expansion Strategy	Irrelevant – 110.5 km for the closest NPAES area	-
Critical Biodiversity Area	Relevant – Intersects ONA and NNRs	3.1.1.4
Important Bird and Biodiversity Areas	Relevant – Located within the Northern Turf Thornveld IBA- this will be discussed in the avifauna report	-
South African Inventory of Inland Aquatic Ecosystems	Irrelevant – No Critically Endangered wetland systems or rivers within 500 m	3.1.1.5
Strategic Water Source Areas	Irrelevant – 39 km to the closest SWSA	-

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), 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. According to the spatial dataset the proposed project overlaps with a LC ecosystem (Figure 3-1).

Figure 3-1 Map illustrating the ecosystem threat status associated with the study area.

3.1.1.2 Ecosystem Protection Level

This is 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. The proposed project overlaps with a MP ecosystem (Figure 3-2).

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

3.1.1.3 Protected Areas

According to the protected area spatial dataset from SAPAD (2020), the proposed project does not occur within any protected area (Figure 3-3). The nearest protected area is however approximately 3 km away from the study area, which means the area does fall within the 5 km protected area buffer area (Figure 3-3). The project area is within the 5 km buffer for the Sharme Private Nature Reserve.

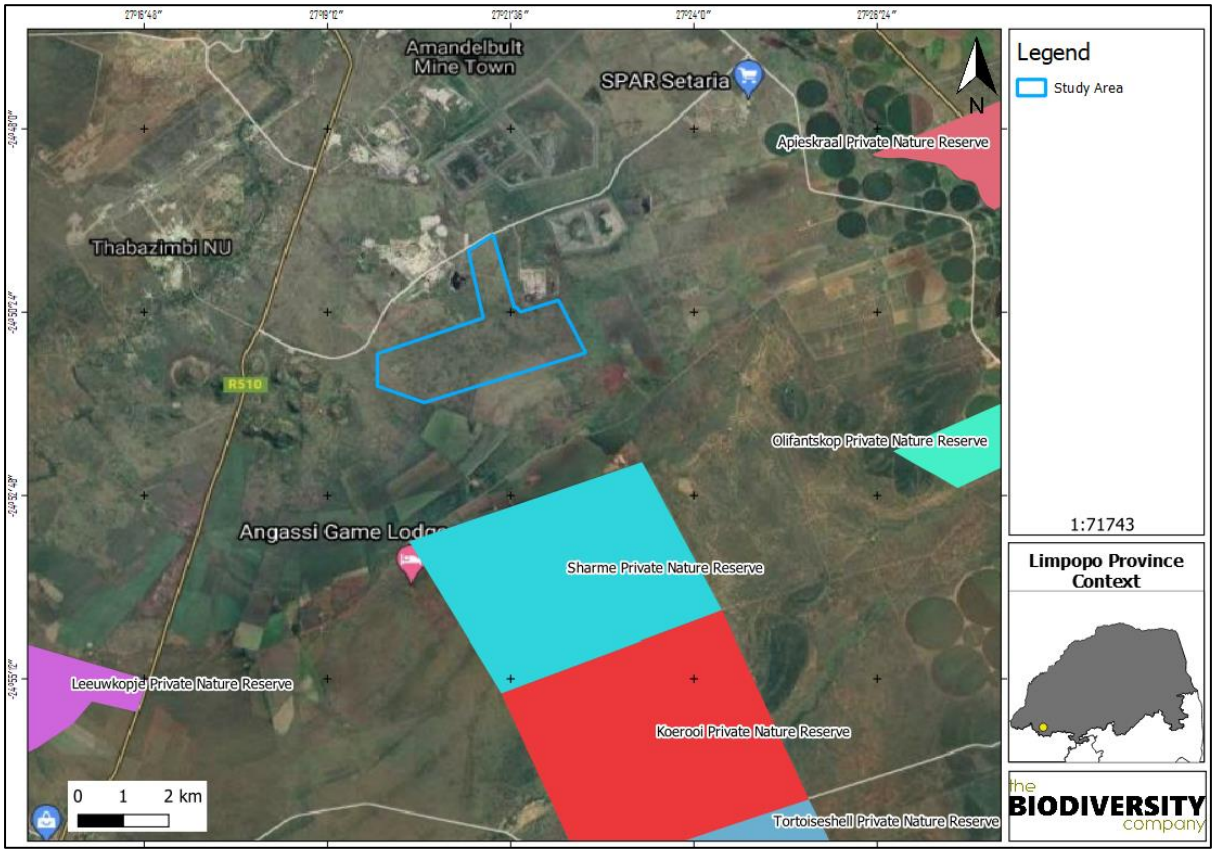

Figure 3-3 Map illustrating the location of protected areas proximal to the study area

3.1.1.4 Critical Biodiversity Areas and Ecological Support Areas

The Limpopo Conservation Plan, Version 2 (LCPv2), was completed in 2018 for the LEDET (Desmet *et al.,* 2018). The purpose of the LCPv2 was to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet *et al.,* 2018). A Limpopo Conservation Plan map was produced as part of this plan and sites were assigned to the following CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes:

- CBA1;
- CBA2;
- ESA1;
- ESA2;
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Remaining (NNR).

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 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 (Desmet *et al.,* 2018).

ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services (SANBI, 2017). ESAs may be terrestrial or aquatic.

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (Desmet *et al.,* 2018).

Areas with NNR are areas in poor ecological condition that have not been identified as CBAs or ESAs. They include all irreversibly modified areas (such as urban or industrial areas and mines), and most severely modified areas (such as cultivated fields and forestry plantations). A biodiversity sector plan or bioregional plan must not specify the desired state/management objective or provide land-use guidelines for NNR areas (Desmet *et al.,* 2018).

Figure 3-4 shows the study area superimposed on the Terrestrial CBA map. The project area overlaps with an ONA area.

Figure 3-4 Map illustrating the locations of CBAs in the study area

3.1.1.5 Hydrological Setting

The proposed development is located between the Crocodile River (7.5 km away) and the Bierspruit (3.2 km) (Figure 3-5). There are no major river systems that overlap with the study area (Figure 3-5).

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. 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).

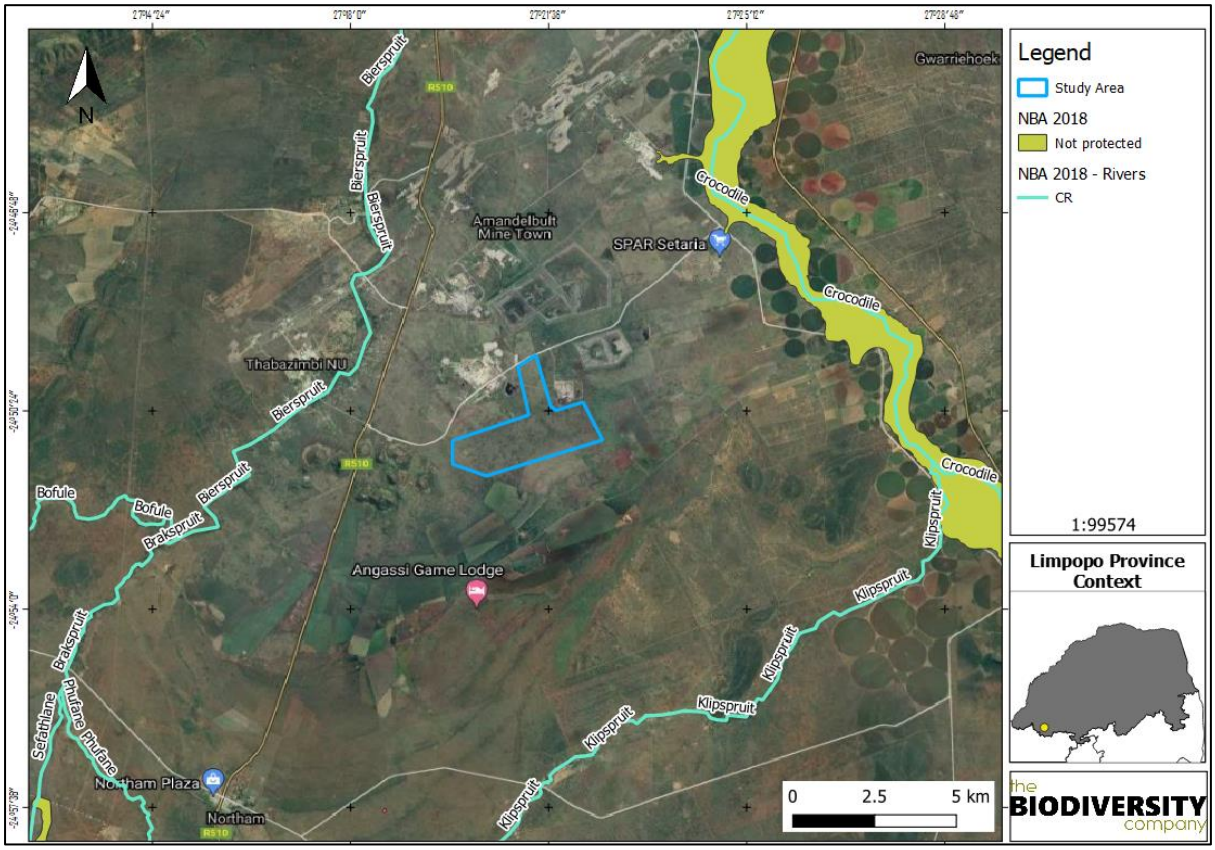

Figure 3-5 Map illustrating ecosystem threat status of wetland ecosystems in the study area

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

The study 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:

a) seasonal precipitation; and

b) (sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

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

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layers, 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 study area overlaps with one vegetation type: the Dwaalboom Thornveld (Figure 3-6).

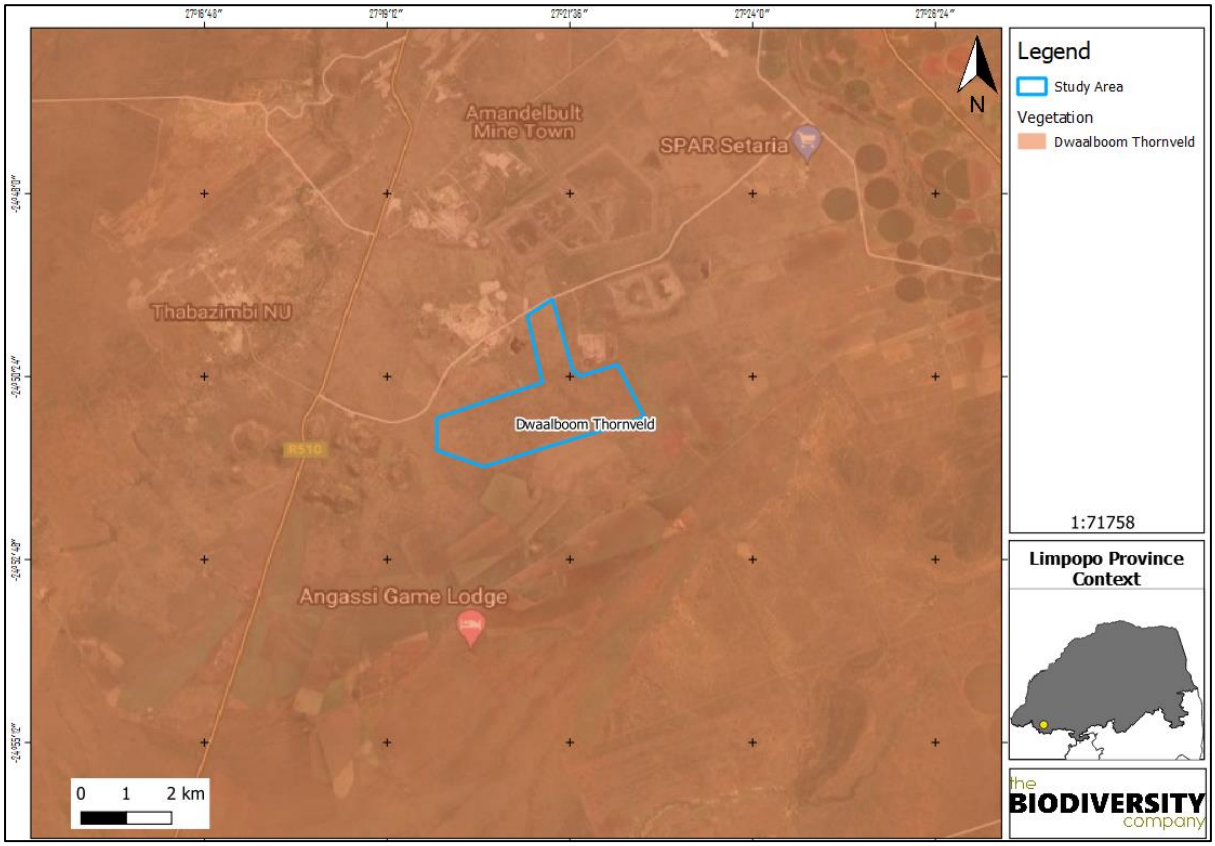

Figure 3-6 Map illustrating the vegetation type associated with the study area

3.1.2.1.1 Dwaalboom Thornveld

Dwaalboom Thornveld is restricted to and is distributed in Limpopo and North-West Provinces, within flats north of the Dwarsberge and associated ridges mainly west of the Crocodile River in the Dwaalboom area but including a patch around Sentrum. South of the ridges it extends eastwards from the Nietverdiend area, north of the Pilanesberg to the Northam area at an altitude range of between 900 and 1,200m AMSL. Its main vegetation and landscape features include plains with a layer of scattered, low to medium high, deciduous microphyllous trees and shrubs with a few broad-leaved tree species. There is almost a continuous herbaceous layer dominated by grass species.

Important Plant Taxa in Dwaalboom Thornveld

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

Trees: *Vachellia erioloba*, *Vachellia erubescens*, *Vachellia nilotica*, *Vachellia tortilis* subsp *heteracantha, Senegalia fleckii, Senegalia burkei, Searsia lancea* (Mucina & Rutherford, 2006).

Tall Shrubs: *Vachellia hebeclada subsp. hebeclada, Combretum hereroense, Diospyros lycioides subsp. lycioides, Euclea undulata, Grewia flava, Tarchonanthus camphoratus*.

Low Shrubs: *Vachellia tenuispina, Abutilon austro-africanum, Aptosimum elongatum, Hirpicium bechuanense, Pavonia burchellii, Solanum delagoense.*

Succulent Shrubs: *Kalanchoe rotundifolia, Talinum caffrum.*

Herbaceous Climber: *Rhynchosia minima.*

Shrubs: *Diospyros lycioides* subsp. *lycioides, Grewia flava, Mystroxylon aethiopicum* subsp. *burkenum, Agathisanthemum bojeri* (Mucina & Rutherford, 2006).

Graminoids: *Aristida bipartite, Bothriochloa insculpta, Digitaria eriantha* subsp *eriantha, Ischaemum afrum, Panicum maximum* and *Cymbopogon pospischilii* (Mucina & Rutherford, 2006).

Conservation Status

According to Mucina and Rutherford (2006) Dwaalboom Thornveld is classified as Least Threatened. Although the target for conservation is 19%, only 6%of this vegetation type is currently under statutory conservation in reserves such as the Madikwe Game Reserve (approximately 150km west of the project area). Cultivation and to a lesser extend urbanisation have resulted in the transformation of approximately 14% of Dwaalboom Thornveld and exotic invasive plants are present. Incidences of erosion are low to very low (Mucina & Rutherford, 2006).

3.1.2.2 Expected Flora Species

The POSA database indicates that 470 species of indigenous plants are expected to occur within the study area. Appendix A provides the list of species and their respective conservation status and endemism. Two (2) SCC based on their conservation status could be expected to occur within the study area and are provided in Table 3-2 below.

Table 3-2 Threatened flora species that may occur within the study area.

Family	Taxon	Author	IUCN	Ecology
Scrophulariaceae	*Jamesbrittenia bergae*	Lemmer	VU	Indigenous; Endemic
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 30 amphibian species are expected to occur within the area (Appendix B). None of these species are threatened. ‘

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 91 reptile species are expected to occur within the area (Appendix C). Three (3) are regarded as threatened (Table 3-3). Based on the absence of a suitable perennial river in the study area, the likelihood of occurrence of the Nile Crocodile was rated as low.

Table 3-3 Threatened reptile species that are expected to occur within the study area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Lygodactylus waterbergensis	Waterberg Dwarf Gecko	NT	NT	Moderate
Pseudocordylus transvaalensis	Northern Crag Lizard	NT	LC	Moderate

Lygodactylus waterbergensis (Waterberg Dwarf Gecko) is classified as NT both regionally and internationally. This species is endemic to Limpopo Province, where it is found in rocky areas of the grassland and savannas. The likelihood of occurrence is moderate, as rocky habitat is present in the study area, but it has been somewhat disturbed by cattle grazing in the habitat.

Pseudocordylus transvaalensis (Northern Crag Lizard) is categorised as NT regionally. This species is threatened by the pet trade and is listed on CITES. The likelihood of occurrence in the study area is moderate because of the rocky habitat present for this species, although somewhat disturbed. This species is sensitive to habitat disturbance.

3.1.3.3 Mammals

The IUCN Red List Spatial Data lists 86 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Fourteen (14) of these expected species are regarded as threatened (Table 3-4), eleven of these have a low likelihood of occurrence based on the lack of suitable habitat in the study area.

Table 3-4 Threatened mammal species that are expected to occur within the study area.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Aonyx capensis	Cape Clawless Otter	NT	NT	High
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Cloeotis percivali	Short-eared Trident Bat	EN	LC	Low
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Crocuta crocuta	Spotted Hyaena	NT	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Leptailurus serval	Serval	NT	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate
Redunca fulvorufula	Mountain Reedbuck	EN	LC	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and therefore not often seen, there are some patches of suitable habitat in the study area and therefore the likelihood of occurrence is rated as moderate.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring; is small and nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the study area can be considered somewhat suitable for the species and the likelihood of occurrence is rated as moderate.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the study area although somewhat disturbed and the likelihood of occurrence of this species is therefore considered to be moderate.

3.1.4 Review of Previous Reports

In 2013 a flora assessment was conducted by Ecofin Consulting Ecologists on the Zondereinde Mine footprint. The following observations were made during this flora assessment:

- The site is dominated by grass species namely, *Aristida bipartita, Bothriochloa insculpta* and *Setaria incrassata* in the herbaceous layer and the tree *Vachellia tortilis* subsp*. Heteracantha* in the woody layer;
- The area has undisturbed patches typical for this vegetation unit situated on heavy clay soils;
- Species richness is low at 37 but not abnormally so for this habitat, since the seasonal swelling and shrinking of clay soils tends to keep plant species numbers down due to root breakage;

- Herbaceous plants (forbs and grasses) constitute 73% of the species present and the woody plants (trees, shrubs and dwarf shrubs) only constitute 27%.
- The forb component comprises 49% of all plants, although this group of plants occurs at very low numbers.

A fauna assessment was also conducted by Ecofin Consulting Ecologists on the Zondereinde Mine footprint in 2013. During this survey three mammal species were recorded::Slender mongoose, Steenbok, and Scrub hare. Two reptile species were recoded, the Common Giant plated lizard and the Tree agama. No Amphibian species were recorded. During this assessment none of the fauna species were SCC.

In this study a total of 34 tree, shrub and herbaceous plant species were recorded in the project area (~ 2 Ha) during the field assessment. One individual *Boscia albitrunca* (Shepard's Tree) was observed within the property. The mammal and herpetofauna diversity were low, with three mammal species recorded: Chacma Baboon, Yellow mongoose, Scrub Hare and one reptile species recorded, Variable Skink.

3.1.5 Catchment

The study area is associated with the quaternary catchments A24C and A24F within the Limpopo Water Management Area (WMA1). According to StatsSA (2010), the Limpopo WMA is semi-arid and the mean annual rainfall ranges from 300 to 700 mm over most of the region. The study area is located in two Sub-Quaternary Reaches (SQR), namely A24C-536 and A24F-517.

The desktop integrity of the A24C-536 reach of the Crocodile River is moderately modified. The Ecological Importance (EI) of the reach is moderate. The Ecological Sensitivity (ES) for the reach is rated low (DWS, 2021). The Bierspruit reach (A24C-536) is rated as largely modified (class D). This is predominately due to modifications to instream habitat continuity and modifications, large flow modifications, and serious modifications to water quality within the reach. The EI is rated as moderate. The ES of the system is rated high sensitivity.

3.1.6 National Freshwater Ecosystem Priority Area Status

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

Figure 3-7shows the location of the study area in relation to wetland FEPAs. Based on this information, the study area is adjacent to a non-priority system.

3.1.7 Inland Water Features

A review of river lines and water bodies for quarter degree squared (QDS) 2427CD indicated the presence of non-perennial water features and a dam within the regulatory area (Figure 3-7).

3.1.8 National Wetland Map 5

The National Wetland Map 5 spatial data was published in October 2019 (Deventer *et al*. 2019), in collaboration with SANBI, with the specific aim of spatially representing the location, type and extent of wetlands in South Africa. The data represents a synthesis of a wide number of official watercourse data, including rivers, inland wetlands and estuaries. This database does not recognise the presence of any water resource within the regulatory area.

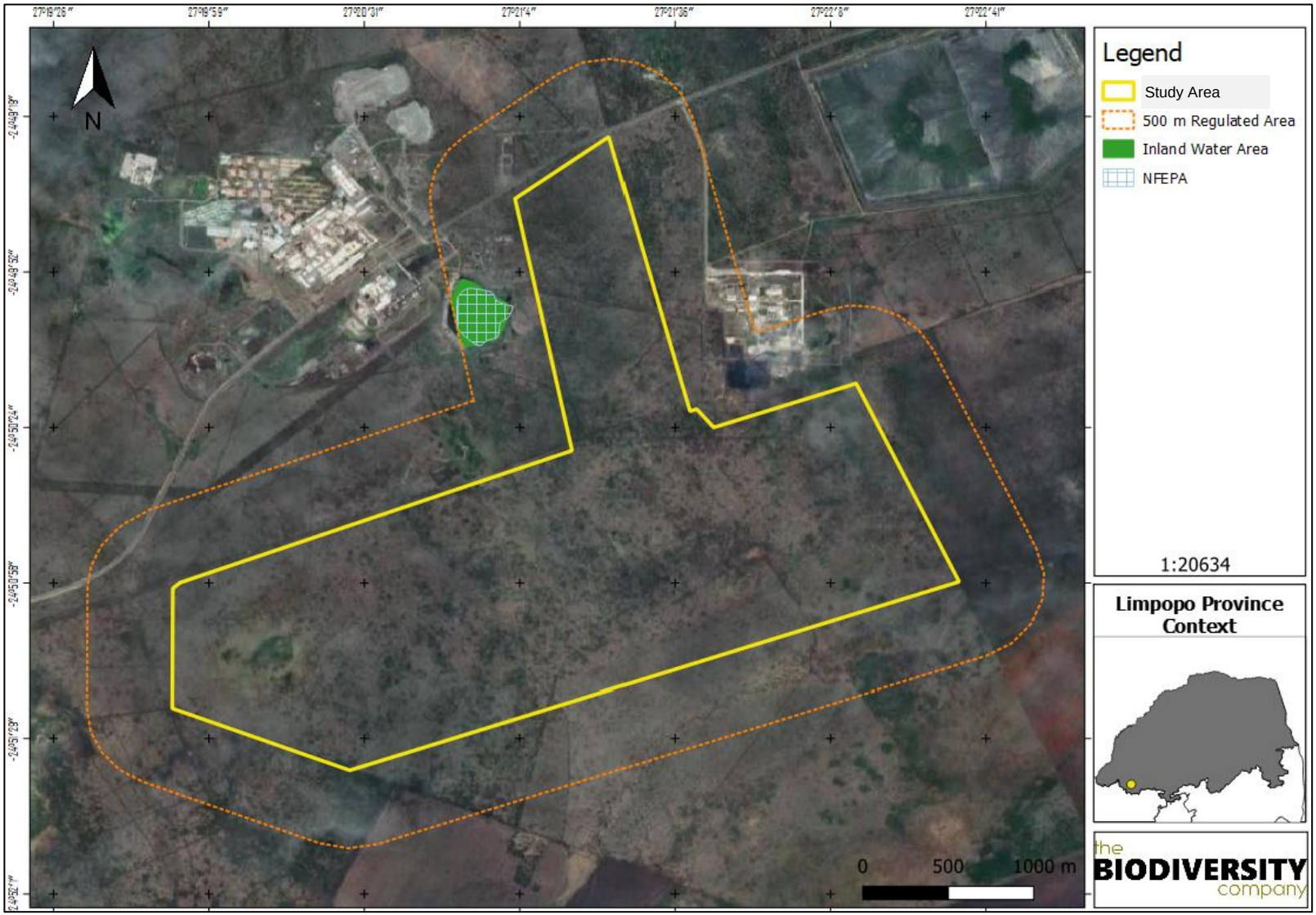

Figure 3-7 The NFEPA & QDS 2427CD datasets

3.2 Field Assessment

The following sections provide the results from the field survey for the proposed development that was undertaken during March 2021.

3.2.1 Flora Assessment

This section is divided into two sections:

- Indigenous flora; and
- Invasive Alien Plants (IAPs).

3.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the study area. A total of 84 tree, shrub and herbaceous plant species were recorded in the study area during the field assessment (Table 3-5). Plants listed as Category 1 alien or invasive species under the NEMBA appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised' according to NEMBA, appear in blue text. Some of the plant species recorded can be seen in Figure 3-8.

Table 3-5 Trees, shrub and herbaceous plant species recorded in the project area.

Family	*Scientific Name*	Threat Status (SANBI, 2017)	SA Endemic	NEMBA Category
Malvaceae	*Abutilon austro-africanum*	LC	No	
Amaranthaceae	*Achyranthes aspera*			**Naturalized exotic weed**
Asparagaceae	*Asparagus cooperi*	LC	No	
Asteraceae	*Bidens pilosa*			**Naturalized exotic weed**
Amaryllidaceae	*Boophone disticha*	LC	No	
Poaceae	*Bothriochloa insculpta*	LC	No	
Poaceae	*Cenchrus ciliaris*	LC	No	
Pedaliaceae	*Ceratotheca triloba*	LC	No	
Poaceae	*Chloris virgata*	LC	No	
Combretaceae	*Combretum hereroense*	LC	No	
Combretaceae	*Combretum imberbe*	LC-Protected Tree	No	
Combretaceae	*Combretum molle*	LC	No	
Commelinaceae	*Commelina erecta*	LC	No	
Nyctaginaceae	*Commicarpus pentandrus*	LC	No	
Burseraceae	*Commiphora mollis*	LC	No	
Asteraceae	*Conyza bonariensis*			**Naturalized exotic weed**
Acanthaceae	*Crabbea angustifolia*	LC	Yes	
Amaryllidaceae	*Crinum crassicaule*	LC	No	
Euphorbiaceae	*Croton gratissimus var. subgratissimus*	LC	No	
Cucurbitaceae	*Cucumis zeyheri*	LC	No	
Convolvulaceae	*Cuscuta campestris*			**Naturalized exotic weed**
Poaceae	*Cymbopogon caesius*	LC	No	
Poaceae	*Cynodon dactylon*	LC	No	
Fabaceae	*Dichrostachys cinerea*	LC	No	
Poaceae	*Digitaria eriantha*	LC	No	

Poaceae	*Diheteropogon amplectens*	LC	No	
Ebenaceae	*Diospyros lycioides subsp. lycioides*	LC	No	
Malvaceae	*Dombeya rotundifolia*	LC	No	
Solanaceae	*Datura ferox*			**NEMBA Category 1B**
Boraginaceae	*Ehretia rigida*	LC	Yes	
Poaceae	*Enneapogon cenchroides*	LC	No	
Poaceae	*Eragrostis rigidior*	LC	No	
Moraceae	*Ficus glumosa*	LC	No	
Poaceae	*Fingerhuthia africana*	LC	No	
Asteraceae	***Flaveria bidentis***			**NEMBA Category 1B**
Phyllanthaceae	*Flueggea virosa*	LC	No	
Iridaceae	*Gladiolus elliotii*	LC	No	
Malvaceae	*Grewia flava*	LC	No	
Malvaceae	*Grewia flavescens*	LC	No	
Celastraceae	*Gymnosporia buxifolia*	LC	No	
Poaceae	*Heteropogon contortus*	LC	No	
Malvaceae	*Hibiscus trionum*			**Naturalized exotic weed**
Poaceae	*Ischaemum afrum*	LC	No	
Fabaceae	*Jacaranda mimosifolia*			**NEMBA Category 1B**
Scrophulariaceae	*Jamesbrittenia aurantiaca*	LC	No	
Lamiaceae	*Leonotis leonurus*	LC	No	
Poaceae	*Melinis repens*	LC	No	
Asteraceae	*Nidorella resedifolia*	LC	No	
Sapindaceae	*Pappea capensis*	LC	No	
Malvaceae	*Pavonia burchellii*	LC	No	
Fabaceae	*Peltophorum africanum*	LC	No	
Apocynaceae	*Pentarrhinum insipidum*	LC	No	
Fabaceae	*Pterocarpus rotundifolius subsp. rotundifolius*	LC	No	
Amaranthaceae	*Pupalia lappacea*	LC	No	
Bignoniaceae	*Rhigozum brevispinosum*	LC	No	
Amaryllidaceae	*Scadoxus puniceus*	LC	No	
Asteraceae	***Schkuhria pinnata***			**Naturalized exotic weed**
Anacardiaceae	*Sclerocarya birrea subsp. caffra*	LC-Protected Tree	No	
Anacardiaceae	*Searsia lancea*	LC	No	
Anacardiaceae	Searsia pyroides var. pyroides	LC	No	
Convolvulaceae	*Seddera capensis*	LC	No	
Fabaceae	*Senegalia erubescens*	LC	No	
Fabaceae	*Senegalia mellifera*	LC	No	
Fabaceae	*Sesbania bispinosa*			**Naturalized exotic weed**

Poaceae	*Setaria sphacelata var sphacelata*	LC	No	
Poaceae	*Setaria verticillata*	LC	No	
Solanaceae	*Solanum campylacanthum*	LC	No	
Poaceae	*Sorghum versicolor*	LC	No	
Orobanchaceae	*Striga asiatica*	LC	No	
Orobanchaceae	*Striga gesnerioides*	LC	No	
Asteraceae	***Tagetes minuta***			**Naturalized exotic weed**
Zygophyllaceae	*Tribulus terrestris*	LC	No	
Poaceae	*Urelytrum agropyroides*	LC	No	
Poaceae	*Urochloa mosambicensis*	LC	No	
Fabaceae	*Vachellia gerrardii subsp. gerrardii*	LC	No	
Fabaceae	*Vachellia hebeclada subsp. hebeclada*	LC	No	
Fabaceae	*Vachellia karoo*	LC	No	
Fabaceae	*Vachellia nilotica*	LC	No	
Fabaceae	*Vachellia tortilis*	LC	No	
Asteraceae	*Xanthium spinosum*			**NEMBA Category 1B**
Velloziaceae	*Xerophyta retinervis*	LC	No	
Olacaceae	*Ximenia americana var. microphylla*	LC	No	
Asteraceae	*Zinnia peruviana*			**Naturalized exotic weed**
Rhamnaceae	*Ziziphus mucronata*	LC	No	

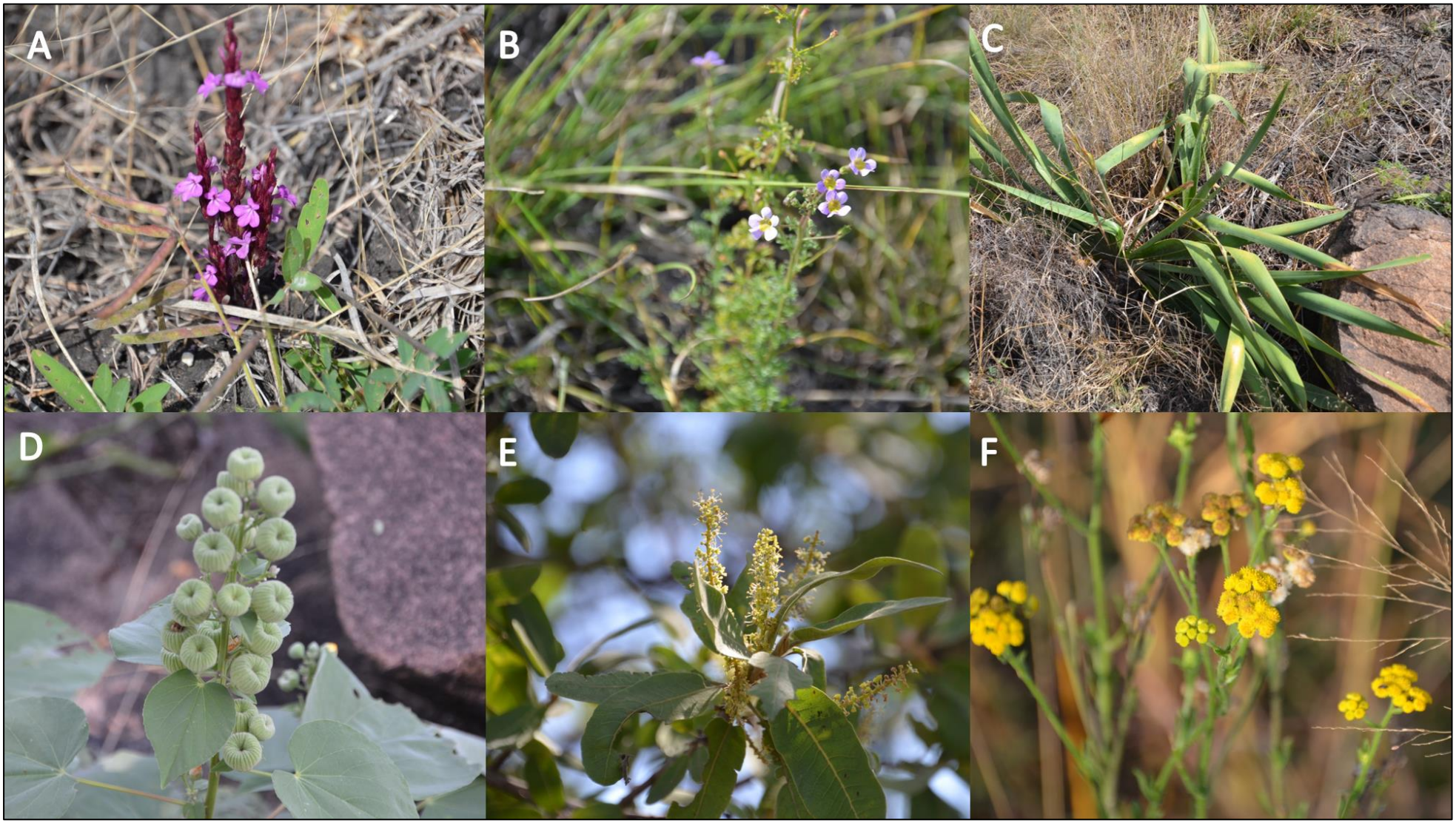

Figure 3-8 Photographs illustrating some of the flora recorded within the assessment area.
A) Striga gesnerioides, B) Jamesbrittenia aurantiaca, C) Boophone disticha, D) Abutilon austro-africanum, E) Pappea capensis and F) Nidorella resedifolia*.*

3.2.1.2 Invasive Alien Plants

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are 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. 43726, 18 September 2020. 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.

Four (4) IAP species were recorded within the study area. These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. These IAP species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

3.2.1.3 Protected Trees

During the field assessment 2 species of protected trees were observed: *Sclerocarya birrea. subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood). The protected trees observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). In terms of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence. The locations of the trees recorded in the study area can be seen in Figure 3-9. None of these trees are within the project area.

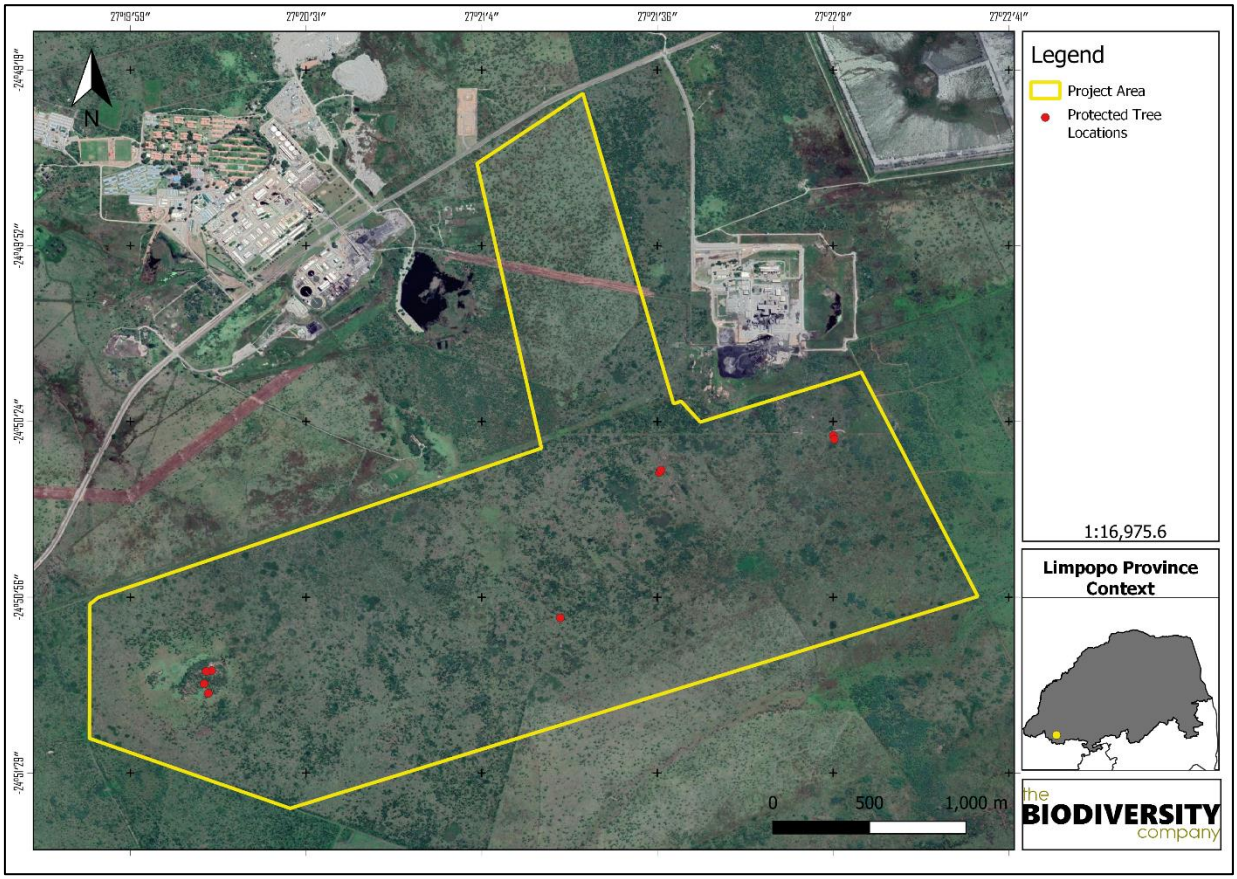

Figure 3-9 Location of protected flora species.

3.2.2 Faunal Assessment

Herpetofauna and mammal observations and recordings fall under this section. A separate avifaunal report was compiled for this project.

3.2.2.1 Amphibians and Reptiles

Four (4) species of reptile and one species were recorded within the study area during the survey period (Table 3-6, Figure 3-10). However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. None of the species recorded are regarded as threatened, albeit all are protected under provincial legislation.

The use of the rocky outcrops by these species on the fine-scale habitats is important to consider for mitigation actions when an area is cleared for placement of the infrastructure. One rocky outcrop is present in the project area.

Table 3-6 Summary of herpetofauna species recorded within the study area.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	Global (IUCN, 2017)
Reptiles			
Naja annulifera	Snouted Cobra	Least concern (LC)	Unlisted
Trachylepis punctatissima	Speckled Rock Skink	LC	Unlisted
Lygodactylus capensis	Cape dwarf gecko	LC	LC
Psammophis mossambicus	Olive Grass Snake	LC	Unlisted

Trachylepis varia	Variable Skink	LC	LC
		Amphibians	
Schismaderma carens	African Red Toad	LC	LC

Figure 3-10 Photographs illustrating the reptile species recorded within the assessment area associated with the project area during the survey period.

A) Psammophis mossambicus, B) Trachylepis varia, and C) Naja annulifera*.*

3.2.2.2 Mammals

Thirteen (13) mammal species were observed during the survey of the study area (Table 3-7) based on either direct observation or the presence of visual tracks and signs (Figure 3-12). None of the species recorded are regarded as threatened.

The use of the rocky outcrop in the project area by these species on the fine-scale habitats is important to consider for mitigation actions when an area is cleared for placement of the infrastructure.

Table 3-7 Summary of mammal species recorded within the study area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Aonyx capensis	Cape Clawless Otter	NT	NT
Canis mesomelas	Black-backed Jackal	LC	LC
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Dendromus melanotis	Grey Climbing Mouse	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Papio ursinus	Chacma Baboon	LC	LC
Paraxerus cepapi	Tree Squirrel	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Procavia capensis	Rock Hyrax	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC

Figure 3-11 Photographs of Near-Threatened mammal species, Aonyx capensis, recorded close to the study area.

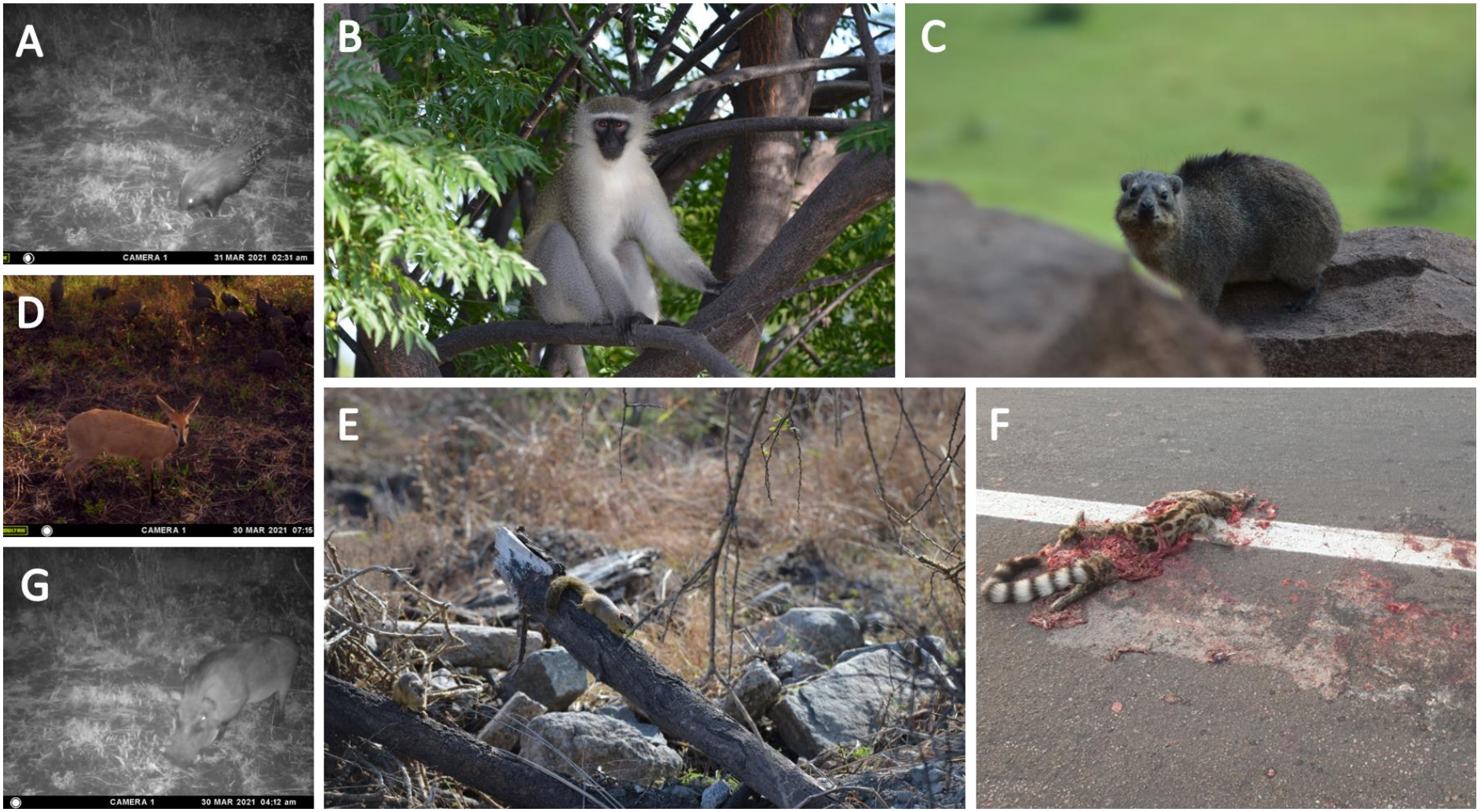

Figure 3-12 Photographs illustrating the mammal species recorded within the study area during the survey period.

A) Hystrix africaeaustralis, B) Chlorocebus pygerythrus, C) Procavia capensis and D) Sylvicapra grimmia, E) Paraxerus cepapi, F) Genetta genetta (Roadkill) and G) Phacochoerus africanus

3.2.3 Wetland Assessment

3.2.3.1 Wetland Classification and Extent

In total six (6) water resources were identified and delineated in the study area, four of which are relevant to the project area (Figure 3-14). These comprised both natural and artificial systems, with the artificial systems comprising of an impoundment and a dam and drainage feature associated with the smelter. Three (3) natural wetland hydrogeomorphic (HGM) units belonging to three HGM types (channelled valley bottom, unchannelled valley bottom and seepage) were identified within the 500 m regulated area surrounding the broader study area (Figure 3-14). Of these, only a portion / segment of the seepage wetland (HGM 3) encroaches into the study area and none encroach into the project area.HGM3 is 300 m from the project area. Photographs of the identified resources are presented in Figure 3-13.

The systems are associated with black turf soils, with the Arcadia form and the Rensburg form dominant with the terrestrial landscape and wetlands respectively. The wetland systems are largely seasonal to temporary systems, and the G horizon is feint and slightly calcareous. Several small ephemeral washes bisect the study area but are far too infrequently inundated to support hydromorphic vegetation.

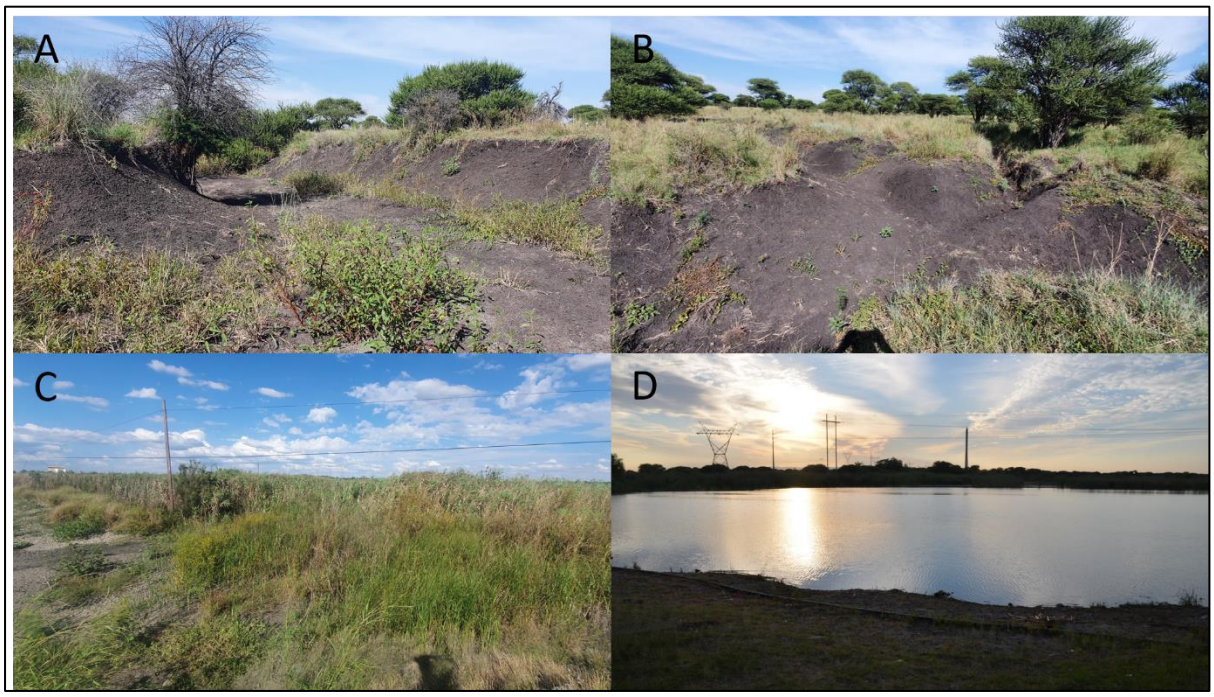

Figure 3-13 Photographs of the delineated resources
A & B) HGM 1, C) HGM 2, D) The dam adjacent to HGM 3

The level 1-4 classification for these HGM units, as per the national wetland classification system (Ollis *et al.,* 2013), is presented in (Table 3-8). A map showing the extent of these wetlands is shown in Figure 3-14. (As noted above, only HGM3 is relevant to the project area).

Table 3-8 Wetland classification as per SANBI guideline (Ollis et al. 2013)

Wetland System	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Bushveld Basin	Central Bushveld Group 2	Valley Floor	Channelled valley bottom	N/A	N/A
HGM 2	Inland	Bushveld Basin	Central Bushveld Group 2	Valley Floor	Unchannelled valley bottom	N/A	N/A
HGM 3	Inland	Bushveld Basin	Central Bushveld Group 2	Slope	Seep	Upland Floodplain	N/A

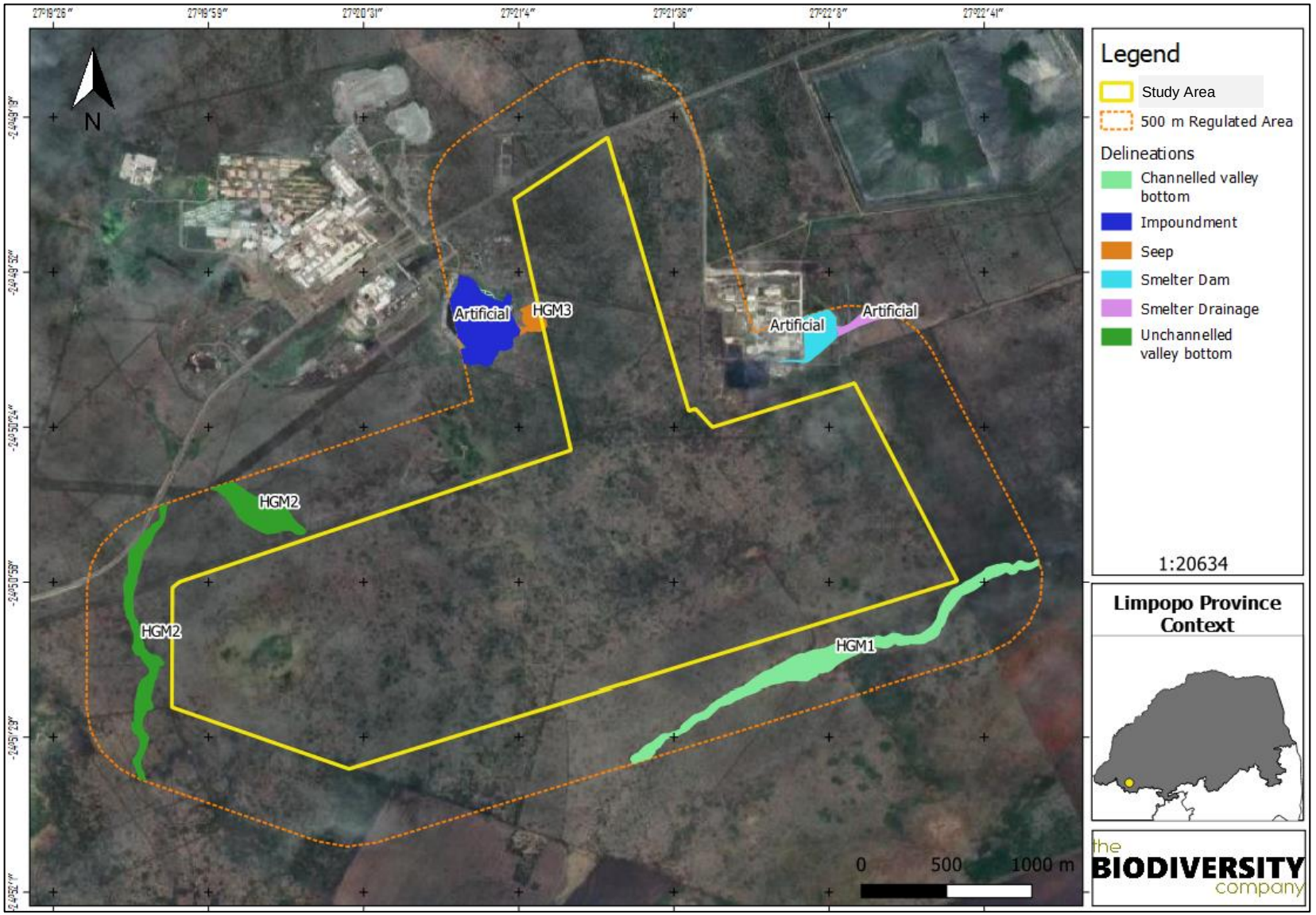

Figure 3-14 Wetlands delineated within the 500 m regulation area of the study area

3.2.3.2 Wetland Ecosystem Services

The ecosystem services provided by the wetlands identified within the project area were assessed and rated using the WET-EcoServices method (Kotze *et al*. 2008) (Table 3-9). In respect of the project area, HGM 3 overall scored **Intermediate** in terms of its wetland ecosystem services; and in the study area HGMs 1 and 2 scored Moderately High. All three wetlands are considered relatively important for regulating and supporting benefits, such as flood attenuation and water quality enhancement. The most benefits are associated with HGM 2. Due to the location of HGM 3 in relation to the impoundment; and the largely natural state of HGMs 1 and 2, all three wetlands are considered highly important from biodiversity maintenance perspective. The HGM 3 seep has been impacted by the creation of the dam but together with the dam is considered important for supporting significant congregations of waterfowl.

All the wetlands are considered highly important in terms of their direct provisioning of harvestable resources and cultivated foods for humans as the systems are actively cultivated. All three wetlands, particularly the more intact HGMs 1 and 2, are considered very important from tourism and recreation perspective.

Table 3-9 Summary of the ecosystem services scores

Wetland Unit				HGM 1	HGM 2	HGM 3
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation	2.0	2.1	1.9
			Streamflow regulation	1.5	1.5	1.5
			Water Quality enhancement benefits: Sediment trapping	2.4	2.4	2.0
			Water Quality enhancement benefits: Phosphate assimilation	2.3	2.4	1.7
			Water Quality enhancement benefits: Nitrate assimilation	1.8	1.9	1.5
			Water Quality enhancement benefits: Toxicant assimilation	2.0	2.1	1.6
			Water Quality enhancement benefits: Erosion control	2.0	2.2	2.5
			Carbon storage	1.3	1.3	1.3
	Direct Benefits	Biodiversity maintenance		3.0	3.0	2.2
		Provisioning benefits	Provisioning of water for human use	1.1	1.1	1.3
			Provisioning of harvestable resources	2.4	2.4	2.4
			Provisioning of cultivated foods	2.4	2.4	2.4
		Cultural benefits	Cultural heritage	1.5	1.5	1.5
			Tourism and recreation	2.1	2.1	1.7
			Education and research	1.5	1.5	1.0
Overall				29.5	30.1	26.5
Average				2.0	2.0	1.8

3.2.3.3 Wetland Health

The present ecological state (PES) of the wetlands identified within the study area is provided in Table 3-10. Overall, HGM 3 is in a Moderately Modified state (class: C); and HGM 1 and 2 are rated as being in a Largely Natural state (class: B). The site in general, although largely natural bush is still heavily encroached by weedy annual alien invasive species due to intensive cattle farming.

Table 3-10 Summary of the scores for the wetland PES

Wetland	Hydrology	Geomorphology	Vegetation	Overall
HGM 1	B: Largely Natural (1.5)	C: Moderately Modified (2.0)	B: Largely Natural (1.7)	B: Largely Natural (1.7)
HGM 2	B: Largely Natural (1.5)	B: Largely Natural (1.3)	B: Largely Natural (1.8)	B: Largely Natural (1.5)
HGM 3	C: Moderately Modified (3.5)	C: Moderately Modified (2.5)	C: Moderately Modified (3.5)	C: Moderately Modified (3.2)

3.2.3.4 The Ecological Importance and Sensitivity

The results of the ecological and importance (EIS) assessment are shown in Table 3-11. At a regional scale, the NFEPA Wetveg database recognises channelled valley bottom wetland types within the Central Bushveld Group 2 as Critically Endangered and Not Protected (Nel and Driver, 2012). The unchanneled valley bottom and seepage wetland types are classified as Vulnerable and Least Threatened. None of the wetlands within the study area are recognised as NFEPA wetlands. The following was also considered for the EIS description, the project area:

- Is not located in a Strategic Water Source Area;
- Does not overlap any CBAs; and
- Does not overlap any ESA.

Table 3-11 The Ecological Importance and Sensitivity results for the wetland areas

Aspect	HGM 1	HGM 2	HGM 3
Ecological Importance & Sensitivity	3.3	3.0	2.0
Hydrological/Functional Importance	1.9	2.0	1.8
Direct Human Benefits	0.5	1.8	1.7

3.2.3.5 Sensitivity and Buffer Analysis

The "*Buffer zone guidelines for wetlands, rivers and estuaries*" (Macfarlane *et al.,* 2014) was used to determine the appropriate wetland buffer zone for the proposed project.

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another. A buffer zone has been prescribed for this project to serve as a "barrier" between the proposed development and the wetland systems. This buffer area would only be applicable to wetland areas that will not be lost due to the project.

The wetland buffer zone tool was used to calculate the appropriate buffer required for the proposed solar development. The model shows that the largest risk posed by the project during the construction phase is that of "increased sediment inputs and turbidity". During the operational phase, the flow patterns being altered (increase flood peaks); increased sediment inputs; and altered water quality are high risks. These risks are based on what could threaten the wetland and what buffer would be required at a desktop level. A buffer zone was suggested of 22m (Table 3-12), this buffer is calculated assuming no mitigation measures are applied. However, given the expected loss of wetland area, it is recommended that a conservative approach be opted for the remaining wetland systems and a minimum buffer width of 30 m be implemented.

Table 3-12 Post-mitigation buffer requirement

Required Buffer after mitigation measures have been applied	
Solar PV	**22 m**

A sensitivity map was produced to visually represent the sensitivity of each HGM unit to the proposed project based on the findings of the assessment. All identified wetland HGM units were classified as having a High sensitivity while their associated 22 m buffers were assigned a Medium sensitivity. The remaining extent of the study area was assigned a Low sensitivity from a water resource perspective.

4 Habitat Assessment and Site Ecological Importance

4.1 Habitat Assessment

The main habitat types identified across the study area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 4-1, while Figure 4-2 is an illustration of habitats in the study area. Emphasis was placed on limiting timed meander searches within the natural habitats and therefore habitats with a higher potential of hosting SCC. Six habitats were identified in the study area, each of the habitats identified are discussed in the sub-sections below.

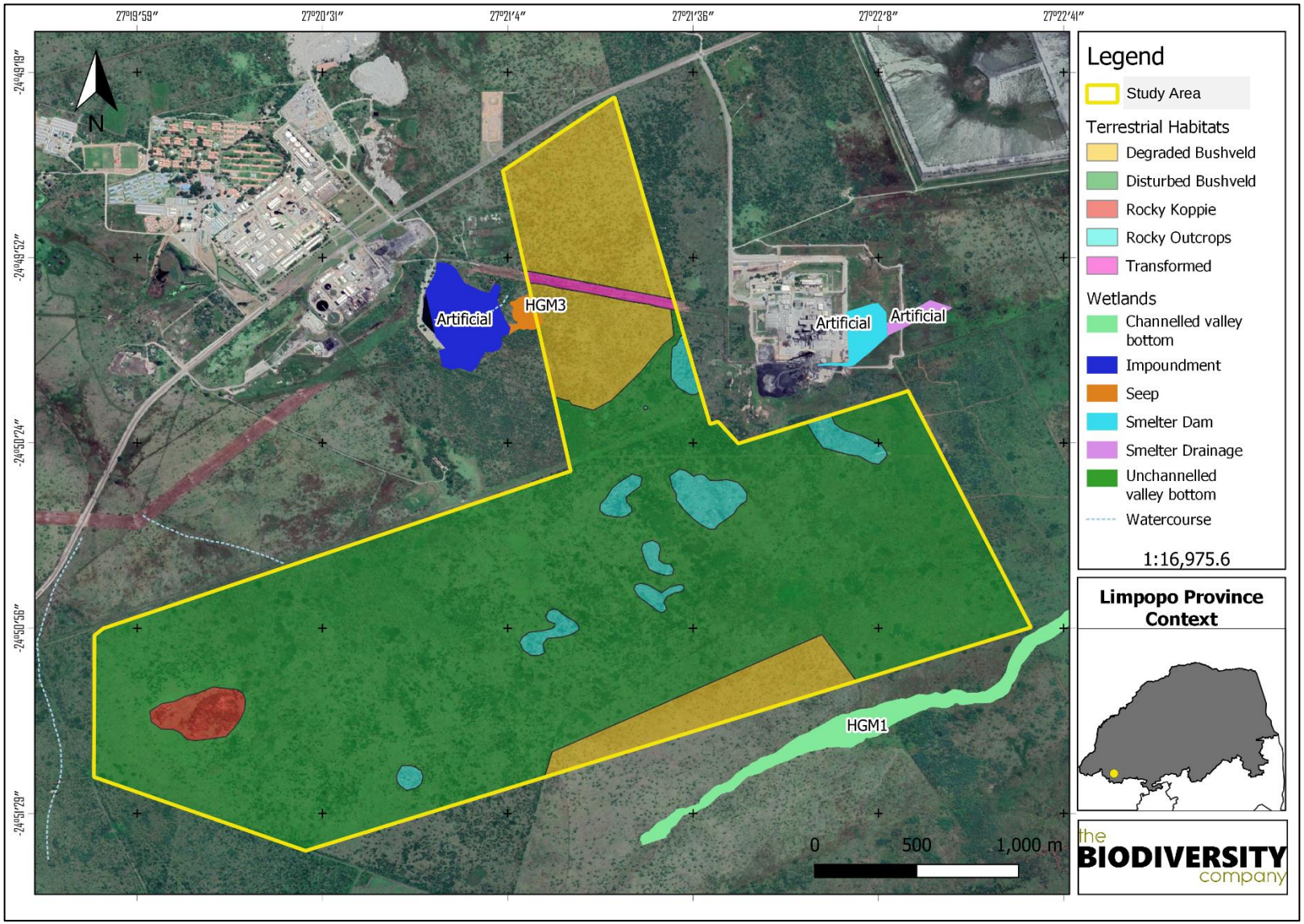

Figure 4-1 Habitats identified in the study area.

Figure 4-2 The study area taken from the Rocky koppie in an easterly direction.

Degraded Bushveld

This habitat is the remainder of the bushveld that has not been as disturbed by the historic grazing and impacts (Figure 4-3). This habitat type is regarded as semi-natural bushveld, but slightly disturbed due to some grazing by livestock, the adjacent mining land use and human infringement. The current ecological condition of this habitat regarding the main driving forces, are intact, which is evident in the amount and importance of the species recorded in the faunal assessment; and the high species diversity and number of plant species recorded. Current human infringement still occurs throughout, especially in areas close to roads. The difference between this habitat and the disturbed bushveld is the extent of the disturbance in the disturbed bushveld being more severe.

The unit acts as remaining greenlands, which supports viable plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a landscape fragmented. The habitat sensitivity is regarded as medium sensitivity due to the role of this intact habitat to biodiversity within a very fragmented local landscape.

Figure 4-3 A typical example of degraded Bushveld habitat from the study area.

Disturbed Bushveld

This habitat is regarded as areas that have been impacted more by historic overgrazing, mismanagement and land use (Figure 4-4). These habitats aren't 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 grazing and mismanagement. This habitat can be found in different conditions of disturbance, but in many cases has either been encroached on by *Dichrostachys cinerea* or infested by *Bidens pilosa* and *Zinnia peruviana*. These areas are considered to have a low sensitivity, as they may be used as a movement corridor and in many cases form a barrier between the more degraded bushveld and the transformed areas.

Figure 4-4 A typical example of disturbed Bushveld habitat from the study area.

Rocky Outcrops

Rocky outcrops occur in small portions within the disturbed Bushveld habitat and consist of bedrock protruding from the soil layer, with the associated boulders and large rocks (Figure 4-5). One rocky outcrop is present in the project area. The habitat is used by faunal species as fine-scale habitats and is important to consider for mitigation actions when an area is cleared for placement of the infrastructure. These habitats are also hotspots for the protected tree species recorded on site.

Figure 4-5 A typical example the rocky outcrop habitat from the study area.

Rocky Koppie

A single large rocky hill consisting of rocks and boulders of different sizes (Figure 4-6). It is not in proximity to the project area. A unique habitat within the landscape and used by faunal species as a fine-scale unique habitat and should be avoided for placement of the infrastructure. This habitat was a hotspot for the protected tree species recorded on site. Rock Hyrax was found only in this habitat.

Figure 4-6 The rocky koppie habitat from the study area.

Transformed

This habitat unit represents all areas that have been cleared of natural vegetation for a tailings line, with the associated secondary road (Figure 4-7).

Figure 4-7 The transformed habitat from the study area.

Wetlands

Wetlands were identified in the relevant section of this report. Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora, including the SCC recorded, the Cape Clawless Otter. The preservation of this system is the most important aspect to consider for the proposed project. This habitat needs to be protected and improved due to the role of this habitat as a water resource.

4.2 Site Ecological Importance (SEI)

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the study area being with an ESA (Figure 4-8), while the animal and plant species theme sensitivity shows that majority of the area is classified as low sensitivity. This is in contrast to the LCP, which classifies most of the project areas as ONA.

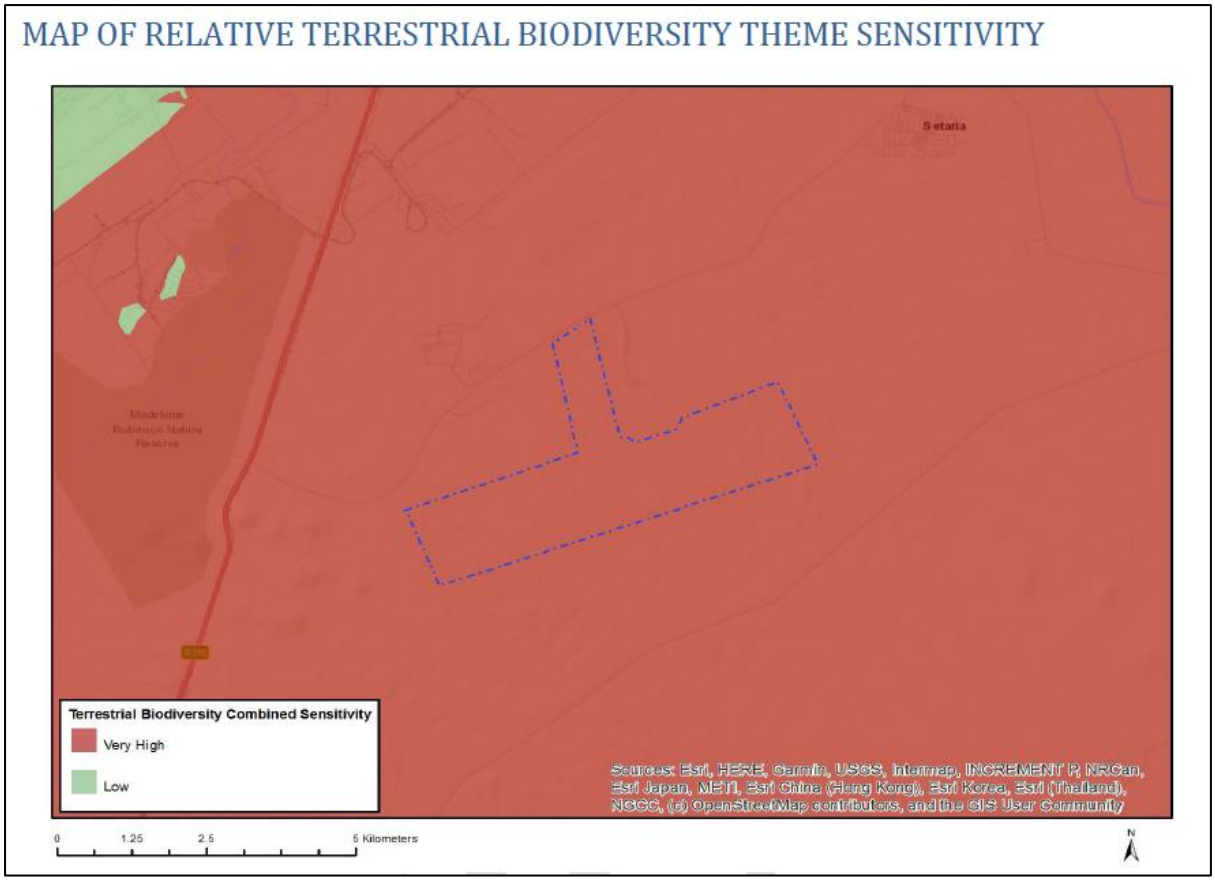

Figure 4-8 Terrestrial Biodiversity Theme Sensitivity, TBC Screening Report

Five (5) different terrestrial habitat types were delineated within the study area, and one set of wetland habitats as a whole (

Table 4-1). The location and extent of these habitats are illustrated in Figure 4-1. Based on the criteria provided in Section 2.4 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category. The sensitivities of the habitat types delineated are illustrated in Figure 4-9.

The project area will overlap **low to medium sensitivity areas**.

Table 4-1 Summary of habitat types delineated within field assessment area of project area

Habitat (Area)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	Very Low	Very High	Very Low
Disturbed Bushveld	Low	Low	Low	Medium	Low
Degraded Bushveld	Medium	Medium	Medium	Medium	Medium
Rocky Outcrops	Medium	Medium	Medium	Medium	Medium
Rocky Koppie	High	Medium	Medium	Low	High
Wetlands	High	Medium	Medium	Low	High

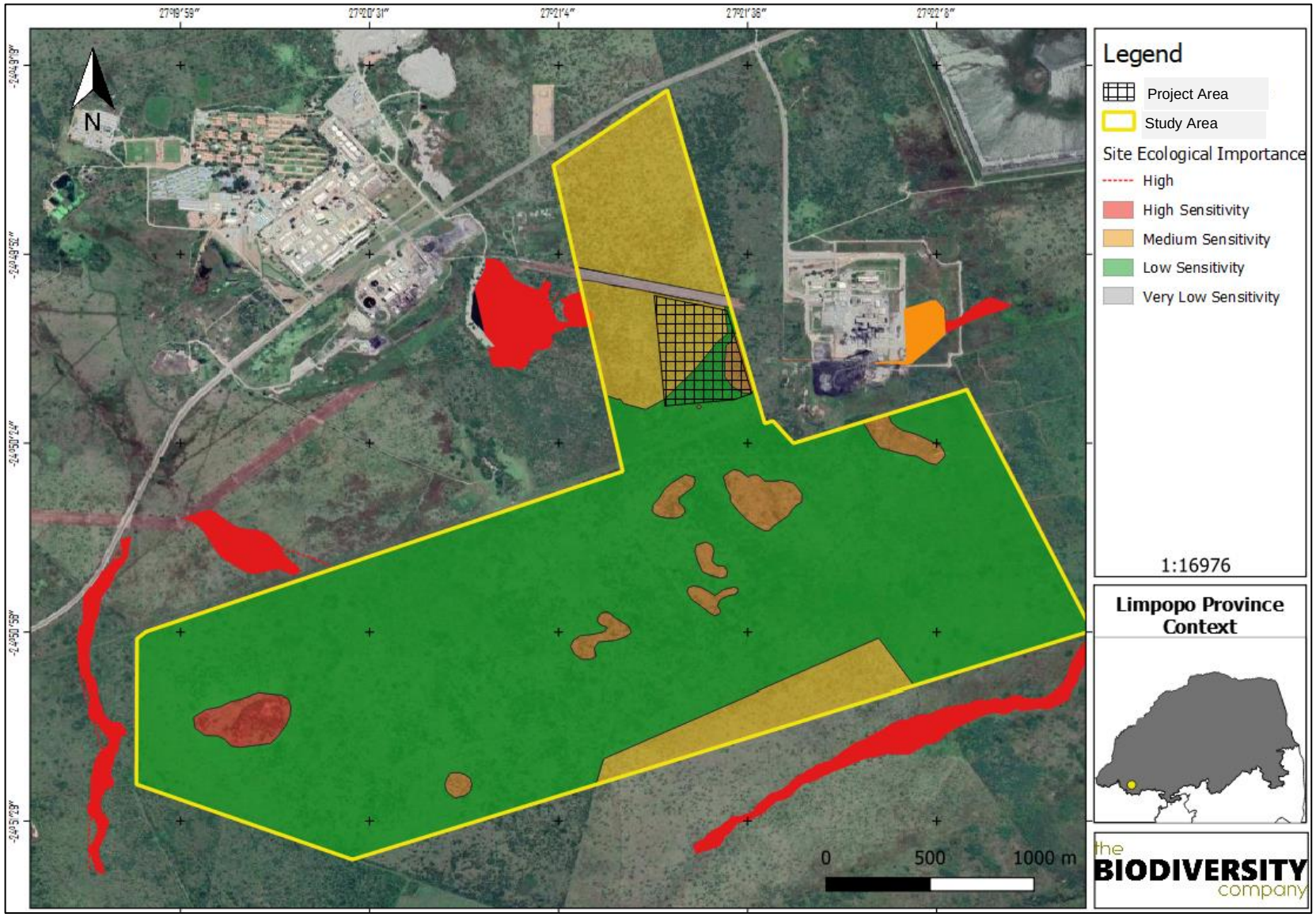

Figure 4-9 Sensitivity of the study area

5 Impact Risk Assessment

5.1 Biodiversity: Risk Assessment Method

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah. The assessment of the impact considers the following, the:

- Nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected;
- Extent of the impact, indicating whether the impact will be local or regional;
- Duration of the impact, very short-term duration (0-1 year), short-term duration (2-5 years), medium-term (5-15 years), long-term (> 15 years) or permanent;
- Probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable, probable, highly probable or definite;
- Severity/beneficial scale, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit); severe/beneficial (long-term impact that could be mitigated/long-term benefit); moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit); slight; or have no effect;
- Significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high;
- Status, which will be described as either positive, negative or neutral;
- Degree to which the impact can be reversed;
- Degree to which the impact may cause irreplaceable loss of resources; and
- Degree to which the impact can be mitigated.

5.1.1 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the study area. These include:

- Mining activities;
- Present energy distribution infrastructure, including powerlines;
- Wood harvesting;
- Historical cattle grazing land-use;
- Invasive species;
- Roads and associated vehicle traffic and road kills; and
- Fences.

Figure 5-1 Photographs illustrating impacts to biodiversity
A) Mining (Smelter), B) Road kills C) Wood harvesting D) Encroachment and exotic plant species infestation and E) Powerlines

5.1.2 Identification of Additional Potential Impacts

The potential impacts during the construction and operation phases of the project are presented in Table 5-1.

Table 5-1 Potential impacts to biodiversity associated with the proposed activity

Main Impact	Project activities that can cause loss/impacts to habitat (especially with regard to the proposed infrastructure areas):	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species.	Displacement/loss of flora & fauna (including possible SCC)
	Access roads and servitudes	Increased potential for soil erosion
	Soil dust precipitation	Habitat fragmentation
	Dumping of waste products	Increased potential for establishment of alien & invasive vegetation
	Random events such as fire (cooking fires or cigarettes)	Erosion
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including SCC)
	Vehicles potentially spreading seed	Spreading of potentially dangerous diseases due to invasive and pest species
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	Alteration of fauna assemblages due to habitat modification
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	
Main Impact	**Project activities that can cause direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Clearing of vegetation	Loss of habitat
		Loss of ecosystem services
	Roadkill due to vehicle collision	
	Pollution of water resources due to dust effects, chemical spills, etc.	Increase in rodent populations and associated disease risk
	Intentional killing of fauna for food (hunting)	
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4. Reduced dispersal/migration of fauna	Loss of landscape used as corridor	Reduced dispersal/migration of fauna
		Loss of ecosystem services
	Compacted roads	Reduced plant seed dispersal
	Removal of vegetation	
Main Impact	**Project activities that can cause pollution in watercourses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills	Pollution in watercourses and the surrounding environment
	Erosion	Faunal mortality (direct and indirectly)
		Groundwater pollution
		Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding,	Operation of machinery (Large earth moving machinery, vehicles)	Disruption/alteration of ecological life cycles due to noise

migration, feeding) due to noise, dust and light pollution.		Loss of ecosystem services
	Project activities that can cause disruption/alteration of ecological life cycles due to dust	Secondary impacts associated with disruption/alteration of ecological life cycles due to dust
	Vehicles	Loss of ecosystem services
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Loss of SCCs

5.1.3 Assessment of Impact Significance

The assessment of impact significance was undertaken in accordance with the method developed by Savannah. The various identified impacts are assessed below for the different phases of the development. The impacts assessed may be re-assessed if an exact infrastructure layout has been provided.

5.1.3.1 Construction Phase

The following potential main impacts on the biodiversity (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community (Table 5-2),
- Introduction of alien species, especially plants (Table 5-3;
- Destruction of protected plant species (Table 5-4); and
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) (Table 5-5).

Table 5-2 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Loss of vegetation within development footprint		
Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 5-3 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long-term broad scale. IAP infestation if not mitigated.		

Table 5-4 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Destruction of protected plant species		
Construction activity will likely lead to direct loss of protected tree species		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (52)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
N/A		

Table 5-5 Impacts to biodiversity associated with the proposed construction phase.

Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance

Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Short term (2)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

5.1.3.2 Operation Phase

The operational phase of the impact of daily activities is anticipated to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance and mining vehicles don't only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems (Table 5-6);
- Spread of alien and/or invasive species (Table 5-7);
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration) (Table 5-8).

Table 5-6 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (2)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems	
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.	
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.
Mitigation:	
See Biodiversity Management Outcomes	
Residual Impacts	
There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.	

Table 5-7 Impacts to biodiversity associated with the proposed operational phase.

Impact Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long term broad scale IAP infestation if not mitigated.		

Table 5-8 Impacts to biodiversity associated with the proposed operational phase

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	**With Mitigation**
Extent	Low (2)	Very low (1)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (42)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration	
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.	
Can impacts be mitigated?	Yes
Mitigation:	
See Biodiversity Management Outcomes	
Residual Impacts	
Disturbance from maintenance activities will occur albeit at a low and infrequent level.	

5.1.3.3 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

Impact Nature: Cumulative habitat loss within the region		
The development of the proposed infrastructure will contribute to cumulative habitat loss within ESAs and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Moderate (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly probable (4)
Significance	**Medium (30)**	**Medium (52)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation:		
• Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

5.1.4 Biodiversity Management Outcomes

The purpose of the management outcomes is to allow for the mitigation measures associated with the impact assessment to be incorporated into the EMPr. These are provided in Table 5-9.

Table 5-9 Mitigation measures including requirements for timeframes, roles and responsibilities for this report

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Areas rated as High sensitivity in proximity to the development areas, should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to this area from construction workers, machinery. The infrastructure should be realigned to prioritise development within very low/low sensitivity areas. Mitigated development in Moderate sensitivity areas is permissible. High sensitivity areas are to be avoided.	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further than that proposed for the project. 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 very low/ 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 under powerline and in SS 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 may occur 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

Storm Water run-off & Discharge Water Quality monitoring	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 prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
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
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
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, to respect all forms of wildlife. 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.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
Any excavations or holes must be conducted in a progressive manner. • Should the holes/excavations stay open overnight they must be covered temporarily, to ensure no small fauna species fall in.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
A qualified environmental control officer must be on site when construction begins. The area must be walked though prior to construction, to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase

Heat generated from the substation must be monitored to ensure it does not negatively affect the local fauna	Life of operation	Environmental Officer & Contractor	Heat generated by substations	Ongoing
Management outcome: Alien Vegetation and fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
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	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used, as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.
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 adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. • Refuse bins will be emptied and secured; • Temporary storage of domestic waste shall be in covered waste skips; and • Maximum domestic waste storage period will be 10 days.	Construction Phase	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
Toilets at the recommended Health and Safety standards must be provided. These should be emptied twice a day, to prevent staff from using the surrounding vegetation.	Construction Phase	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. Under no circumstances may domestic waste be burned on site	Construction Phase	Environmental Officer & Health and Safety Officer	Availability of bins and the collection 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 10 days.	Construction Phase	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing
Suitable temporary solid waste facilities are to be incorporated into the design to prevent unsanitary conditions. These are to be cleared weekly and waste collected by the local waste management department. The residents must be encouraged to recycle.	Operational Phase	Project manager	Management of bins and collection of waste	Ongoing

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. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance; and biology, habitat requirements and management requirements in the EA and EMPr. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.	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. • Reducing the dust generated by the listed activities above, especially the earthmoving machinery, through wetting the soil surface; putting up signs to enforce speed limit; and speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
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

5.2 Wetland Risk Assessment

The wetland assessment has been completed in accordance with the requirements of the published GN 509 that was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016. The GN 509 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a GA, as opposed to a full WULA.

The risks posed by the proposed development to wetlands within the project areas are provided in Table 5-10 for scenarios with and without mitigation. Three levels of risk have been identified and determined for the overall risk assessment, these include low, medium and high risk.

High risks are not applicable, as wetlands will not be directly impacted on by the proposed project. Medium risk refers to wetland areas that are within the 500 m regulated area and possibly at an indirect risk.

Low risks are wetland systems beyond the project area that would be avoided, or wetland areas that could be avoided if feasible.

Figure 5-2 presents the location of the project area / development footprint area and a 22 m buffer, depicting the avoidance of direct impacts to wetlands. The nearest wetland unit is HGM 3, which is approximately 300 m west of the project area. The medium risks were the priority for the risk assessment, focussing on the expected potential for these indirect risks. The significance of all post-mitigation risks was determined to be low.

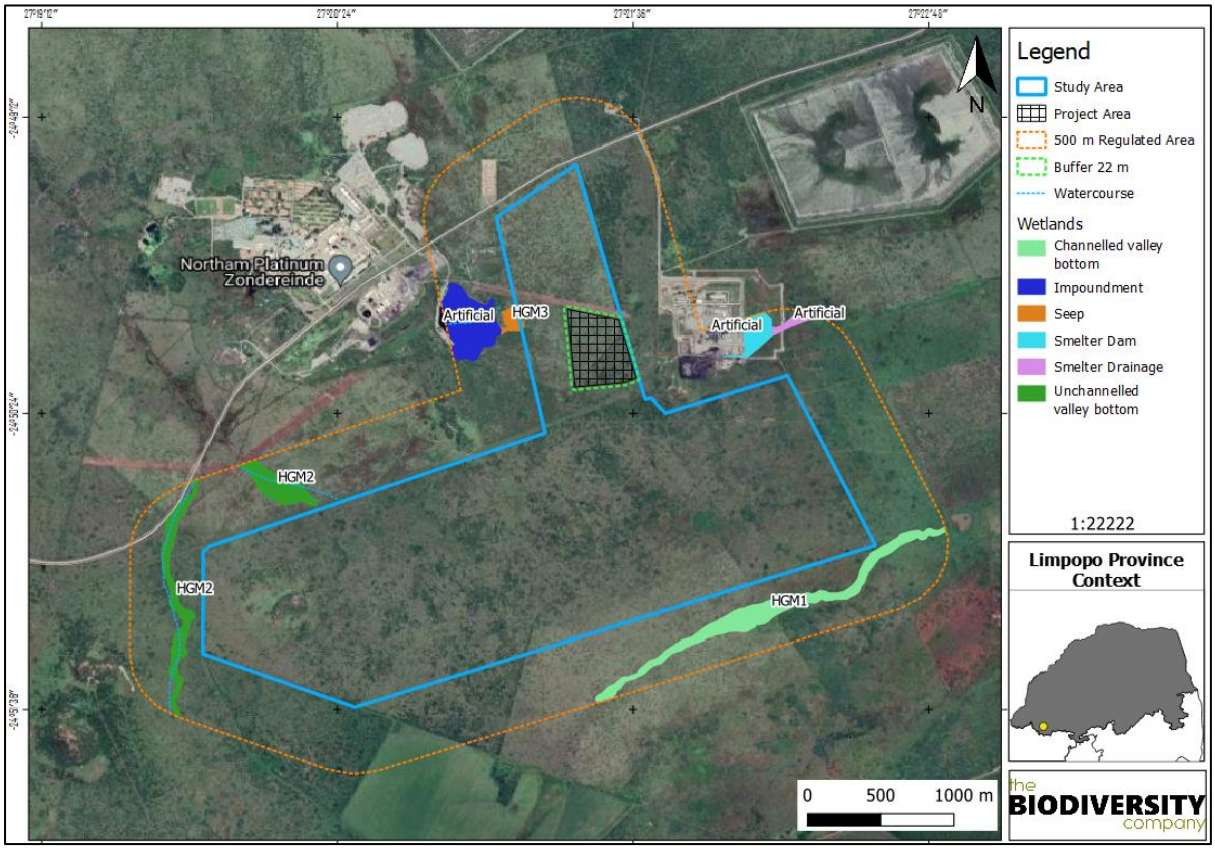

Figure 5-2 The development footprint and associated 22 m buffer area

Table 5-10 DWS Risk Impact Matrix for the proposed development (Andrew Husted Pr Sci Nat 400213/11)

Activity	Aspect	Impact	Severity: Mitigation	Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
Construction																			
Site clearing and preparation.	Wetland disturbance / loss.	Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility.	Without	2	2	3	2	2.3	2	3	7.3	3	4	1	1	9	65	**M**	• Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 25 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions and the overall master plan. • All activities (including driving) must adhere to the 22 m buffer area. • Promptly remove / control all IAP species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • All IAP along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the CARA and IAP regulations. • Landscape and re-vegetate all denuded areas as soon as possible.
			With	1	1	2	1	1.3	2	3	6.3	3	3	1	1	8	50	**L**	
	Water runoff from construction site.	Increased erosion and sedimentation.	Without	2	2	2	2	2	2	3	7	3	3	1	2	9	63	**M**	• Limit construction activities near (< 50m) HGM 3 to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland. Activities in black turf soils can become messy during the height of the rainy season and construction activities should be minimised during these times, to avoid unnecessary soil disturbances.

Activity	Aspect	Impact	Mitigation	Severity: Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
			With	2	3	1	1	1.8	2	2	5.8	3	2	1	1	7	40	L	• Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.
		Potential contamination of wetlands with machine oils and construction materials.	Without	1	2	2	2	1.8	1	2	4.8	3	3	1	2	9	43	L	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. • No activities are permitted within the wetland and associated buffer areas.
			With	1	1	1	1	1	1	2	4	1	2	1	2	6	24	L	
Operation																			
Operation of the solar facility.	Hardened surfaces.	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Without	2	2	2	2	2	3	2	7	3	3	1	2	9	63	M	• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels. • Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site, each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible. • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for
			With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	

Activity	Aspect	Impact	Severity: Mitigation	Flow Regime	Water Quality	Habitat	Biota	Total	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
																			infiltration. If not feasible then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels.
	Contamination.	Potential for increased contaminants entering the wetland systems.	Without	2	1	2	2	1.8	3	2	6.8	3	3	1	2	9	61	M	• Where possible, minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used, do so well prior to any significant predicted rainfall events.
			With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	
Closure																			
Decommissioning of the solar facility.	Rehabilitation.	Potential degradation of nearby wetlands through inappropriate closure.	Without	2	1	2	2	1.8	2	3	6.8	3	3	1	1	8	54	M	• Develop and implement a rehabilitation and closure plan. • Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species.
			With	1	1	1	1	1	2	2	5	1	2	1	1	5	25	L	

5.3 Wetland Impact Assessment

5.3.1 Assessment of Impact Significance

The assessment of impact significance was undertaken in accordance with the method developed by Savannah. The various identified impacts are assessed below for the different phases of the project. The impacts assessed may be re-assessed if an exact infrastructure layout has been provided.

5.3.1.1 Construction Phase

The following potential main impacts on the wetlands were considered for the construction phase of the proposed project. This phase refers to the period during construction when the proposed features are constructed. The following potential impacts during site clearing and preparation were considered:

- Wetland disturbance / loss.
    - Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility. (Table 5-11); and
- Water runoff from construction site;
    - Increased erosion and sedimentation. (Table 5-12).

Table 5-11 Impacts to wetlands associated with the proposed construction phase.

Impact Nature: Wetland disturbance / loss		
Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	**Low**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, avoidance of wetlands is possible.	
Mitigation:		
• Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 25 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions and the overall master plan. • All activities (including driving) must adhere to the 22 m buffer area. • Promptly remove / control all AIPs that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • All alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the CARA and IAP regulations. • Landscape and re-vegetate all denuded areas as soon as possible.		

Residual Impacts:
The loss of wetlands directly is unexpected, as no wetlands overlap with the development area. The residual impact would be low.

Table 5-12 Impacts to wetlands associated with the proposed construction phase.

Impact Nature: Water runoff from construction site		
Increased erosion and sedimentation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Limit construction activities near (< 50m) of HGM 3 to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland. Activities in black turf soils can become messy during the height of the rainy season and construction activities should be minimised during these times to avoid unnecessary soil disturbances. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.		
Residual Impacts:		
Long term broad scale erosion and sedimentation		

5.3.1.2 Operation Phase

The operational phase refers to the phase when the construction has been completed and the infrastructure is functional. It is anticipated to increase stormwater runoff due to the hardened surfaces or potentially contaminate any wetland systems, particularly the system 300 m west of the proposed project area.

The following potential impacts were considered:

- Hardened surfaces;
    - Potential for increased stormwater runoff, leading to increased erosion and sedimentation (Table 5-13); and
- Contamination;
    - Potential for increased contaminants entering the wetland systems (Table 5-14).

Table 5-13 Impacts to wetlands associated with the proposed operational phase

Impact Nature: Hardened surfaces		
Potential for increased stormwater runoff leading to increased erosion and sedimentation		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (2)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels. • Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site, each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible. • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible, then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels.		
Residual Impacts		
Long-term broad scale erosion and sedimentation		

Table 5-14 Impacts to wetlands associated with the proposed operational phase.

Impact Nature: Contamination		
Potential for increased contaminants entering the wetland systems		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative

Impact Nature: Contamination		
Potential for increased contaminants entering the wetland systems		
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Where possible, minimise the use of surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used, do so well prior to any significant predicted rainfall events.		
Residual Impacts:		
Wetland deterioration over time		

5.3.1.3 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general wetland loss and transformation resulting from other activities in the area. The expected post-mitigation risk significance is expected to be low, and the overall cumulative impact is therefore expected to be low.

6 Conclusion and Impact Statement

6.1 Conclusion

6.1.1 Terrestrial Biodiversity

The study area has been altered both currently and historically. The present land use had a direct impact on both the fauna and the flora in the area, which is evident in the disturbed and transformed habitats. Historically, overgrazing from cattle and mismanagement has led to the deterioration of most of the area to a disturbed Bushveld that is either encroached upon or invaded by exotic plant species. However, the degraded Bushveld habitat and rocky outcrop in the project area and the rocky koppie and wetlands/watercourses in the wider study area can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by development.

The Bushveld habitat and rocky outcrop in the project area have a **Medium significance**.

The habitat sensitivity of the rocky koppie habitat and wetland/water resources is regarded as high, due to the species recorded and the role of this intact unique habitat to biodiversity within a very fragmented local landscape, not to mention the sensitivity according to various ecological datasets. The high sensitivity terrestrial areas still:

- Support nearby ESA's as per the LCP; and
- Support various organisms and may play an important role in the ecosystem, if left to recover from the superficial impacts.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project.

Any development in high sensitivity areas must be avoided, which will occur with the selection of the project area. Development within the degraded Bushveld and rocky outcrop within the project area (both medium sensitivity) will lead the direct destruction and loss of functional habitats; and the faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near

natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigation measures, management and associated monitoring regarding the expected impacts will be the most important factor of this project and must be considered by the issuing authority.

6.1.2 Wetlands

In total six (6) water resources were identified and delineated within the wider study area. These comprised both natural and artificial systems, with the artificial systems comprising of an impoundment and a dam and drainage feature associated with the smelter.

One (1) natural wetland hydrogeomorphic unit HGM 3 was identified within the 500 m regulated area for the project area.

Overall, HGM 3 scored **Intermediate** in terms of its wetland ecosystem services and is considered relatively important for regulating and supporting benefits. The wetland is considered highly important in terms of its direct provisioning of harvestable resources and cultivated foods for humans as the systems are actively cultivated. The integrity (or health) for HGM 3 was rated as in a **Moderately Modified** state (class: C). The EIS of HGM 3 was determined to be Moderate for the HGM 3 respectively.

A 22 m buffer width was recommended for the project. All identified wetland HGM units for the study area were classified as having a High sensitivity while their associated 22 m buffers were assigned a Medium sensitivity.

A risk assessment was conducted in line with Sections 21 (c) and (i) of the NWA. High risks are not applicable, as wetlands will not be directly impacted on by the proposed project. The nearest wetland (HGM 3) is approximately 300 m west of the project site. The significance of all post-mitigation risks was determined to be low.

6.2 Impact Statement

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

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- 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 but there is still a possibility of impacts. Considering that this area that has been identified as being of significance for biodiversity maintenance and ecological processes (ESAs), development may proceed but with caution and only with the implementation of mitigation measures.

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.

In terms of water use authorisation, owing to the expected post-mitigation Low risks, a General Authorisation is permissible for the project.

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8 Appendix Items

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

Family	Taxon	Author	IUCN	Ecology
Malvaceae	*Abutilon angulatum var. angulatum*	(Guill. & Perr.) Mast.	NE	Indigenous
Malvaceae	*Abutilon austro-africanum*	Hochr.	LC	Indigenous
Euphorbiaceae	*Acalypha villicaulis*	Hochst.	LC	Indigenous
Pteridaceae	*Actiniopteris dimorpha subsp. dimorpha*	Pic.Serm.	LC	Indigenous
Turneraceae	*Afroqueta capensis*	(Harv.) Thulin & Razafim.	LC	Indigenous
Rubiaceae	*Agathisanthemum bojeri subsp. bojeri*	Klotzsch	LC	Indigenous
Loranthaceae	*Agelanthus natalitius subsp. zeyheri*	(Meisn.) Polhill & Wiens	LC	Indigenous
Orobanchaceae	*Alectra orobanchoides*	Benth.	LC	Indigenous
Asphodelaceae	*Aloe ammophila*	Reynolds	LC	Indigenous; Endemic
Apocynaceae	*Ancylobothrys capensis*	(Oliv.) Pichon	LC	Indigenous
Poaceae	*Andropogon chinensis*	(Nees) Merr.	LC	Indigenous
Poaceae	*Andropogon fastigiatus*	Sw.	LC	Indigenous
Poaceae	*Anthephora pubescens*	Nees	LC	Indigenous
Melastomataceae	*Antherotoma debilis*	(Sond.) Jacq.-Fel.	LC	Indigenous
Menispermaceae	*Antizoma angustifolia*	(Burch.) Miers ex Harv.	LC	Indigenous
Icacinaceae	*Apodytes dimidiata subsp. dimidiata*	E.Mey. ex Arn.	LC	Indigenous
Scrophulariaceae	*Aptosimum indivisum*	Burch. ex Benth.	LC	Indigenous
Poaceae	*Aristida adscensionis*	L.	LC	Indigenous
Poaceae	*Aristida congesta subsp. barbicollis*	Roem. & Schult.	LC	Indigenous
Poaceae	*Aristida meridionalis*	Henrard	LC	Indigenous
Poaceae	*Aristida scabrivalvis subsp. scabrivalvis*	Hack.	LC	Indigenous
Poaceae	*Aristida spectabilis*	Hack.	LC	Indigenous
Poaceae	*Aristida stipitata subsp. graciliflora*	Hack.	LC	Indigenous
Asparagaceae	*Asparagus cooperi*	Baker	LC	Indigenous
Asteraceae	*Aspilia mossambicensis*	(Oliv.) Wild	LC	Indigenous
Pottiaceae	*Barbula eubryum*	Mull.Hal.		Indigenous
Acanthaceae	*Barleria bremekampii*	Oberm.	LC	Indigenous
Acanthaceae	*Barleria crossandriformis*	C.B.Clarke	LC	Indigenous
Acanthaceae	*Barleria macrostegia*	Nees	LC	Indigenous
Acanthaceae	*Barleria pretoriensis*	C.B.Clarke	LC	Indigenous
Asteraceae	*Berkheya carlinopsis subsp. magalismontana*	Welw. ex O.Hoffm.	LC	Indigenous; Endemic
Poaceae	*Bewsia biflora*	(Hack. ex Schinz) Gooss.	LC	Indigenous
Acanthaceae	*Blepharis integrifolia var. integrifolia*	(L.f.) E.Mey. ex Schinz	LC	Indigenous
Capparaceae	*Boscia albitrunca*	(Burch.) Gilg & Gilg-Ben.	LC	Indigenous
Poaceae	*Bothriochloa bladhii*	(Retz.) S.T.Blake	LC	Indigenous
Poaceae	*Brachiaria brizantha*	(A.Rich.) Stapf	LC	Indigenous
Poaceae	*Brachiaria deflexa*	(Schumach.) C.E.Hubb. ex Robyns	LC	Indigenous
Poaceae	*Brachiaria eruciformis*	(Sm.) Griseb.	LC	Indigenous

Poaceae	*Brachiaria nigropedata*	(Ficalho & Hiern) Stapf	LC	Indigenous
Asteraceae	*Brachylaena rotundata*	S.Moore	LC	Indigenous
Bryaceae	*Brachymenium acuminatum*	Harv.		Indigenous
Bryaceae	*Bryum dichotomum*	Hedw.		Indigenous
Scrophulariaceae	*Buddleja salviifolia*	(L.) Lam.	LC	Indigenous
Asphodelaceae	*Bulbine angustifolia*	Poelln.	LC	Indigenous
Cyperaceae	*Bulbostylis burchellii*	(Ficalho & Hiern) C.B.Clarke	LC	Indigenous
Cyperaceae	*Bulbostylis hispidula subsp. pyriformis*	(Vahl) R.W.Haines	LC	Indigenous
Cyperaceae	*Bulbostylis humilis*	(Kunth) C.B.Clarke	LC	Indigenous
Fabaceae	*Burkea africana*	Hook.	LC	Indigenous
Buxaceae	*Buxus macowanii*	Oliv.	LC	Indigenous; Endemic
Capparaceae	*Cadaba termitaria*	N.E.Br.	LC	Indigenous
Rutaceae	*Calodendrum capense*	(L.f.) Thunb.	LC	Indigenous
Fabaceae	*Calpurnia aurea subsp. aurea*	(Aiton) Benth.	LC	Indigenous
Leucobryaceae	*Campylopus introflexus*	(Hedw.) Brid.		Indigenous
Leucobryaceae	*Campylopus savannarum*	(Mull.Hal.) Mitt.		Indigenous
Cyperaceae	*Carex spicatopaniculata*	Boeckeler ex C.B.Clarke	LC	Indigenous
Apocynaceae	*Carissa bispinosa*	(L.) Desf. ex Brenan	LC	Indigenous
Poaceae	*Cenchrus ciliaris*	L.	LC	Indigenous
Ditrichaceae	*Ceratodon purpureus subsp. stenocarpus*	(Hedw.) Brid.		Indigenous
Pedaliaceae	*Ceratotheca triloba*	(Bernh.) Hook.f.	LC	Indigenous
Fabaceae	*Chamaecrista absus*	(L.) H.S.Irwin & Barneby	LC	Indigenous
Verbenaceae	*Chascanum hederaceum var. hederaceum*	(Sond.) Moldenke	LC	Indigenous
Pteridaceae	*Cheilanthes hirta var. brevipilosa*	Sw.	LC	Indigenous
Pteridaceae	*Cheilanthes hirta var. brevipilosa*	Sw.		Indigenous
Pteridaceae	*Cheilanthes nielsii*	W.Jacobsen	LC	Indigenous
Pteridaceae	*Cheilanthes parviloba*	(Sw.) Sw.	LC	Indigenous
Pteridaceae	*Cheilanthes viridis var. glauca*	(Forssk.) Sw.	LC	Indigenous
Poaceae	*Chloris virgata*	Sw.	LC	Indigenous
Agavaceae	*Chlorophytum recurvifolium*	(Baker) C.Archer & Kativu	LC	Indigenous
Poaceae	*Chrysopogon serrulatus*	Trin.	LC	Indigenous
Cleomaceae	*Cleome maculata*	(Sond.) Szyszyl.	LC	Indigenous
Cleomaceae	*Cleome monophylla*	L.	LC	Indigenous
Cleomaceae	*Cleome rubella*	Burch.	LC	Indigenous
Lamiaceae	*Clerodendrum ternatum*	Schinz	LC	Indigenous
Rosaceae	*Cliffortia linearifolia*	Eckl. & Zeyh.	LC	Indigenous
Peraceae	*Clutia natalensis*	Bernh.	LC	Indigenous
Cucurbitaceae	*Coccinia hirtella*	Cogn.	LC	Indigenous
Cucurbitaceae	*Coccinia rehmannii*	Cogn.	LC	Indigenous
Cucurbitaceae	*Coccinia sessilifolia*	(Sond.) Cogn.	LC	Indigenous
Combretaceae	*Combretum apiculatum subsp. apiculatum*	Sond.	LC	Indigenous
Combretaceae	*Combretum hereroense*	Schinz		Indigenous
Combretaceae	*Combretum imberbe*	Wawra	LC	Indigenous

Combretaceae	*Combretum moggii*	Exell	LC	Indigenous; Endemic
Combretaceae	*Combretum molle*	R.Br. ex G.Don	LC	Indigenous
Combretaceae	*Combretum zeyheri*	Sond.	LC	Indigenous
Commelinaceae	*Commelina africana var. krebsiana*	L.	LC	Indigenous
Commelinaceae	*Commelina africana var. lancispatha*	L.	LC	Indigenous
Commelinaceae	*Commelina benghalensis*	L.	LC	Indigenous
Commelinaceae	*Commelina modesta*	Oberm.	LC	Indigenous
Commelinaceae	*Commelina subulata*	Roth	LC	Indigenous
Burseraceae	*Commiphora mollis*	(Oliv.) Engl.	LC	Indigenous
Rubiaceae	*Coptosperma supra-axillare*	(Hemsl.) Degreef	LC	Indigenous
Malvaceae	*Corchorus asplenifolius*	Burch.	LC	Indigenous
Malvaceae	*Corchorus tridens*	L.	NE	Not indigenous; Naturalised
Acanthaceae	*Crabbea angustifolia*	Nees	LC	Indigenous; Endemic
Acanthaceae	*Crabbea hirsuta*	Harv.	LC	Indigenous
Amaryllidaceae	*Crinum crassicaule*	Baker	LC	Indigenous
Acanthaceae	*Crossandra greenstockii*	S.Moore	LC	Indigenous
Acanthaceae	*Crossandra zuluensis*	W.T.Vos & T.J.Edwards	LC	Indigenous
Fabaceae	*Crotalaria laburnifolia subsp. australis*	L.	LC	Indigenous
Fabaceae	*Crotalaria sphaerocarpa subsp. sphaerocarpa*	Perr. ex DC.	LC	Indigenous
Euphorbiaceae	*Croton gratissimus var. subgratissimus*	Burch.	LC	Indigenous
Euphorbiaceae	*Croton megalobotrys*	Mull.Arg.	LC	Indigenous
Apocynaceae	*Cryptolepis oblongifolia*	(Meisn.) Schltr.	LC	Indigenous
Cucurbitaceae	*Cucumis hirsutus*	Sond.	LC	Indigenous
Convolvulaceae	*Cuscuta campestris*	Yunck.		Not indigenous; Naturalised; Invasive
Araliaceae	*Cussonia spicata*	Thunb.	LC	Indigenous
Orobanchaceae	*Cycnium tubulosum*	(L.f.) Engl.		Indigenous
Poaceae	*Cymbopogon caesius*	(Hook. & Arn.) Stapf	LC	Indigenous
Poaceae	*Cymbopogon pospischilii*	(K.Schum.) C.E.Hubb.	NE	Indigenous
Poaceae	*Cymbopogon sp.*			
Cyperaceae	*Cyperus albostriatus*	Schrad.	LC	Indigenous
Cyperaceae	*Cyperus austro-africanus*	C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	*Cyperus decurvatus*	(C.B.Clarke) C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	*Cyperus difformis*	L.	LC	Indigenous
Cyperaceae	*Cyperus digitatus subsp. auricomus*	Roxb.	LC	Indigenous
Cyperaceae	*Cyperus fulgens*	C.B.Clarke	LC	Indigenous
Cyperaceae	*Cyperus margaritaceus var. margaritaceus*	Vahl	LC	Indigenous
Cyperaceae	*Cyperus rupestris var. rupestris*	Kunth	LC	Indigenous
Cyperaceae	*Cyperus sexangularis*	Nees	LC	Indigenous
Cyperaceae	*Cyperus turrillii*	Kuk.	LC	Indigenous
Amaranthaceae	*Cyphocarpa angustifolia*	(Moq.) Lopr.	LC	Indigenous

Vitaceae	*Cyphostemma cirrhosum subsp. transvaalense*	(Thunb.) Desc. ex Wild & R.B.Drumm.	LC	Indigenous
Vitaceae	*Cyphostemma lanigerum*	(Harv.) Desc. ex Wild & R.B.Drumm.	LC	Indigenous
Vitaceae	*Cyphostemma sulcatum*	(C.A.Sm.) J.J.M.van der Merwe	LC	Indigenous; Endemic
Poaceae	*Dactyloctenium aegyptium*	(L.) Willd.	LC	Indigenous
Euphorbiaceae	*Dalechampia capensis*	A.Spreng.	LC	Indigenous
Poaceae	*Dichanthium annulatum var. papillosum*	(Forssk.) Stapf	LC	Indigenous
Fabaceae	*Dichrostachys cinerea subsp. africana*	(L.) Wight & Arn.	NE	Indigenous
Acanthaceae	*Dicliptera minor subsp. minor*	C.B.Clarke	LC	Indigenous
Asteraceae	*Dicoma anomala subsp. gerrardii*	Sond.	LC	Indigenous
Poaceae	*Digitaria diagonalis var. diagonalis*	(Nees) Stapf	LC	Indigenous
Poaceae	*Digitaria eriantha*	Steud.	LC	Indigenous
Poaceae	*Digitaria ternata*	(A.Rich.) Stapf	LC	Indigenous
Poaceae	*Digitaria velutina*	(Forssk.) P.Beauv.	LC	Indigenous
Poaceae	*Diheteropogon amplectens var. amplectens*	(Nees) Clayton	LC	Indigenous
Poaceae	*Dinebra retroflexa var. condensata*	(Vahl) Panz.	LC	Indigenous
Ebenaceae	*Diospyros lycioides subsp. lycioides*	Desf.	LC	Indigenous
Ebenaceae	*Diospyros whyteana*	(Hiern) F.White	LC	Indigenous
Hyacinthaceae	*Dipcadi viride*	(L.) Moench	LC	Indigenous
Apocynaceae	*Diplorhynchus condylocarpon*	(Mull.Arg.) Pichon	LC	Indigenous
Sapindaceae	*Dodonaea viscosa var. angustifolia*	Jacq.	LC	Indigenous
Asteraceae	*Doellia cafra*	(DC.) Anderb.	LC	Indigenous
Hyacinthaceae	*Drimia elata*	Jacq. ex Willd.	DD	Indigenous
Verbenaceae	*Duranta erecta*	L.		Not indigenous; Naturalised; Invasive
Acanthaceae	*Dyschoriste transvaalensis*	C.B.Clarke	LC	Indigenous
Poaceae	*Echinochloa crus-galli*	(L.) P.Beauv.	LC	Indigenous
Poaceae	*Echinochloa holubii*	(Stapf) Stapf	LC	Indigenous
Fabaceae	*Elephantorrhiza burkei*	Benth.	LC	Indigenous
Poaceae	*Eleusine coracana subsp. africana*	(L.) Gaertn.	LC	Indigenous
Poaceae	*Elionurus muticus*	(Spreng.) Kunth	LC	Indigenous
Rubiaceae	*Empogona lanceolata*	(Sond.) Tosh & Robbr.		Indigenous
Poaceae	*Enneapogon cenchroides*	(Licht. ex Roem. & Schult.) C.E.Hubb.	LC	Indigenous
Poaceae	*Enneapogon pretoriensis*	Stent	LC	Indigenous
Poaceae	*Enneapogon scoparius*	Stapf	LC	Indigenous
Poaceae	*Enteropogon macrostachyus*	(Hochst. ex A.Rich.) Munro ex Benth.	LC	Indigenous
Poaceae	*Eragrostis aspera*	(Jacq.) Nees	LC	Indigenous
Poaceae	*Eragrostis barbinodis*	Hack.	LC	Indigenous
Poaceae	*Eragrostis biflora*	Hack. ex Schinz	LC	Indigenous
Poaceae	*Eragrostis chloromelas*	Steud.	LC	Indigenous
Poaceae	*Eragrostis cilianensis*	(All.) Vignolo ex Janch.	LC	Indigenous
Poaceae	*Eragrostis curvula*	(Schrad.) Nees	LC	Indigenous
Poaceae	*Eragrostis gummiflua*	Nees	LC	Indigenous
Poaceae	*Eragrostis hierniana*	Rendle	LC	Indigenous

Poaceae	*Eragrostis nindensis*	Ficalho & Hiern	LC	Indigenous
Poaceae	*Eragrostis pallens*	Hack.	LC	Indigenous
Poaceae	*Eragrostis planiculmis*	Nees	LC	Indigenous
Poaceae	*Eragrostis rigidior*	Pilg.	LC	Indigenous
Poaceae	*Eragrostis superba*	Peyr.	LC	Indigenous
Poaceae	*Eragrostis trichophora*	Coss. & Durieu	LC	Indigenous
Poaceae	*Eriochloa fatmensis*	(Hochst. & Steud.) Clayton	LC	Indigenous
Fabaceae	*Eriosema nutans*	Schinz	LC	Indigenous
Ruscaceae	*Eriospermum flagelliforme*	(Baker) J.C.Manning	LC	Indigenous
Ruscaceae	*Eriospermum porphyrovalve*	Baker	LC	Indigenous
Sapindaceae	*Erythrophysa transvaalensis*	I.Verd.	LC	Indigenous
Erythroxylaceae	*Erythroxylum emarginatum*	Thonn.	LC	Indigenous
Ebenaceae	*Euclea crispa subsp. crispa*	(Thunb.) Gurke	LC	Indigenous
Ebenaceae	*Euclea linearis*	Zeyh. ex Hiern	LC	Indigenous
Ebenaceae	*Euclea natalensis subsp. angustifolia*	A.DC.	LC	Indigenous
Ebenaceae	*Euclea undulata*	Thunb.	LC	Indigenous
Euphorbiaceae	*Euphorbia duseimata*	R.A.Dyer	LC	Indigenous
Euphorbiaceae	*Euphorbia neopolycnemoides*	Pax & K.Hoffm.	LC	Indigenous
Euphorbiaceae	*Euphorbia schinzii*	Pax	LC	Indigenous
Euphorbiaceae	*Euphorbia trichadenia*	Pax		Indigenous
Poaceae	*Eustachys paspaloides*	(Vahl) Lanza & Mattei	LC	Indigenous
Convolvulaceae	*Evolvulus alsinoides*	(L.) L.	LC	Indigenous
Rubiaceae	*Fadogia homblei*	De Wild.	LC	Indigenous
Proteaceae	*Faurea saligna*	Harv.	LC	Indigenous
Moraceae	*Ficus glumosa*	Delile	LC	Indigenous
Moraceae	*Ficus salicifolia*	Vahl	LC	Indigenous
Cyperaceae	*Fimbristylis dichotoma subsp. dichotoma*	(L.) Vahl	LC	Indigenous
Fissidentaceae	*Fissidens rufescens*	Hornsch.		Indigenous
Salicaceae	*Flacourtia indica*	(Burm.f.) Merr.	LC	Indigenous
Scrophulariaceae	*Freylinia tropica*	S.Moore	LC	Indigenous
Rubiaceae	*Gardenia volkensii subsp. spatulifolia*	K.Schum.	LC	Indigenous
Asteraceae	*Geigeria burkei subsp. burkei*	Harv.	NE	Indigenous
Asteraceae	*Geigeria burkei subsp. fruticulosa*	Harv.	LC	Indigenous
Asteraceae	*Geigeria elongata*	Alston	LC	Indigenous; Endemic
Iridaceae	*Gladiolus elliotii*	Baker	LC	Indigenous
Iridaceae	*Gladiolus oatesii*	Rolfe	LC	Indigenous
Iridaceae	*Gladiolus permeabilis subsp. edulis*	D.Delaroche	LC	Indigenous
Iridaceae	*Gladiolus sericeovillosus subsp. calvatus*	Hook.f.	LC	Indigenous
Colchicaceae	*Gloriosa rigidifolia*	(Bredell) J.C.Manning & Vinn.	LC	Indigenous; Endemic
Apocynaceae	*Gomphocarpus tomentosus subsp. tomentosus*	Burch.	LC	Indigenous
Malvaceae	*Grewia bicolor var. bicolor*	Juss.	LC	Indigenous
Malvaceae	*Grewia flava*	DC.	LC	Indigenous

Malvaceae	*Grewia subspathulata*	N.E.Br.	LC	Indigenous
Amaranthaceae	*Guilleminea densa*	(Humb. & Bonpl. ex Schult.) Moq.		Not indigenous; Naturalised; Invasive
Celastraceae	*Gymnosporia polyacantha subsp. vaccinifolia*	Szyszyl.	LC	Indigenous; Endemic
Celastraceae	*Gymnosporia tenuispina*	(Sond.) Szyszyl.	LC	Indigenous
Orchidaceae	*Habenaria filicornis*	Lindl.	LC	Indigenous
Pedaliaceae	*Harpagophytum zeyheri subsp. zeyheri*	Decne.	LC	Indigenous
Asteraceae	*Helichrysum aureonitens*	Sch.Bip.	LC	Indigenous
Asteraceae	*Helichrysum chionosphaerum*	DC.	LC	Indigenous
Asteraceae	*Helichrysum nudifolium var. nudifolium*	(L.) Less.	LC	Indigenous
Malvaceae	*Hermannia burkei*	Burtt Davy	LC	Indigenous
Malvaceae	*Hermannia depressa*	N.E.Br.	LC	Indigenous
Malvaceae	*Hermannia parvula*	Burtt Davy	LC	Indigenous
Malvaceae	*Hermannia stellulata*	(Harv.) K.Schum.	LC	Indigenous
Malvaceae	*Hermannia tomentosa*	(Turcz.) Schinz ex Engl.	LC	Indigenous
Malvaceae	*Hermannia umbratica*	I.Verd.	LC	Indigenous; Endemic
Amaranthaceae	*Hermbstaedtia odorata var. albi-rosea*	(Burch.) T.Cooke	NE	Indigenous
Amaranthaceae	*Hermbstaedtia odorata var. odorata*	(Burch.) T.Cooke	NE	Indigenous
Poaceae	*Heteropogon contortus*	(L.) Roem. & Schult.	LC	Indigenous
Heteropyxidaceae	*Heteropyxis natalensis*	Harv.	LC	Indigenous
Annonaceae	*Hexalobus monopetalus var. monopetalus*	(A.Rich.) Engl. & Diels	LC	Indigenous
Malvaceae	*Hibiscus aethiopicus var. ovatus*	L.	LC	Indigenous
Malvaceae	*Hibiscus marlothianus*	K.Schum.	LC	Indigenous; Endemic
Malvaceae	*Hibiscus meyeri subsp. transvaalensis*	Harv.	LC	Indigenous; Endemic
Malvaceae	*Hibiscus micranthus var. micranthus*	L.f.	LC	Indigenous
Malvaceae	*Hibiscus sidiformis*	Baill.	LC	Indigenous
Malvaceae	*Hibiscus vitifolius subsp. vulgaris*	L.	LC	Indigenous
Asteraceae	*Hirpicium bechuanense*	(S.Moore) Roessler	LC	Indigenous
Apocynaceae	*Huernia transvaalensis*	Stent	LC	Indigenous; Endemic
Poaceae	*Hyparrhenia filipendula var. pilosa*	(Hochst.) Stapf	LC	Indigenous
Poaceae	*Hyparrhenia hirta*	(L.) Stapf	LC	Indigenous
Hypericaceae	*Hypericum aethiopicum subsp. sonderi*	Thunb.	LC	Indigenous
Hypericaceae	*Hypericum lalandii*	Choisy	LC	Indigenous
Poaceae	*Hyperthelia dissoluta*	(Nees ex Steud.) Clayton	LC	Indigenous
Acanthaceae	*Hypoestes forskaolii*	(Vahl) R.Br.	LC	Indigenous
Fabaceae	*Indigastrum costatum subsp. macrum*	(Guill. & Perr.) Schrire	LC	Indigenous
Fabaceae	*Indigofera circinnata*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Indigofera egens*	N.E.Br.	LC	Indigenous; Endemic
Fabaceae	*Indigofera filipes*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Indigofera laxeracemosa*	Baker f.	LC	Indigenous
Fabaceae	*Indigofera oxytropis*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Indigofera pongolana*	N.E.Br.	LC	Indigenous; Endemic
Fabaceae	*Indigofera rostrata*	Bolus	LC	Indigenous
Convolvulaceae	*Ipomoea coptica*	(L.) Roth ex Roem. & Schult.	LC	Indigenous

Convolvulaceae	*Ipomoea gracilisepala*	Rendle	LC	Indigenous
Convolvulaceae	*Ipomoea magnusiana*	Schinz	LC	Indigenous
Convolvulaceae	*Ipomoea sinensis subsp. blepharosepala*	(Desr.) Choisy	LC	Indigenous
Convolvulaceae	*Ipomoea wightii var. wightii*	(Wall.) Choisy	LC	Indigenous
Poaceae	*Ischaemum fasciculatum*	Brongn.	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia bergae*	Lemmer	VU	Indigenous; Endemic
Scrophulariaceae	*Jamesbrittenia burkeana*	(Benth.) Hilliard	LC	Indigenous
Oleaceae	*Jasminum breviflorum*	Harv. ex C.H.Wright	LC	Indigenous
Euphorbiaceae	*Jatropha schlechteri*	Pax		Indigenous
Euphorbiaceae	*Jatropha schlechteri subsp. setifera*	Pax	LC	Indigenous
Euphorbiaceae	*Jatropha zeyheri*	Sond.	LC	Indigenous
Juncaceae	*Juncus oxycarpus*	E.Mey. ex Kunth	LC	Indigenous
Acanthaceae	*Justicia betonica*	L.	LC	Indigenous
Acanthaceae	*Justicia debilis*	(Forssk.) Vahl		Indigenous
Acanthaceae	*Justicia flava*	(Vahl) Vahl	LC	Indigenous
Acanthaceae	*Justicia odora*	(Forssk.) Lam.	LC	Indigenous
Kirkiaceae	*Kirkia wilmsii*	Engl.	LC	Indigenous
Rubiaceae	*Kohautia amatymbica*	Eckl. & Zeyh.	LC	Indigenous
Verbenaceae	*Lantana rugosa*	Thunb.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon sericocephalus*	(Meisn.) J.C.Manning & Boatwr.	LC	Indigenous
Hyacinthaceae	*Ledebouria atrobrunnea*	S.Venter	LC	Indigenous; Endemic
Hyacinthaceae	*Ledebouria burkei subsp. burkei*	(Baker) J.C.Manning & Goldblatt	LC	Indigenous
Hyacinthaceae	*Ledebouria cooperi*	(Hook.f.) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria inquinata*	(C.A.Sm.) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria leptophylla*	(Baker) S.Venter	LC	Indigenous
Hyacinthaceae	*Ledebouria luteola*	Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria marginata*	(Baker) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria sp.*			
Poaceae	*Leersia hexandra*	Sw.	LC	Indigenous
Fabaceae	*Leobordea foliosa*	(Bolus) B.-E.van Wyk & Boatwr.	LC	Indigenous
Lamiaceae	*Leonotis pentadentata*	J.C.Manning & Goldblatt	LC	Indigenous
Polypodiaceae	*Lepisorus excavatus*	(Bory ex Willd.) Ching	LC	Indigenous
Limeaceae	*Limeum pauciflorum*	Moq.	LC	Indigenous; Endemic
Limeaceae	*Limeum viscosum subsp. viscosum*	(J.Gay) Fenzl	NE	Indigenous
Scrophulariaceae	*Limosella maior*	Diels	LC	Indigenous
Poaceae	*Loudetia flavida*	(Stapf) C.E.Hubb.	LC	Indigenous
Capparaceae	*Maerua angolensis subsp. angolensis*	DC.	LC	Indigenous

Malvaceae	*Malvastrum coromandelianum*	(L.) Garcke		Not indigenous; Naturalised; Invasive
Celastraceae	*Maytenus undata*	(Thunb.) Blakelock	LC	Indigenous
Malvaceae	*Melhania acuminata var. acuminata*	Mast.	LC	Indigenous
Malvaceae	*Melhania prostrata*	DC.	LC	Indigenous
Convolvulaceae	*Merremia palmata*	Hallier f.	LC	Indigenous
Sapotaceae	*Mimusops zeyheri*	Sond.	LC	Indigenous
Poaceae	*Miscanthus junceus*	(Stapf) Pilg.	LC	Indigenous
Geraniaceae	*Monsonia angustifolia*	E.Mey. ex A.Rich.	LC	Indigenous
Fabaceae	*Mundulea sericea subsp. sericea*	(Willd.) A.Chev.	LC	Indigenous
Myrothamnaceae	*Myrothamnus flabellifolius*	Welw.	DD	Indigenous
Celastraceae	*Mystroxylon aethiopicum subsp. burkeanum*	(Thunb.) Loes.	LC	Indigenous; Endemic
Amaryllidaceae	*Nerine laticoma*	(Ker Gawl.) T.Durand & Schinz	LC	Indigenous
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	DC.	LC	Indigenous
Stilbaceae	*Nuxia congesta*	R.Br. ex Fresen.	LC	Indigenous
Ochnaceae	*Ochna pulchra*	Hook.f.	LC	Indigenous
Lamiaceae	*Ocimum americanum var. americanum*	L.	LC	Indigenous
Lamiaceae	*Ocimum gratissimum subsp. gratissimum*	L.	NE	Indigenous
Lamiaceae	*Ocimum obovatum subsp. obovatum*	E.Mey. ex Benth.	NE	Indigenous
Rubiaceae	*Oldenlandia herbacea var. herbacea*	(L.) Roxb.	LC	Indigenous
Oleaceae	*Olea europaea subsp. cuspidata*	L.		Indigenous
Asteraceae	*Oocephala staehelinoides*	(Harv.) H.Rob. & Skvarla		Indigenous; Endemic
Poaceae	*Oropetium capense*	Stapf	LC	Indigenous
Santalaceae	*Osyris lanceolata*	Hochst. & Steud.	LC	Indigenous
Rubiaceae	*Otiophora cupheoides*	N.E.Br.	LC	Indigenous
Oxalidaceae	*Oxalis depressa*	Eckl. & Zeyh.	LC	Indigenous
Oxalidaceae	*Oxalis smithiana*	Eckl. & Zeyh.	LC	Indigenous
Anacardiaceae	*Ozoroa paniculosa var. paniculosa*	(Sond.) R.Fern. & A.Fern.	LC	Indigenous
Poaceae	*Panicum coloratum*	L.	LC	Indigenous
Poaceae	*Panicum maximum*	Jacq.	LC	Indigenous
Poaceae	*Panicum schinzii*	Hack.	LC	Indigenous
Molluginaceae	*Paramollugo nudicaulis*	(Lam.) Thulin		Indigenous
Thymelaeaceae	*Passerina montana*	Thoday	LC	Indigenous
Rubiaceae	*Pavetta zeyheri subsp. zeyheri*	Sond.	LC	Indigenous
Malvaceae	*Pavonia transvaalensis*	(Ulbr.) A.Meeuse	LC	Indigenous; Endemic
Fabaceae	*Pearsonia sessilifolia subsp. marginata*	(Harv.) Dummer	LC	Indigenous
Fabaceae	*Pearsonia uniflora*	(Kensit) Polhill	LC	Indigenous
Asteraceae	*Pegolettia senegalensis*	Cass.	LC	Indigenous
Geraniaceae	*Pelargonium dolomiticum*	R.Knuth	LC	Indigenous
Geraniaceae	*Pelargonium luridum*	(Andrews) Sweet	LC	Indigenous
Ranunculaceae	*Peltocalathos baurii*	(MacOwan) Tamura	LC	Indigenous
Poaceae	*Pennisetum setaceum*	(Forssk.) Chiov.	NE	Not indigenous; Naturalised; Invasive
Rubiaceae	*Pentanisia angustifolia*	(Hochst.) Hochst.	LC	Indigenous

Poaceae	*Perotis patens*	Gand.	LC	Indigenous
Polygonaceae	*Persicaria lapathifolia*	(L.) Delarbre		Not indigenous; Naturalised; Invasive
Polygonaceae	*Persicaria madagascariensis*	(Meisn.) S.Ortiz & Paiva		Indigenous
Phyllanthaceae	*Phyllanthus incurvus*	Thunb.	LC	Indigenous
Phyllanthaceae	*Phyllanthus parvulus var. parvulus*	Sond.	LC	Indigenous
Lamiaceae	*Plectranthus neochilus*	Schltr.	LC	Indigenous
Lamiaceae	*Plectranthus sp.*			
Poaceae	*Pogonarthria squarrosa*	(Roem. & Schult.) Pilg.	LC	Indigenous
Polytrichaceae	*Pogonatum capense*	(Hampe) A.Jaeger		Indigenous
Caryophyllaceae	*Polycarpaea corymbosa var. corymbosa*	(L.) Lam.		Not indigenous; Naturalised
Polygalaceae	*Polygala albida subsp. albida*	Schinz	LC	Indigenous
Polygalaceae	*Polygala gracilenta*	Burtt Davy	LC	Indigenous
Polygalaceae	*Polygala sphenoptera var. sphenoptera*	Fresen.	LC	Indigenous
Polytrichaceae	*Polytrichum commune*	Hedw.		Indigenous
Portulacaceae	*Portulaca kermesina*	N.E.Br.	LC	Indigenous
Portulacaceae	*Portulaca quadrifida*	L.	LC	Indigenous
Proteaceae	*Protea roupelliae*	Meisn.		Indigenous
Proteaceae	*Protea welwitschii*	Engl.	LC	Indigenous
Asteraceae	*Pseudopegolettia tenella*	(DC.) H.Rob., Skvarla & V.A.Funk		Indigenous
Asteraceae	*Psiadia punctulata*	(DC.) Vatke	LC	Indigenous
Rubiaceae	*Psydrax livida*	(Hiern) Bridson	LC	Indigenous
Fabaceae	*Pterocarpus rotundifolius subsp. rotundifolius*	(Sond.) Druce	LC	Indigenous
Pedaliaceae	*Pterodiscus speciosus*	Hook.	LC	Indigenous
Cyperaceae	*Pycreus flavescens*	(L.) P.Beauv. ex Rchb.	LC	Indigenous
Cyperaceae	*Pycreus pumilus*	(L.) Nees	LC	Indigenous
Apocynaceae	*Raphionacme dyeri*	Retief & Venter	LC	Indigenous
Rhamnaceae	*Rhamnus prinoides*	L'Her.	LC	Indigenous
Vitaceae	*Rhoicissus digitata*	(L.f.) Gilg & M.Brandt	LC	Indigenous
Fabaceae	*Rhynchosia densiflora subsp. chrysadenia*	(Roth) DC.	LC	Indigenous
Fabaceae	*Rhynchosia holosericea*	Schinz	LC	Indigenous
Fabaceae	*Rhynchosia monophylla*	Schltr.	LC	Indigenous
Fabaceae	*Rhynchosia spectabilis*	Schinz	LC	Indigenous; Endemic
Fabaceae	*Rhynchosia totta var. totta*	(Thunb.) DC.	LC	Indigenous
Ricciaceae	*Riccia atropurpurea*	Sim		Indigenous
Ricciaceae	*Riccia congoana*	Steph.		Indigenous
Rubiaceae	*Richardia scabra*	L.	NE	Not indigenous; Naturalised
Apocynaceae	*Riocreuxia polyantha*	Schltr.	LC	Indigenous
Lythraceae	*Rotala tenella*	(Guill. & Perr.) Hiern	LC	Indigenous
Lamiaceae	*Rotheca hirsuta*	(Hochst.) R.Fern.	LC	Indigenous
Lamiaceae	*Rotheca louwalbertsii*	(P.P.J.Herman) P.P.J.Herman & Retief	LC	Indigenous
Rosaceae	*Rubus ludwigii subsp. ludwigii*	Eckl. & Zeyh.	LC	Indigenous
Acanthaceae	*Ruellia patula*	Jacq.	LC	Indigenous

Salicaceae	*Salix mucronata subsp. woodii*	Thunb.	LC	Indigenous
Lamiaceae	*Salvia reflexa*	Hornem.		Not indigenous; Naturalised; Invasive
Dipsacaceae	*Scabiosa columbaria*	L.	LC	Indigenous
Amaryllidaceae	*Scadoxus puniceus*	(L.) Friis & Nordal	LC	Indigenous
Poaceae	*Schizachyrium exile*	(Hochst.) Pilg.	LC	Indigenous
Poaceae	*Schizachyrium jeffreysii*	(Hack.) Stapf	LC	Indigenous
Poaceae	*Schizachyrium sanguineum*	(Retz.) Alston	LC	Indigenous
Hyacinthaceae	*Schizocarphus nervosus*	(Burch.) Van der Merwe	LC	Indigenous
Poaceae	*Schmidtia pappophoroides*	Steud.	LC	Indigenous
Cyperaceae	*Schoenoplectus muriculatus*	(Kuk.) Browning	LC	Indigenous
Oleaceae	*Schrebera alata*	(Hochst.) Welw.	LC	Indigenous
Salicaceae	*Scolopia zeyheri*	(Nees) Harv.	LC	Indigenous
Anacardiaceae	*Searsia dentata*	(Thunb.) F.A.Barkley	LC	Indigenous
Anacardiaceae	*Searsia discolor*	(E.Mey. ex Sond.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia magalismontana subsp. magalismontana*	(Sond.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia pyroides var. pyroides*	(Burch.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia tenuinervis*	(Engl.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia tumulicola var. tumulicola*	(S.Moore) Moffett	LC	Indigenous
Apocynaceae	*Secamone filiformis*	(L.f.) J.H.Ross	LC	Indigenous
Selaginellaceae	*Selaginella dregei*	(C.Presl) Hieron.	LC	Indigenous
Asteraceae	*Senecio barbertonicus*	Klatt	LC	Indigenous
Asteraceae	*Senecio digitalifolius*	DC.	LC	Indigenous
Asteraceae	*Senecio ruwenzoriensis*	S.Moore	LC	Indigenous
Fabaceae	*Senegalia caffra*	(Thunb.) P.J.H.Hurter & Mabb.	LC	Indigenous
Fabaceae	*Senegalia erubescens*	(Welw. ex Oliv.) Kyal. & Boatwr.	LC	Indigenous
Fabaceae	*Senegalia galpinii*	(Burtt Davy) Seigler & Ebinger	LC	Indigenous
Fabaceae	*Senegalia mellifera subsp. detinens*	(Vahl) Seigler & Ebinger	LC	Indigenous
Fabaceae	*Sesbania transvaalensis*	J.B.Gillett	LC	Indigenous
Poaceae	*Setaria incrassata*	(Hochst.) Hack.	LC	Indigenous
Poaceae	*Setaria lindenbergiana*	(Nees) Stapf	LC	Indigenous
Poaceae	*Setaria pumila*	(Poir.) Roem. & Schult.	LC	Indigenous
Poaceae	*Setaria verticillata*	(L.) P.Beauv.	LC	Indigenous
Malvaceae	*Sida chrysantha*	Ulbr.	LC	Indigenous
Malvaceae	*Sida sp.*			
Orobanchaceae	*Sopubia cana var. cana*	Harv.	LC	Indigenous
Poaceae	*Sorghum versicolor*	Andersson	LC	Indigenous
Sphagnaceae	*Sphagnum capense*	Hornsch.		Indigenous
Sphagnaceae	*Sphagnum violascens*	Mull.Hal.		Indigenous
Malpighiaceae	*Sphedamnocarpus pruriens subsp. pruriens*	(A.Juss.) Szyszyl.	LC	Indigenous
Poaceae	*Sporobolus africanus*	(Poir.) Robyns & Tournay	LC	Indigenous
Poaceae	*Sporobolus festivus*	Hochst. ex A.Rich.	LC	Indigenous

Poaceae	*Sporobolus fimbriatus*	(Trin.) Nees	LC	Indigenous
Poaceae	*Sporobolus ioclados*	(Trin.) Nees	LC	Indigenous
Poaceae	*Sporobolus nitens*	Stent	LC	Indigenous
Poaceae	*Sporobolus panicoides*	A.Rich.	LC	Indigenous
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Malvaceae	*Sterculia rogersii*	N.E.Br.	LC	Indigenous
Poaceae	*Stipagrostis uniplumis var. uniplumis*	(Licht.) De Winter	LC	Indigenous
Orobanchaceae	*Striga asiatica*	(L.) Kuntze	LC	Indigenous
Orobanchaceae	*Striga gesnerioides*	(Willd.) Vatke	LC	Indigenous
Loganiaceae	*Strychnos madagascariensis*	Poir.	LC	Indigenous
Loganiaceae	*Strychnos pungens*	Soler.	LC	Indigenous
Fabaceae	*Stylosanthes fruticosa*	(Retz.) Alston	LC	Indigenous
Lamiaceae	*Syncolostemon canescens*	(Gurke) D.F.Otieno	LC	Indigenous
Lamiaceae	*Syncolostemon elliottii*	(Baker) D.F.Otieno	LC	Indigenous
Myrtaceae	*Syzygium guineense subsp. guineense*	(Willd.) DC.	LC	Indigenous
Talinaceae	*Talinum arnotii*	Hook.f.	LC	Indigenous
Asteraceae	*Tarchonanthus camphoratus*	L.	LC	Indigenous
Asteraceae	*Tarchonanthus trilobus var. galpinii*	DC.	LC	Indigenous
Scrophulariaceae	*Teedia lucida*	(Sol.) Rudolphi	LC	Indigenous
Fabaceae	*Tephrosia burchellii*	Burtt Davy	LC	Indigenous
Fabaceae	*Tephrosia purpurea subsp. leptostachya*	(L.) Pers.	NE	Indigenous
Fabaceae	*Tephrosia semiglabra*	Sond.	LC	Indigenous
Combretaceae	*Terminalia sericea*	Burch. ex DC.	LC	Indigenous
Lamiaceae	*Tetradenia brevispicata*	(N.E.Br.) Codd	LC	Indigenous
Lamiaceae	*Teucrium trifidum*	Retz.	LC	Indigenous
Poaceae	*Themeda triandra*	Forssk.	LC	Indigenous
Asphodelaceae	*Trachyandra saltii var. saltii*	(Baker) Oberm.	LC	Indigenous
Poaceae	*Trachypogon spicatus*	(L.f.) Kuntze	LC	Indigenous
Euphorbiaceae	*Tragia dioica*	Sond.	LC	Indigenous
Poaceae	*Tragus berteronianus*	Schult.	LC	Indigenous
Poaceae	*Tricholaena monachne*	(Trin.) Stapf & C.E.Hubb.	LC	Indigenous
Poaceae	*Trichoneura grandiglumis*	(Nees) Ekman	LC	Indigenous
Pottiaceae	*Trichostomum brachydontium*	Bruch		Indigenous
Poaceae	*Tripogon minimus*	(A.Rich.) Steud.	LC	Indigenous
Poaceae	*Triraphis schinzii*	Hack.	LC	Indigenous
Malvaceae	*Triumfetta sonderi*	Ficalho & Hiern	LC	Indigenous; Endemic
Alliaceae	*Tulbaghia leucantha*	Baker	LC	Indigenous
Alliaceae	*Tulbaghia transvaalensis*	Vosa	LC	Indigenous; Endemic
Meliaceae	*Turraea obtusifolia*	Hochst.	LC	Indigenous
Poaceae	*Urochloa mosambicensis*	(Hack.) Dandy	LC	Indigenous
Asteraceae	*Ursinia montana subsp. montana*	DC.	LC	Indigenous
Lentibulariaceae	*Utricularia stellaris*	L.f.	LC	Indigenous
Fabaceae	*Vachellia gerrardii subsp. gerrardii*	(Benth.) P.J.H.Hurter		Indigenous

Fabaceae	*Vachellia karroo*	(Hayne) Banfi & Galasso	LC	Indigenous
Fabaceae	*Vachellia luederitzii var. retinens*	(Engl.) Kyal. & Boatwr.	LC	Indigenous
Fabaceae	*Vachellia permixta*	(Burtt Davy) Kyal. & Boatwr.	LC	Indigenous
Vahliaceae	*Vahlia capensis subsp. capensis*	(L.f.) Thunb.	LC	Indigenous
Santalaceae	*Viscum combreticola*	Engl.	LC	Indigenous
Lamiaceae	*Vitex pooara*	Corbishley	LC	Indigenous; Endemic
Lamiaceae	*Vitex rehmannii*	Gurke	LC	Indigenous
Poaceae	*Vulpia myuros*	(L.) C.C.Gmel.	NE	Not indigenous; Naturalised; Invasive
Malvaceae	*Waltheria indica*	L.	LC	Indigenous
Pottiaceae	*Weissia latiuscula*	Mull.Hal.		Indigenous
Fabaceae	*Wiborgia fusca subsp. fusca*	Thunb.	LC	Indigenous; Endemic
Solanaceae	*Withania somnifera*	(L.) Dunal	LC	Indigenous
Olacaceae	*Ximenia americana var. microphylla*	L.	LC	Indigenous
Xyridaceae	*Xyris congensis*	Buttner	LC	Indigenous
Aizoaceae	*Zaleya pentandra*	(L.) C.Jeffrey	LC	Indigenous
Rhamnaceae	*Ziziphus mucronata subsp. mucronata*	Willd.	LC	Indigenous
Rhamnaceae	*Ziziphus zeyheriana*	Sond.	LC	Indigenous

8.2 Appendix B – Amphibian species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Breviceps mossambicus	Mozambique Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Chiromantis xerampelina	Southern Foam Nest Frog	LC	LC
Hildebrandtia ornata	Southern Ornate Frog	LC	LC
Hyperolius marmoratus	Painted Reed Frog	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Phrynobatrachus mababiensis	Dwarf Puddle Frog	LC	LC
Phrynobatrachus natalensis	Snoring Puddle Frog	LC	LC
Phrynomantis bifasciatus	Banded Rubber Frog	LC	LC
Poyntonophrynus fenoulheti	Northern Pygmy Toad	LC	LC
Ptychadena anchietae	Plain Grass Frog	LC	LC
Ptychadena mossambica	Mozambique Ridged Frog	LC	LC
Ptychadena porosissima	Striped Grass Frog	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	LC	LC
Pyxicephalus edulis	African Bullfrog	LC	LC
Schismaderma carens	African Red Toad	LC	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys garmani	Olive Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys poweri	Power's Toad	LC	LC
Sclerophrys pusilla	Flatbacked Toad	LC	LC
Strongylopus fasciatus	Striped Stream Frog	LC	LC
Strongylopus grayii	Clicking Stream Frog	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna krugerensis	Knocking Sand Frog	LC	LC
Tomopterna natalensis	Natal Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Xenopus laevis	Common Platanna	LC	LC

8.3 Appendix C – Reptile species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acanthocercus atricollis	Southern Tree Agama	LC	LC
Acontias occidentalis	Savanna Legless Skink	LC	Unlisted
Acontias percivali	Percival's legless lizard	Unlisted	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC
Agama aculeata distanti	Eastern Ground Agama	LC	LC
Agama atra	Southern Rock Agama	LC	LC
Amblyodipsas polylepis	Purple Gloss Snake	Unlisted	Unlisted
Amblyodipsas ventrimaculata	Kalahari purple-glossed snake	Unlisted	LC
Aparallactus capensis	Black-headed Centipede-eater	LC	LC
Aspidelaps scutatus scutatus	Common Shield Snake	LC	Unlisted
Atractaspis bibronii	Bibron's Stiletto Snake	LC	Unlisted
Bitis arietans arietans	Puff Adder	LC	Unlisted
Boaedon capensis	Brown House Snake	LC	LC
Causus defilippii	Snouted Night Adder	LC	Unlisted
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Chondrodactylus turneri	Turner's Gecko	LC	Unlisted
Cordylus jonesii	Jones' Girdled Lizard	LC	Unlisted
Cordylus vittifer	Common Girdled Lizard	LC	LC
Crocodylus niloticus	Nile Crocodile	VU	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Dendroaspis polylepis	Black Mamba	LC	LC
Dispholidus typus	Boomslang	LC	Unlisted
Elapsoidea boulengeri	Boulenger's Garter Snake	LC	Unlisted
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	Unlisted
Gonionotophis capensis	Common File Snake	LC	LC
Gracililima nyassae	Black File Snake	LC	LC
Heliobolus lugubris	Bushveld Lizard	LC	Unlisted
Hemidactylus mabouia	Common Tropical House Gecko	LC	Unlisted
Hemirhagerrhis nototaenia	Eastern Bark Snake	LC	Unlisted
Homopholis wahlbergii	Wahlberg's Velvet Gecko	LC	LC
Ichnotropis capensis	Ornate Rough-scaled Lizard	LC	Unlisted
Kinixys lobatsiana	Lobatse hinged-back Tortoise	LC	VU
Kinixys spekii	Speke's Hinged-Back Tortoise	LC	Unlisted
Leptotyphlops distanti	Distant's Tread Snake	LC	LC
Leptotyphlops incognitus	Incognito Thread Snake	LC	Unlisted
Leptotyphlops scutifrons	Peters' Thread Snake	LC	Unlisted
Limaformosa capensis	Common File Snake	LC	Unlisted
Lycodonomorphus rufulus	Brown Water Snake	LC	Unlisted
Lycophidion capense capense	Cape Wolf Snake	LC	Unlisted
Lycophidion variegatum	Variegated Wolf Snake	LC	Unlisted
Lygodactylus capensis	Cape dwarf gecko	LC	LC
Lygodactylus waterbergensis	Waterberg Dwarf Gecko	NT	NT

Matobosaurus validus	Common Giant Plated Lizard	LC	Unlisted
Meroles squamulosus	Common Rough-scaled Lizard	LC	Unlisted
Mochlus sundevallii	Sundevall's Writhing Skink	LC	LC
Monopeltis capensis	Cape Worm Lizard	LC	LC
Monopeltis infuscata	Dusky Worm Lizard	LC	Unlisted
Naja annulifera	Snouted Cobra	LC	Unlisted
Naja mossambica	Mozambique Spitting Cobra	LC	Unlisted
Nucras holubi	Holub's Sandveld Lizard	LC	Unlisted
Nucras intertexta	Spotted Sandveld Lizard	LC	Unlisted
Pachydactylus affinis	Transvaal Gecko	LC	LC
Pachydactylus capensis	Cape Gecko	LC	Unlisted
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	LC	Unlisted
Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	LC	Unlisted
Pedioplanis lineoocellata pulchella	Common sand lizard	LC	LC
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	Unlisted
Pelusios sinuatus	Serrated Hinged Terrapin	LC	Unlisted
Philothamnus hoplogaster	South Eastern Green Snake	LC	Unlisted
Philothamnus semivariegatus	Spotted Bush Snake	LC	Unlisted
Platysaurus guttatus	Dwarf Flat Lizard	LC	LC
Platysaurus minor	Waterberg Flat Lizard	LC	LC
Prosymna ambigua	Angolan Shovel-snout	Unlisted	LC
Prosymna bivittata	Two-Striped Shovel-Snout	LC	Unlisted
Psammobates oculifer	Serrated Tent Tortoise	LC	Unlisted
Psammophis angolensis	Dwarf Sand Snake	LC	Unlisted
Psammophis brevirostris	Short-snouted Grass Snake	LC	Unlisted
Psammophis jallae	Jalla's Sand Snake	LC	Unlisted
Psammophis subtaeniatus	Stripe-bellied Sand Snake	LC	LC
Psammophylax tritaeniatus	Striped Grass Snake	LC	LC
Pseudaspis cana	Mole Snake	LC	Unlisted
Pseudocordylus transvaalensis	Nothern Crag Lizard	NT	NT
Python natalensis	Southern African Python	LC	Unlisted
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Scelotes limpopoensis limpopoensis	Limpopo Dwarf Burrowing Skink	LC	Unlisted
Smaug breyeri	Waterberg Dragon Lizard	LC	LC
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake	LC	Unlisted
Thelotornis capensis	Southern Twig Snake	LC	LC
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis damarana	Damara skink	Unlisted	LC
Trachylepis margaritifera	Rainbow Skink	LC	LC
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis striata	Striped Skink	LC	Unlisted
Trachylepis varia	Variable Skink	LC	LC
Varanus albigularis albigularis	Southern Rock Monitor	LC	Unlisted
Varanus niloticus	Water Monitor	LC	Unlisted
Xenocalamus bicolor australis	Waterberg Quill-snouted Snake	LC	Unlisted

Xenocalamus bicolor bicolor	Bicoloured Quill-snouted Snake	LC	Unlisted
Zygaspis quadrifrons	Kalahari Dwarf Worm Lizard	LC	Unlisted

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acomys spinosissimus	Spiny Mouse	LC	LC
Aethomys chrysophilus	Red Veld Rat	LC	LC
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Aonyx capensis	Cape Clawless Otter	NT	NT
Atelerix frontalis	South Africa Hedgehog	NT	LC
Atilax paludinosus	Water Mongoose	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Civettictis civetta	African Civet	LC	LC
Cloeotis percivali	Short-eared Trident Bat	EN	LC
Crocidura cyanea	Reddish-grey Musk Shrew	LC	LC
Crocidura fuscomurina	Tiny Musk Shrew	LC	LC
Crocidura hirta	Lesser Red Musk Shrew	LC	LC
Crocidura mariquensis	Swamp Musk Shrew	NT	LC
Crocidura silacea	Lesser Grey-brown Musk Shrew	LC	LC
Crocuta crocuta	Spotted Hyaena	NT	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Dendromus melanotis	Grey Climbing Mouse	LC	LC
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT
Elephantulus brachyrhynchus	Short-snouted Sengi	LC	LC
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Galago moholi	Southern Lesser Galago	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC
Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Graphiurus microtis	Large Savanna African Dormouse	LC	LC
Graphiurus platyops	Rock Dormouse	LC	LC
Helogale parvula	Dwarf Mongoose	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Hipposideros caffer	Sundevall's Leaf-nosed Bat	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Kerivoula lanosa	Lesser Woolly Bat	LC	LC
Lemniscomys rosalia	Single-striped Mouse	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus saxatilis	Scrub Hare	LC	LC
Lepus victoriae	African Savanna Hare	LC	LC
Mastomys coucha	Multimammate Mouse	LC	LC

Mellivora capensis	Honey Badger	LC	LC
Mungos mungo	Banded Mongoose	LC	LC
Mus indutus	Desert Pygmy Mouse	LC	LC
Myotis tricolor	Temminck's Hairy Bat	LC	LC
Neoromicia capensis	Cape Serotine Bat	LC	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC
Oreotragus oreotragus	Klipspringer	LC	LC
Orycteropus afer	Aardvark	LC	LC
Otocyon megalotis	Bat-eared Fox	LC	LC
Otomys angoniensis	Angoni Vlei Rat	LC	LC
Panthera pardus	Leopard	VU	VU
Papio ursinus	Chacma Baboon	LC	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Paraxerus cepapi	Tree Squirrel	LC	LC
Pedetes capensis	Springhare	LC	LC
Pelea capreolus	Grey Rhebok	NT	NT
Phacochoerus africanus	Common Warthog	LC	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Procavia capensis	Rock Hyrax	LC	LC
Pronolagus randensis	Jameson's Red Rock Rabbit	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rattus rattus	House Rat	Exotic (Not listed)	LC
Redunca arundinum	Southern Reedbuck	LC	LC
Redunca fulvorufula	Mountain Reedbuck	EN	LC
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus darlingi	Darling's Horseshoe Bat	LC	LC
Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat	LC	LC
Rhinolophus simulator	Bushveld Horseshoe Bat	LC	LC
Saccostomus campestris	Pouched Mouse	LC	LC
Sauromys petrophilus	Flat-headed Free-tail Bat	LC	LC
Scotophilus dinganii	Yellow House Bat	LC	LC
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU
Steatomys pratensis	Fat Mouse	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC
Taphozous mauritianus	Mauritian Tomb Bat	LC	LC
Thallomys paedulcus	Tree Rat	LC	LC
Thryonomys swinderianus	Greater Cane Rat	LC	LC
Tragelaphus scriptus	Cape Bushbuck	LC	LC
Tragelaphus strepsiceros	Greater Kudu	LC	LC
Vulpes chama	Cape Fox	LC	LC