The Terrestrial Ecology Baseline & Impact Assessment for the proposed Phala Photovoltaic (PV) Facility

Bela Bela, Limpopo Province

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CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a terrestrial biodiversity (fauna and flora) baseline and impact assessment for the proposed Phala Solar Power Plants (SPP) Photovoltaic (PV) project near Bela Bela, Limpopo Province (Figure 1-1 and Figure 1-2). The project area is located 500 m from the town of Bela Bela and is traversed by the R101 and R516 roads.

In order to assess the baseline ecological state of the area and to present a detailed description of the receiving environment, both a desktop assessment as well as a field survey were conducted during October 2022. Furthermore, the desktop assessment and field survey both involved the detection, identification and description of any locally relevant sensitive receptors and habitats, and the manner in which these sensitive features may be affected by the proposed development was also investigated. It is important to note that this assessment considers terrestrial fauna and flora with the exclusion of avifauna, as this aspect is considered as part of a separate assessment.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (No. 326, 7 April 2017) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). The approach has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020 as well as the Government Notice 1150 in terms of NEMA dated 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity theme for the area as ‘Very High’ sensitivity (National Environmental Screening Tool, 2022).

The purpose of conducting the specialist study is to provide relevant input into the overall Environmental Authorisation application process, with a focus on the proposed activities and their impacts associated with the projects. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Registered Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed projects.

1.2 Project Information

The following technical information was provided by Environamics:

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 350MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.

- Wiring to Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line. It is expected that generation from the facility will connect to the national grid via the existing Eskom Warmbad 275/132/66kV MTS Substation. The grid connection route will be assessed within a 200m wide (up to 550m wide in some instances) corridor. The Project will inject up to 300MW into the National Grid. The installed capacity will be approximately 350MW

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

- Supporting Infrastructure – The supporting infrastructure such as the auxiliary buildings will be situated in an area measuring up to 1.3 ha.

- Battery storage – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 m3 of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via the R101 regional road to the west of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor. Access Points: coordinates 24°55'19.96"S 28°18'18.58"E

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used

Table 1-1 Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	550 hectares (Development footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	Central inverters + LV/MV trafo: 750 m2 HV/MV substation with switching station: 15 000m2 BESS: 40 000 m2
Capacity of on-site substation	132kV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Total Footprint Area: 570 hectares Construction laydown area: within ~ 3.7 ha
Area occupied by buildings	Security Room: ~150 m^2 O&M laydown: Within 1.3 ha
Battery storage facility	Maximum height: 8m Maximum volume: 1740 m^3 Capacity: Up to 500 MW

Length of internal roads	Approximately 30 km
Width of internal roads	Between 4 to 6 meters
Proximity to grid connection	The grid connection route will be assessed within a 200m wide (up to 550m wide in some instances)
Grid connection corridor width	200m wide but up to 550m wide in some instances
Grid connection corridor length	± 2,6 km
Power line servitude width	15 – 25 m
Height of fencing	Approximately 2.5 meters

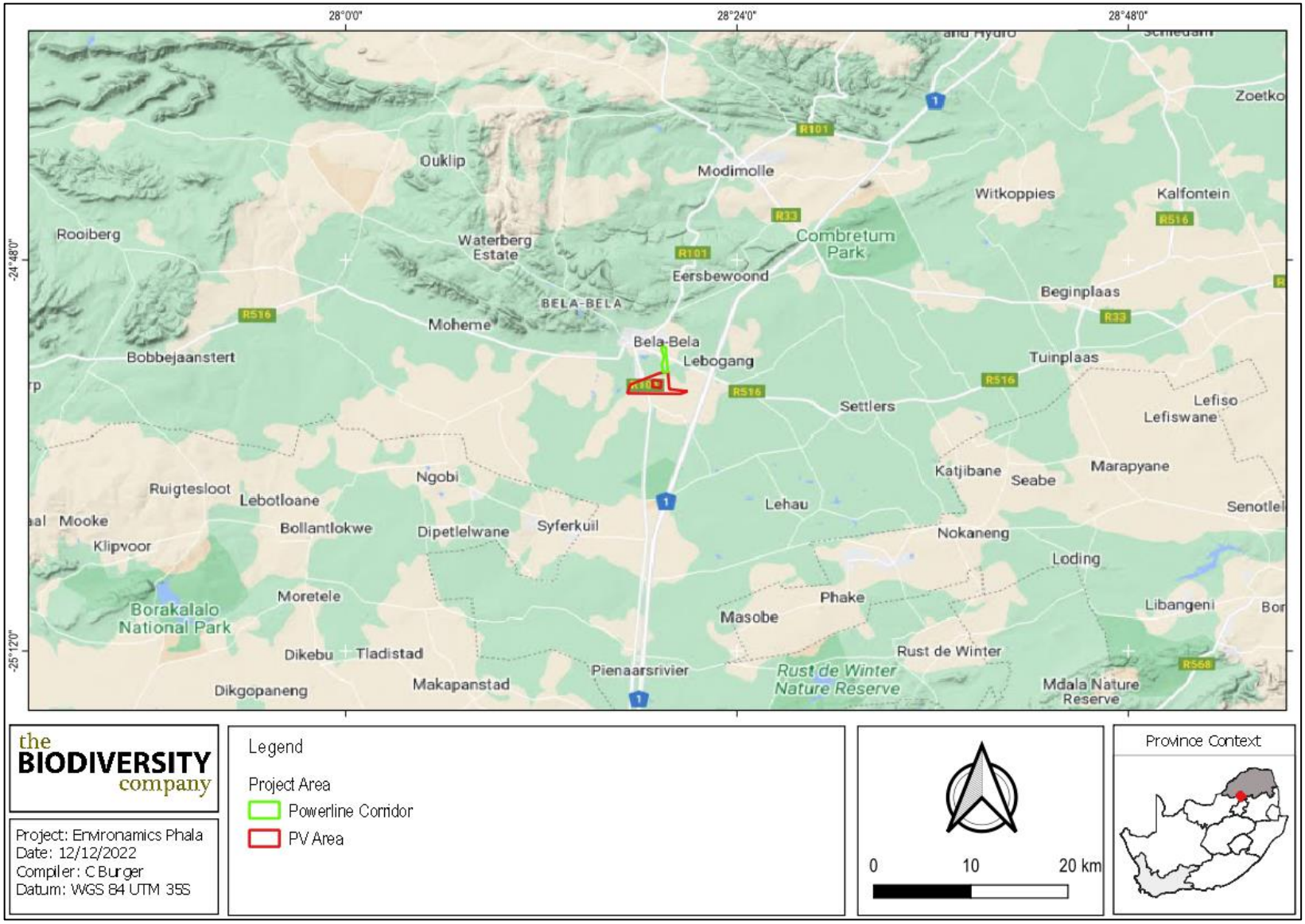


Figure 1-1 Map illustrating the regional context of the project area

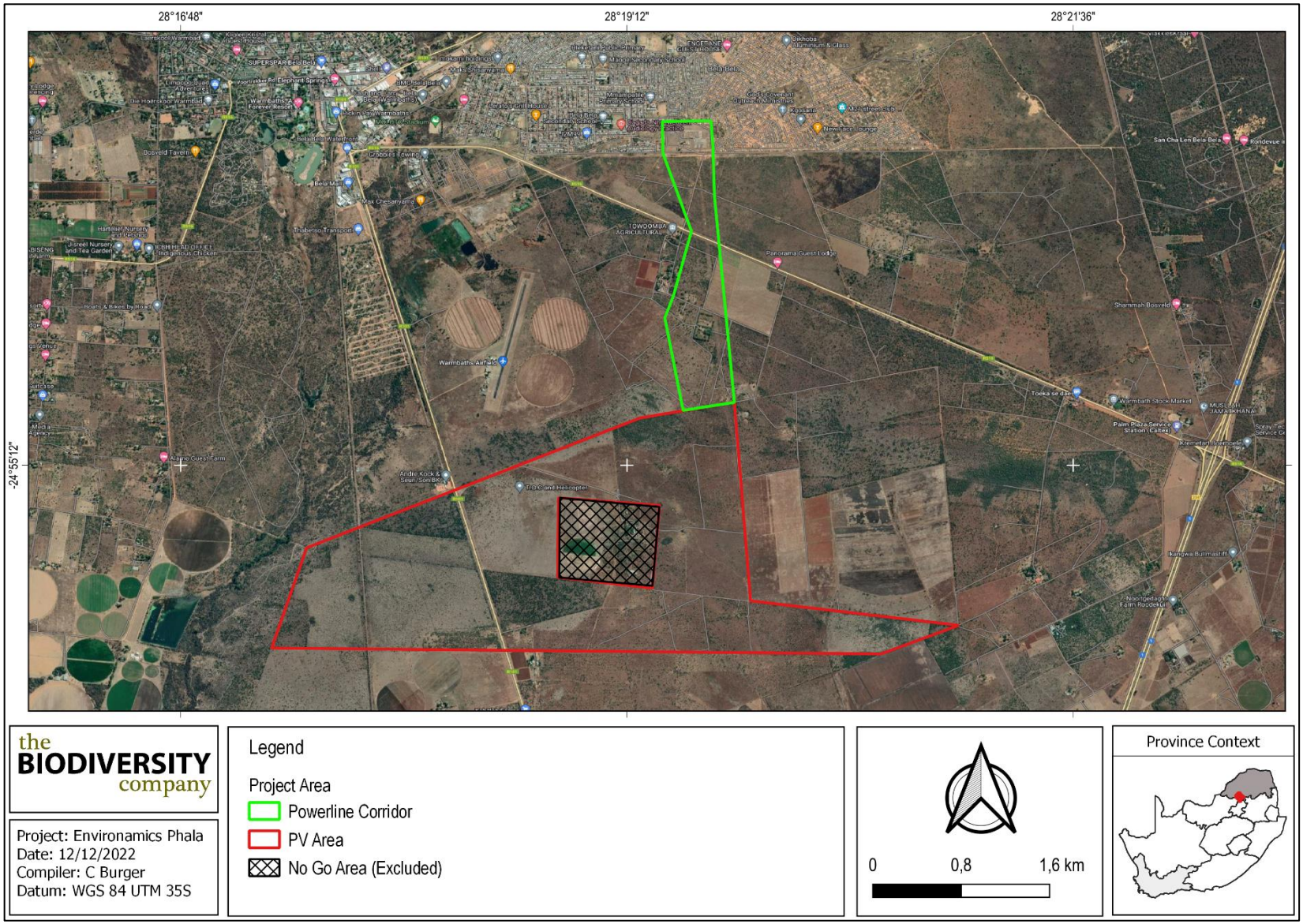


Figure 1-2 Map illustrating the details of the project area

1.3 Specialist Details

Report Name	**The Terrestrial Ecology Baseline & Impact Assessment for the proposed Phala Photovoltaic (PV) Facility**
Reference	Phala PV
Submitted to / Client	ENVIRONAMICS
Fieldwork / Report Writer	Carami Burger
	Carami Burger has completed her Bachelor of Science Honours degree in Ecological Interactions and Ecosystem Resilience. Carami is an ecologist and has completed various studies as part of Basic Assessments and Environmental Impact Assessments.
Checked by	Michael Schrenk
	Michael completed his professional Civil and Environmental engineering degree at the University of the Witwatersrand in 2016. He has been working in the fields of project management, biodiversity and habitat assessment and ecological restoration for over 4 years.
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.

1.4 Scope of Work

The principle aim of the assessment was to provide information to inform on the risk that the proposed activity has on the associated ecosystems within the project area. This was achieved through the following:

- Identification and description of any sensitive receptors that occur in the project area, and the manner in which these sensitive receptors may be affected by the proposed activity;
- Conducting of a desktop assessment to identify the relevant ecologically important geographical features within or nearby to the project area;
- Conducting of a desktop assessment to compile an expected species list and identify flora and fauna Species of Conservation Concern (SCC) that may occur within the project area;
- Conducting of a field survey to ascertain the baseline species composition of the present flora and fauna community within the project area;
- Delineation and mapping of the habitats and their respective sensitivities that occur within the project area;
- Identification of the manners in which the proposed project impacts the flora and fauna communities, and an evaluation of the level of risk that these potential impacts present; and
- The prescription of mitigation measures and associated recommendations for the identified risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 2-1 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 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the Limpopo Province

Region	Legislation / Guideline
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: Biodiversity Act (NEM:BA) (Act No. 10 of 2004)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
	Threatened or Protected Species Regulations and lists (No. R. 152 of Government Gazette No. 29657 of 23 February 2007, and No. R. 1187 of Government Gazette No. 30568 of 14 December 2007)
	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 43110 (March 2020); and GNR 1150 of Government Gazette 43855 (October 2020)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	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)
	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 2014-2020, published under NEM:BA
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
Provincial	The Limpopo Conservation Plan 2018
	Limpopo Environmental Management Act (2003)

3 Definitions

3.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 3-1 below.

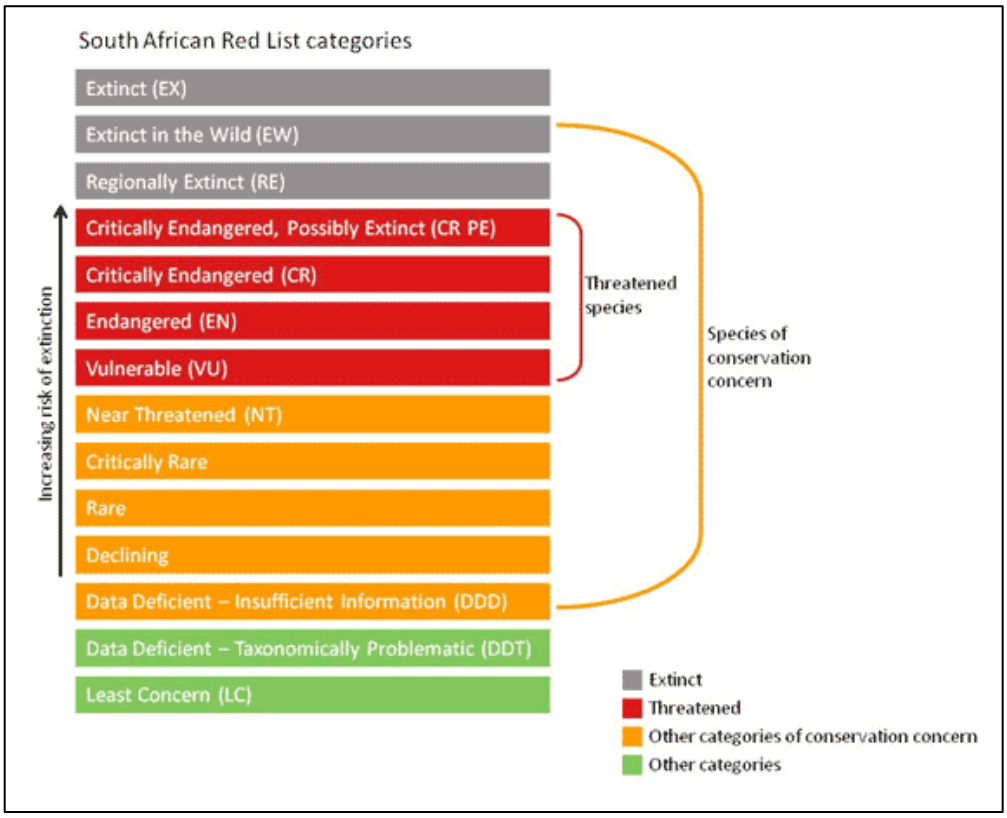


Figure 3-1 Threatened species and Species of Conservation Concern (SANBI, 2016)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna as well as the IUCN categories, for the purposes of this report.

3.2 Protected Species

Protected species include both floral and faunal species that are protected according to some form of relevant legislation, be it provincial, national, or international. Provincial legislation may include that published in the form of a provincial ordinance, bill, or act, and national legislation includes that which is published in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) or the

National Forest Act (Act No. 84 of 1998). Relevant international legislation includes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2021).

4 Methods

4.1 Desktop Assessments

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

4.1.1 Ecologically Important Landscape Features

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

- Limpopo Conservation Plan (LEDET, 2018);
- 2018 National Biodiversity Assessment (NBA, 2018; Skowno *et al.,* 2019);
- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- South Africa Protected and Conservation Areas Databases, 2022 (DFFE, 2022 & DFFE, 2022a);
- National Protected Areas Expansion Strategy, 2018 (DEA, 2018);
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.,* 2015);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), NBA 2018 Rivers and Wetlands (Awuah, 2018 & Van Deventer *et al.,* 2019);
- National Freshwater Priority Areas, Rivers and Wetlands, 2011 (Nel *et al.,* 2011); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

Descriptions of these datasets, and their associated relevance to terrestrial biodiversity, are provided below.

4.1.1.1 Provincial Conservation Plan

The Limpopo Conservation Plan 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 and associated land-use guidelines). The previous Limpopo Conservation Plan (LCPv1) was completely revised and updated (Desmet et al., 2013). 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:

- Critical Biodiversity Area 1 (CBA1);
- Critical Biodiversity Area 2 (CBA2);
- Ecological Support Area 1 (ESA1);
- Ecological Support Area 2 (ESA2);

- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Remaining (NNR).

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (Desmet et al., 2013).

Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

Other Natural Areas (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 (Driver et al., 2017).

Areas with No Natural Habitat Remaining (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 (Driver et al., 2017).

4.1.1.2 National Biodiversity Assessment 2018

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the then Department of Environmental Affairs (DEA), and other stakeholders including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.,* 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The two headline indicators assessed in the NBA are Ecosystem Threat Status and Ecosystem Protection Level (Skowno *et al.,* 2019).

- **Ecosystem Threat Status (ETS)** outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in a good or healthy ecological condition (Skowno et al., 2019). CR, EN, or VU ecosystem types are collectively referred to as threatened ecosystems.
- **Ecosystem Protection level (EPL)** informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.,* 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

4.1.1.3 South Africa Protected and Conservation Areas

The South African Protected Areas Database (SAPAD) and the South Africa Conservation Areas Database (SACAD) contains spatial data critical for the conservation of South Africa's natural resources. It includes

spatial and attribute information for both formally protected areas and areas that have less formal protection, such as conservation areas. These databases are updated regularly and form 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).

Formally protected areas are categorised according to several different types, and each type is subject to specific legislative restrictions and management guidelines, many of which restrict development to some degree. Generally, these areas are assigned a buffer of influence of between 5 and 10 km (the latter pertaining to National Parks and World Heritage Sites), within which certain laws and management actions may apply. Many of the protected area types are further classified into sub-types as well. Formally protected area types include:

- National Parks;
- Nature Reserves;
- Special Nature Reserves;
- Mountain Catchment Areas;
- World Heritage Sites;
- Protected Environments;
- Forest Nature Reserves and Forest Wilderness Areas;
- Specially Protected Forest Areas; and
- Marine Protected Areas.

4.1.1.3.1 National Protected Areas Expansion Strategy

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. The NPAES is a 20-year strategy with 5-year implementation targets aligned with a 5-year revision cycle (DEA, 2016).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2016).

4.1.1.4 Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are sites of international significance for the conservation of the world's birds, and other conservation significant species, as identified through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria. These sites are also Key Biodiversity Areas; sites that contribute significantly to the global persistence and health of biodiversity (Birdlife, 2020).

The selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge on the sizes and trends of bird populations. The criteria ensures that sites selected as IBAs have true significance for the international conservation of bird populations, and it also ensures classification consistency among sites at all geographic levels.

IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. Approximately 60% of the IBA network is unprotected, leaving these sites vulnerable to habitat transformation and mismanagement. Additionally, habitats within many IBAs are poorly managed, leading to habitat degradation, especially in unprotected sites (BirdLife SA, 2022)

4.1.1.5 Aquatic Habitats

Three inland aquatic habitat datasets are used to identify the ecological sensitivity of the project area with regards to local aquatic habitat, which is critical for the healthy functioning of both aquatic and terrestrial biodiversity. The presence of aquatic ecosystems is often a strong indicator for the presence of unique flora as well as the regular presence of fauna. Many national SCC are only found within or near to aquatic habitat.

- **The South African Inventory of Inland Aquatic Ecosystems (SAIIAE):** Established during the 2018 NBA, the SAIIAE is a collection of spatial data layers that represent the extent of river and inland wetland ecosystem types as well as the pressures on these systems. The same two headline indicators, and their associated categorisations, are applied as with the terrestrial ecosystem NBA, namely Ecosystem Threat Status and Ecosystem Protection Level. The Ecosystem Threat Status of river and wetland ecosystem types are based on the extent to which each ecosystem type had been altered from its natural condition.

- **National Freshwater Ecosystem Priority Areas, Rivers and Wetlands (NFEPA):** In an attempt to better conserve aquatic ecosystems, South Africa has categorised its inland aquatic 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). The FEPAs are intended to be conservation support tools and it is envisioned that they will guide the effective implementation of measures to achieve the National Environment Management: Biodiversity Act's biodiversity conservation goals (Nel *et al.,* 2011).

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

4.1.2 Desktop Flora Assessment

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

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) and the 2018 Terrestrial & Freshwater Assessment by SANBI (2018) was used to identify the vegetation types that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA, 2019) database was accessed to compile a list of expected flora species within the PAOI (Figure 4-1). The Red List of South African Plants website (SANBI, 2016) was used to provide the most current account of the national conservation status of flora.

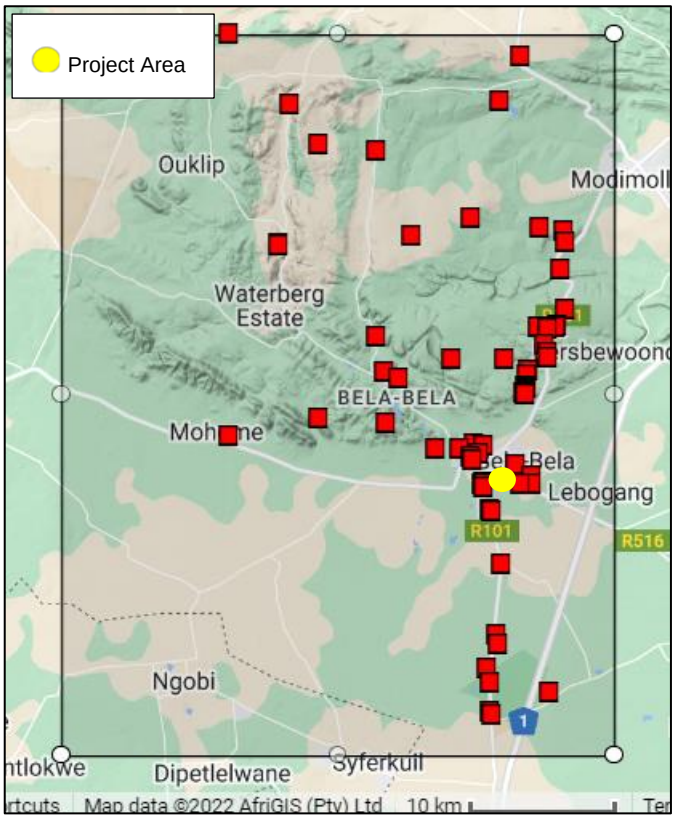


Figure 4-1 ***Map illustrating the extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. The yellow dot indicates the approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data***

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

- Provincially Protected Plant Species (Schedule 11 and 12 of the Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003); and
- List of Nationally Protected Tree Species (DEFF, 2022).

4.1.3 Desktop Fauna Assessment

The faunal desktop assessment involved the compilation of expected species lists and the identification of any protected and/or SCC fauna potentially occurring in the area. The respective species lists, and international Red-List statuses, were obtained from the IUCN spatial dataset (2017), in addition to the following sources:

- Mammal list: Generated from the ADU MammalMap database using the 2428 Degree Square (ADU, 2020);
- Reptile list: Generated from ADU ReptileMap database using the 2428 Degree Square (ADU, 2020a); and
- Amphibian list: Generated from ADU FrogMap database using the 2428 Degree Square (ADU, 2020b).

For data concerning the expected avifaunal species refer to the project avifaunal assessment.

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

- Provincially Protected Wildlife Species (Schedule 2 and 3 of the Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003); and
- Nationally Protected Wildlife species (The 2007 lists of Threatened or Protected Species (TOPS), published in terms of Section 56(1) of the NEM:BA, No. 10 of 2004).

4.2 Biodiversity Field Survey

A single season field survey was undertaken from the 24th to the 27th of October 2022, which constitutes an early wet season survey, to determine the presence of any local SCC and to achieve the delineation of local habitat types and their associated sensitivities. Effort was made to cover all the different habitat types within the project area within the limits of time and access.

4.2.1 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 in order to perform a rapid vegetation and ecological assessment at each sample site.

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

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

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

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

- A field guide to Wild flowers (Pooley, 1998);
- Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 1998);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Medicinal Plants of South Africa (Van Wyk *et al*., 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016), and Aquatic and Wetland Plants of Southern Africa (van Ginkel & Cilliers, 2020);
- Identification guide to southern African grasses (Fish *et al.,* 2015);
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997); and

- Problem Plants and Alien Weeds of Southern Africa (Bromilow, 2018).

4.2.2 Fauna Survey

The faunal component of this report pertains only to mammals and herpetofauna (reptiles and amphibians). The faunal field survey utilised a variety of sampling techniques, including but not limited to:

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

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

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al*., 2010);
- Spiders of Southern Africa (Leroy & Leroy, 2003);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Tortoises, Terrapins, and Turtles of Africa (Branch, 2008);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart & Stuart, 2000).

4.3 Terrestrial Site Ecological Importance

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 4-1 and Table 4-2 respectively.

Table 4-1 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 4-2 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 4-3.

Table 4-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance		Conservation Importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

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

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

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

After the determination of BI and RR, the SEI can be ascertained using the matrix as provided in Table 4-5.

Table 4-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

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

Interpretation of the SEI in the context of the proposed project is provided in Table 4-6.

Table 4-6 Guideline for interpreting Site Ecological Importance in the context of proposed activities

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

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

4.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- It is assumed that all information received from the client and landowner is accurate;
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes;
- The assessment area was based on the footprint areas as provided by the client, and any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;
- The area was only surveyed during a single site visit and therefore this assessment does not consider temporal trends (note that the data collected is considered sufficient to derive a meaningful baseline;
- The single site visit was conducted during the early wet season, and this means that certain flora and fauna would not have been present or observable due to seasonal constraints;
- Whilst every effort was made to cover as much of the project area as possible, representative sampling is completed, and by its nature it is possible that some plant and animal species that are present within the project area were not recorded during the field investigations; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by up to 5 m.

5 Results & Discussion

5.1 Desktop Assessments

5.1.1 Ecologically Important Landscape Features

Table 5-1 below has been produced as a result of the spatial data collected and analysed (as provided by various sources such as the national and provincial environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 5-1 Summary of the spatial relevance of the Project Area to local ecologically important landscape features

Desktop Information Considered	Description	Section
Provincial Conservation Plan	The proposed project is situated across an Ecological Support Area 1 (ESA 1), a No Natural Habitat Remaining (NNR), a Critical Biodiversity Area 1, and a Critical Biodiversity Area 2.	5.1.1.1
Ecosystem Threat Status	Overlaps with a Vulnerable Ecosystem.	5.1.1.2
Ecosystem Protection Level	Overlaps with a Poorly Protected Ecosystem.	5.1.1.2
Protected Areas	The closest protected area is the Rissik Private Nature reserve located 4.9 km to the east of the project area.	5.1.1.3
National Protected Areas Expansion Strategy	The project area lies adjacent to a protected area according to the NPAES dataset.	5.1.1.4
Important Bird and Biodiversity Areas	The project area is located 14 km from the Waterberg IBA.	5.1.1.5
REDZ	The project area is 71 km from the closest Renewable Energy Development Zone.	-
Powerline Corridor	The project area is 62 km from the International corridor.	5.1.1.6
South African Inventory of Inland Aquatic Ecosystems	The project area does not overlap with any wetlands or rivers, however, a CR river is located 120 m west of the project area.	5.1.1.7
National Freshwater Priority Area	The project area does not overlap with neither wetlands nor rivers, however, an unclassified river and wetland can be found 120 m to the west of the project area.	5.1.1.8

5.1.1.1 Provincial Conservation Plan

According to the 2018 Limpopo Conservation Plan the proposed project is situated across an Ecological Support Area 1 (ESA 1), a No Natural Habitat Remaining (NNR), a Critical Biodiversity Area 1 and a Critical Biodiversity Area 2 (Figure 5-1). The majority of the project area is classified as an ESA 1, the ESA 1 area is the most sensitive category after the CBA 1 and CBA 2 categories.

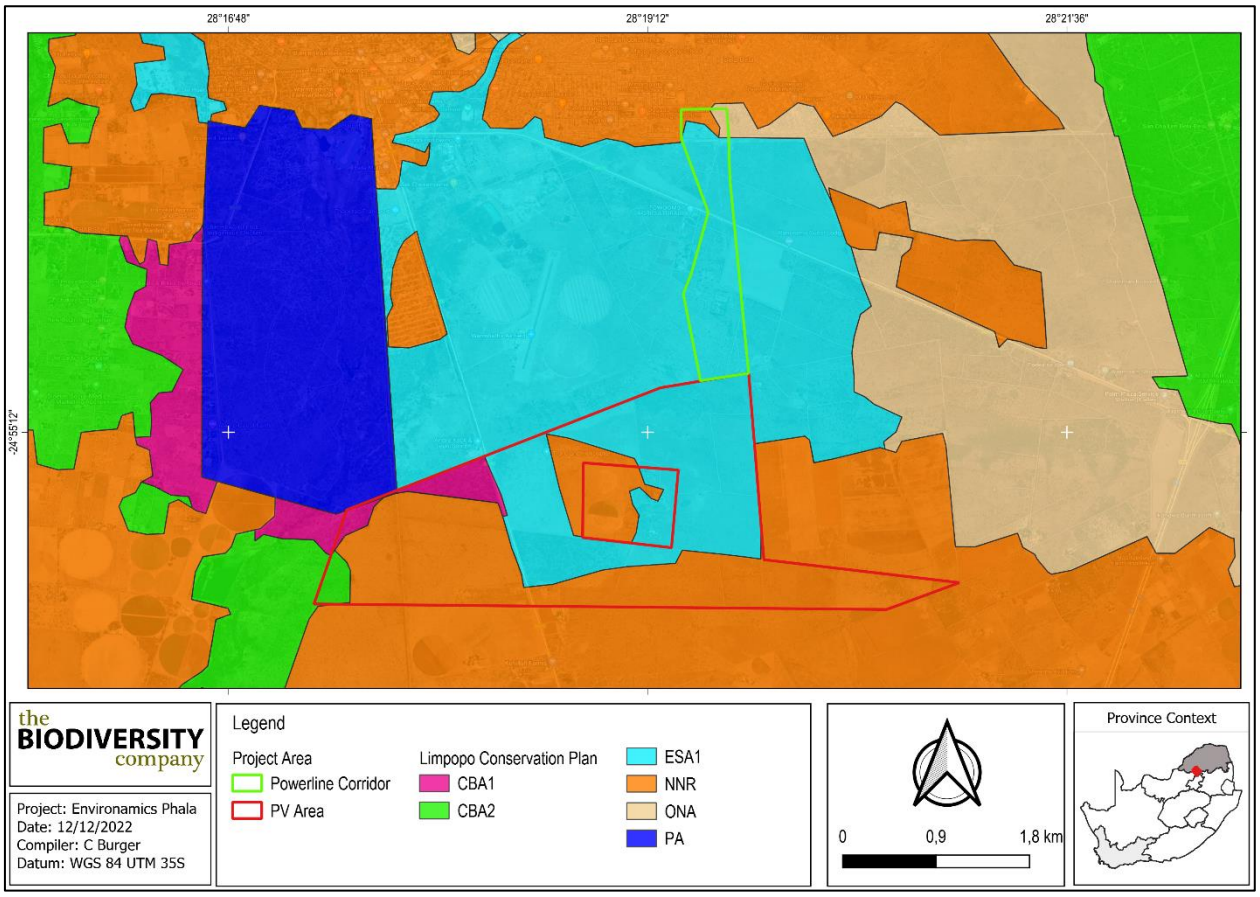


Figure 5-1 Map illustrating the Limpopo Conservation Plan relevance

5.1.1.2 National Biodiversity Assessment

According to the 2018 NBA spatial dataset the project area overlaps with a 'Vulnerable' and 'Poorly Protected' ecosystem (Figure 5-2 and Figure 5-3).

A 'Vulnerable' ecosystem type is one considered to be at a high risk of collapse and a 'Poorly Protected' ecosystems are those which have between five and 50% of their biodiversity target included in one or more protected areas. (SANBI, 2019).

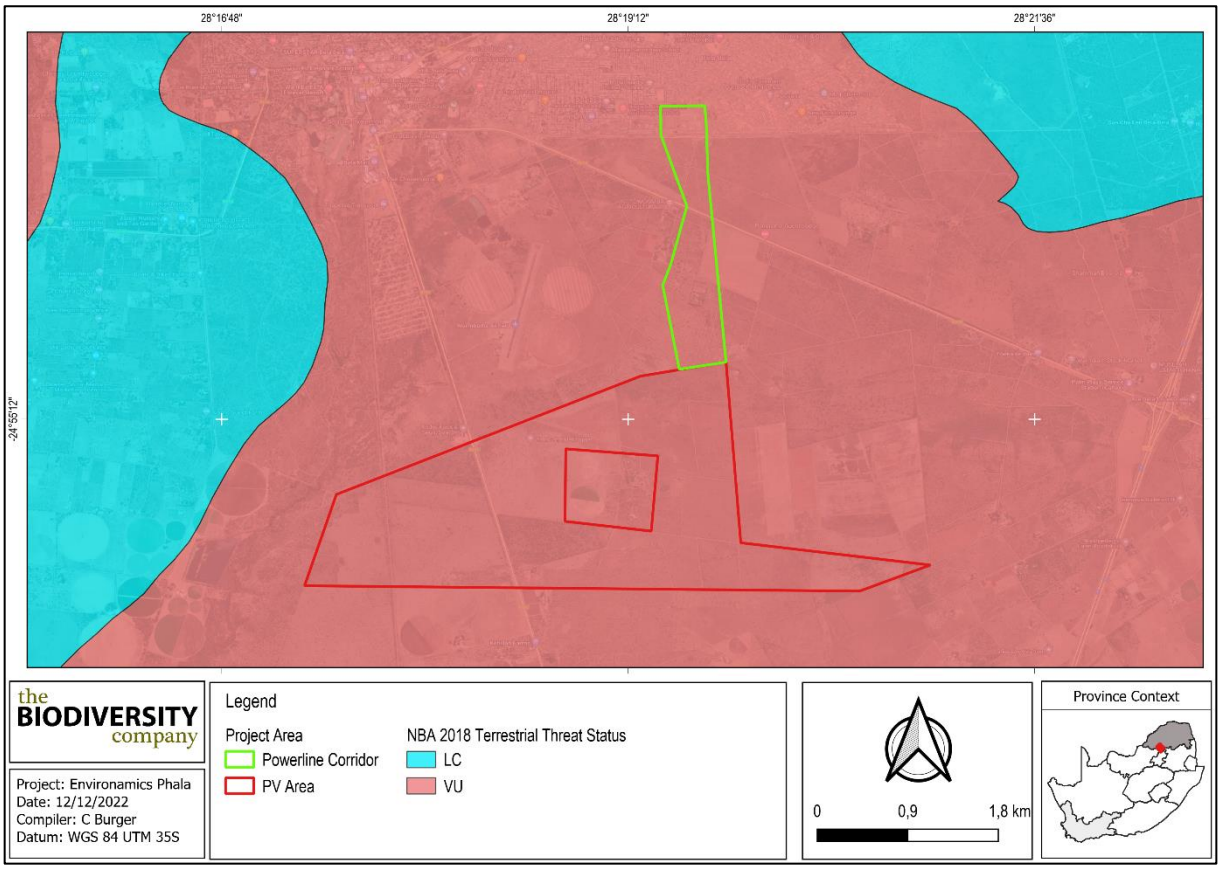


Figure 5-2 Map illustrating the Ecosystem Threat Status associated with the project area

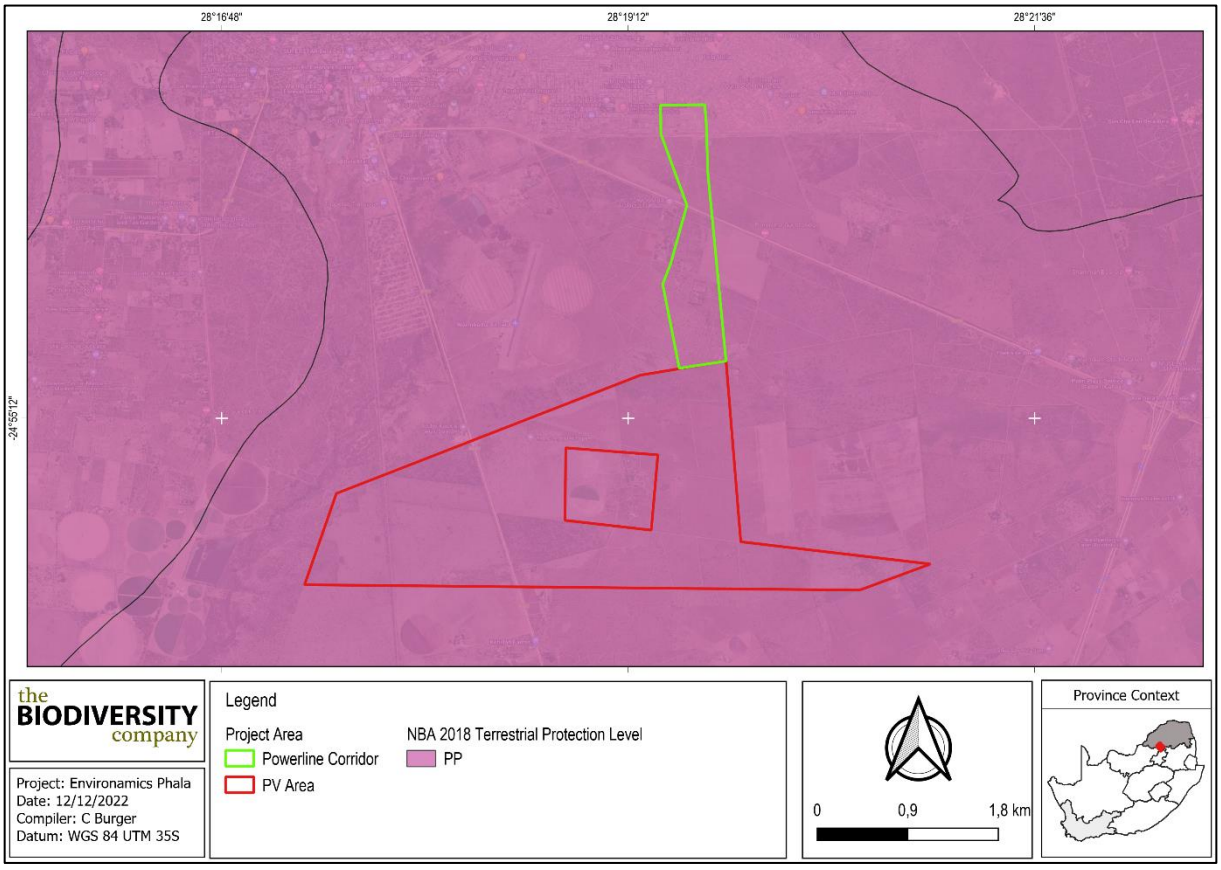


Figure 5-3 Map illustrating the Ecosystem Protection Level associated with the project area

5.1.1.3 Protected areas

According to the protected area spatial datasets from SAPAD (2022) and SACAD (2022), the protected area as identified by the Limpopo Conservation Plan does not appear in this dataset. According to the SAPAD (2022) dataset the closest protected area is the Rissik Private Nature reserve located 4.9 km to the east of the project area (Figure 5-4).

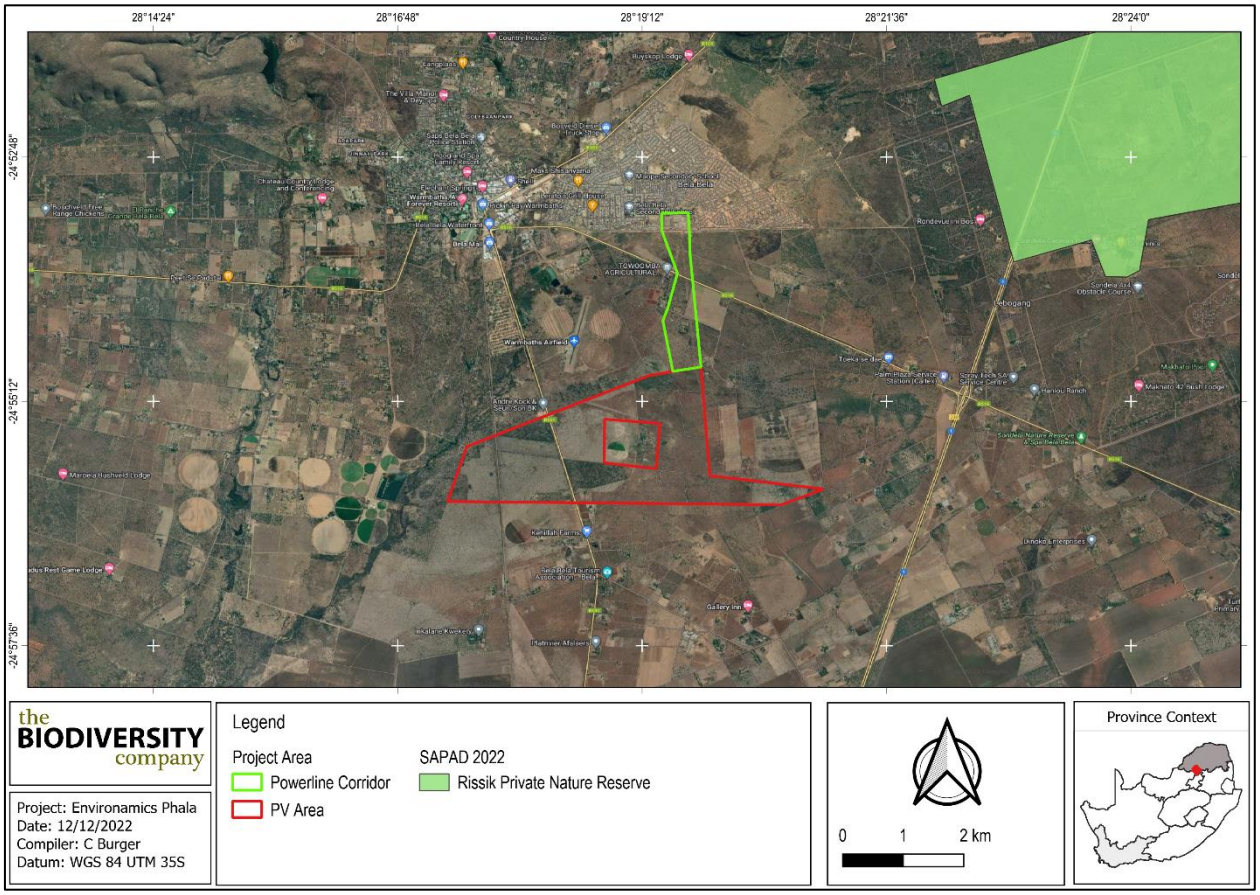


Figure 5-4 Map illustrating the project area in relation to the protected areas

5.1.1.4 National Protected Areas Expansion Strategy

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

The project area lies adjacent to a protected area according to the NPAES dataset (Figure 5-5).

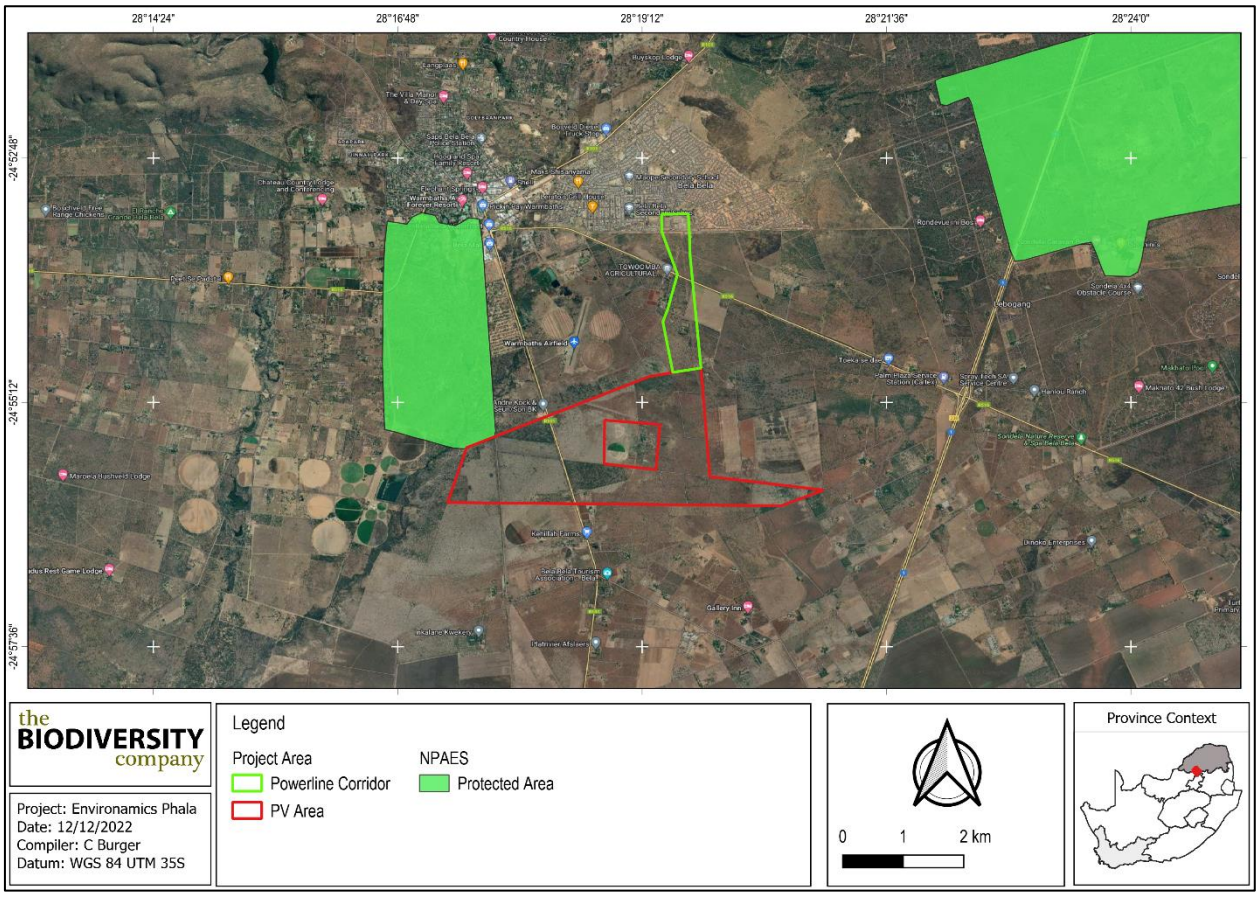


Figure 5-5 The project area in relation to the National Protected Area Expansion Strategy

5.1.1.5 Important Bird and Biodiversity Areas

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

According to Birdlife South Africa (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels. Figure 5-6 shows that the project area is located 14 km from the Waterberg IBA.

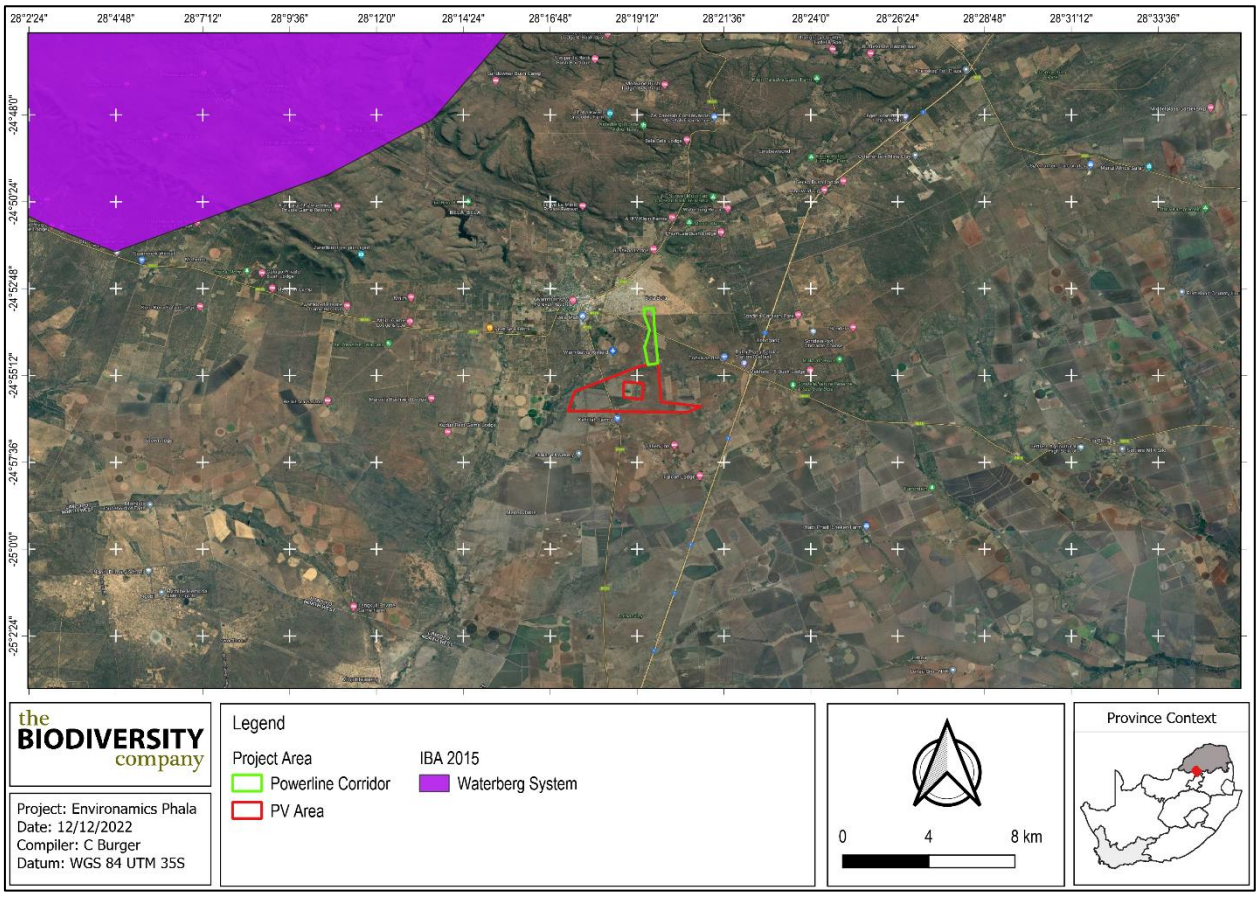


Figure 5-6 Map illustrating the project area location in relation to the 2015 IBA dataset

5.1.1.6 Strategic Transmission Corridors (EGI)

On the 16 February 2018 Minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

Figure 5-7 shows the project area is 62 km from the International corridor.

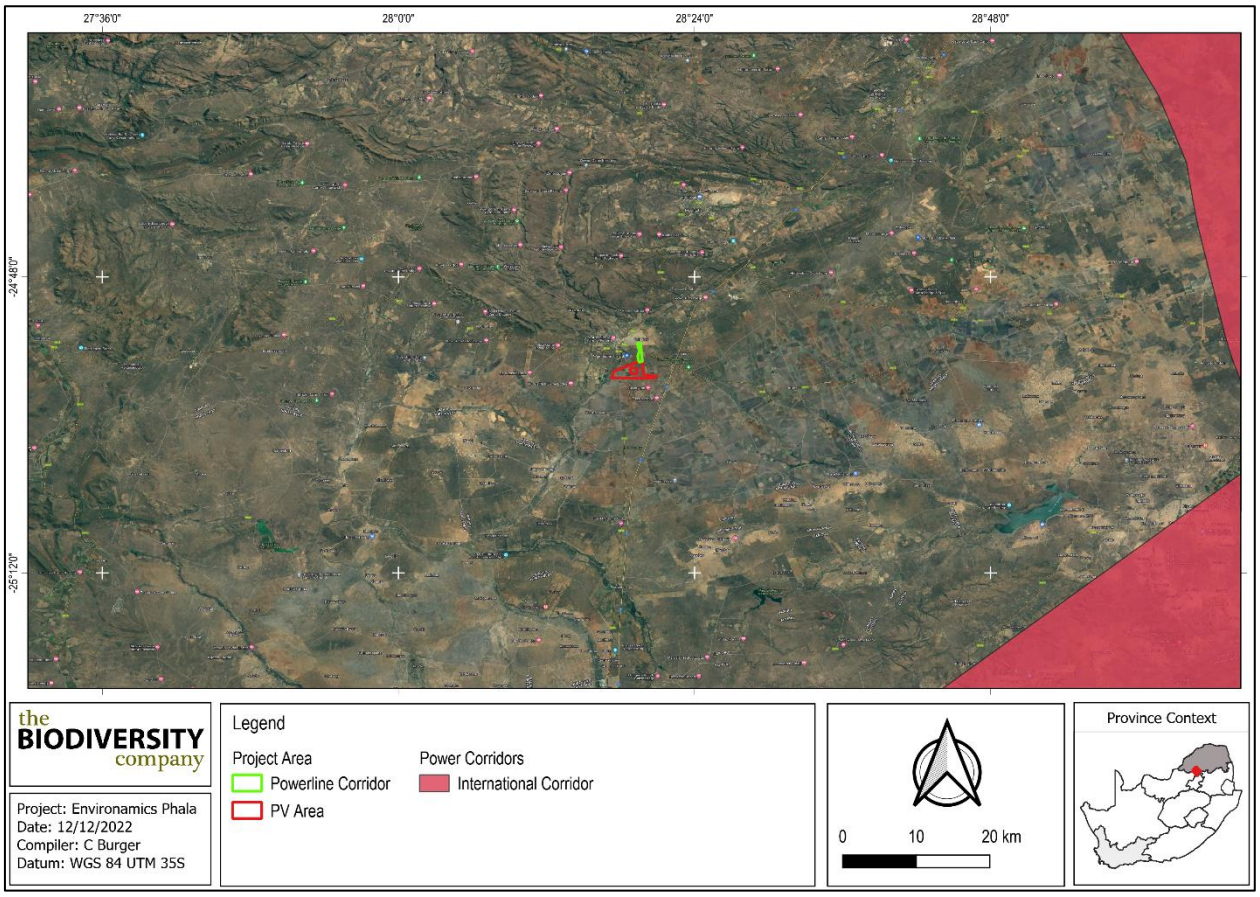


Figure 5-7 The project area in relation to the EGI corridors

5.1.1.7 Hydrological Setting

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).

The project area does not overlap with any wetlands or rivers, however, a CR river is located 120 m west of the project area (Figure 5-8).

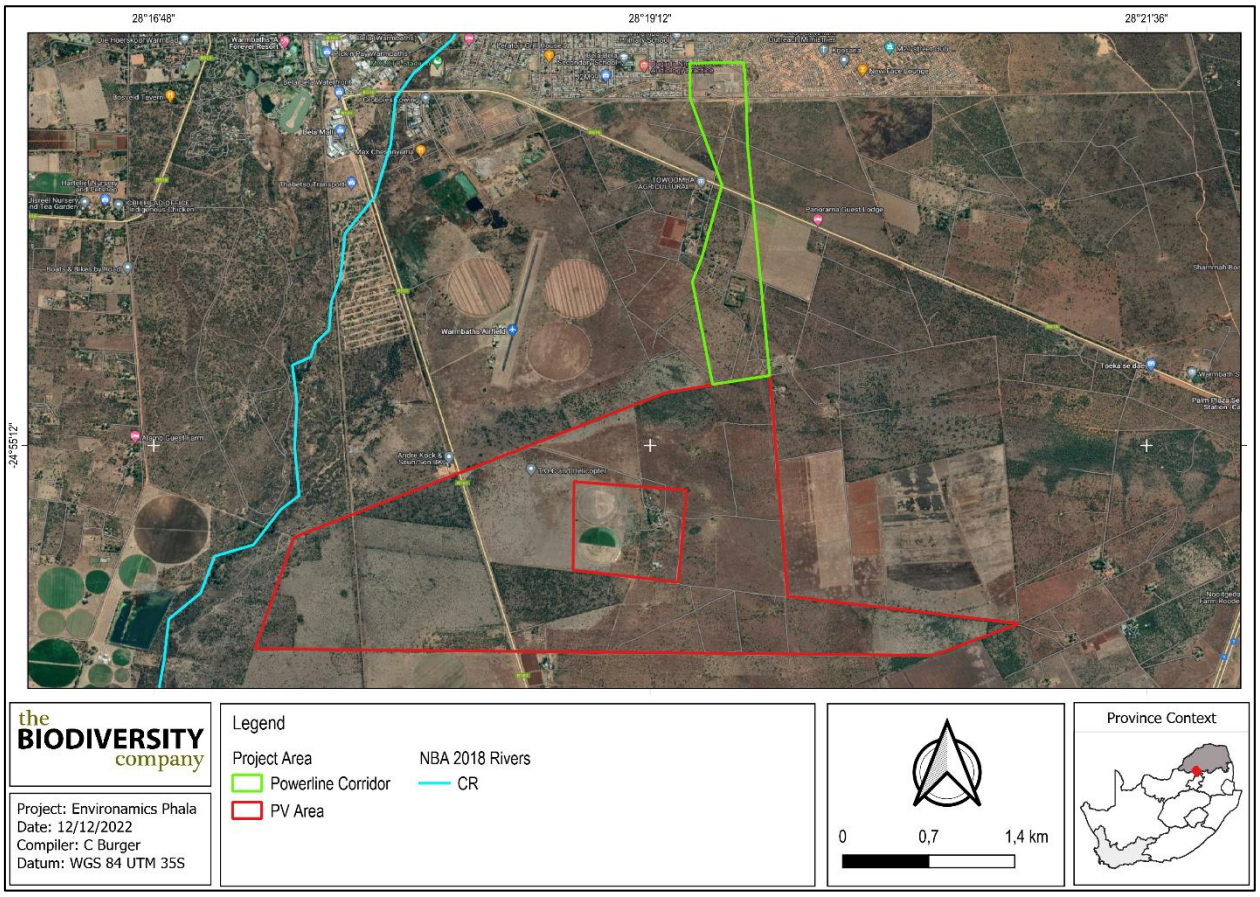


Figure 5-8 Map illustrating the project area location in relation to the SAIIAE dataset

5.1.1.8 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 5-9 shows that the project area does not overlap with neither wetlands nor rivers, however, an unclassified river and wetland can be found 120 m to the west of the project area.

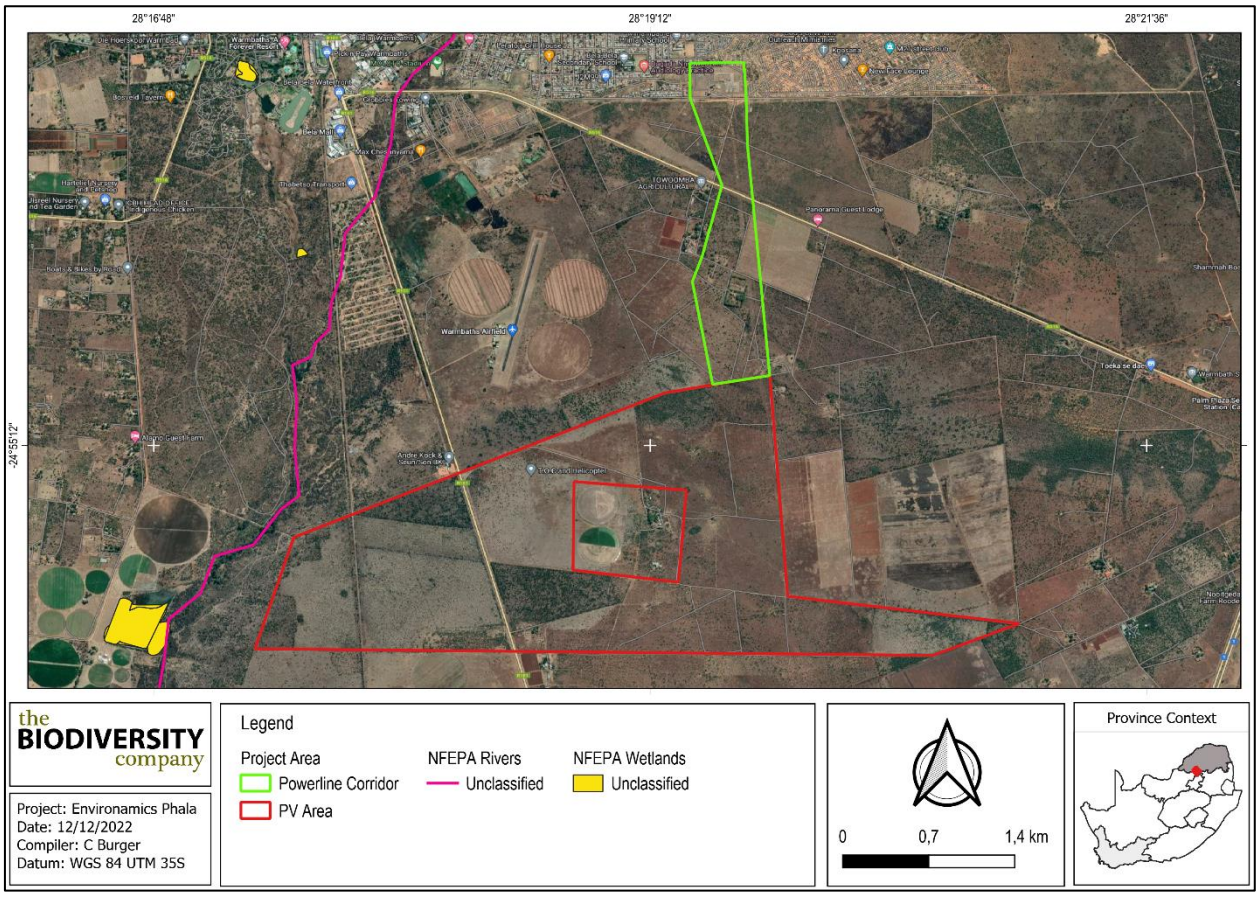


Figure 5-9 Map illustrating the project area location in relation to the NFEPA dataset

5.1.2 Flora Assessment

This section is divided into a description of the local vegetation type that would be expected under natural conditions, and the expected flora species.

5.1.2.1 Vegetation Type

The project area is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

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

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

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

On a fine-scale vegetation type, the project area overlaps with the Springbokvlakte Thornveld vegetation type (Figure 5-10).

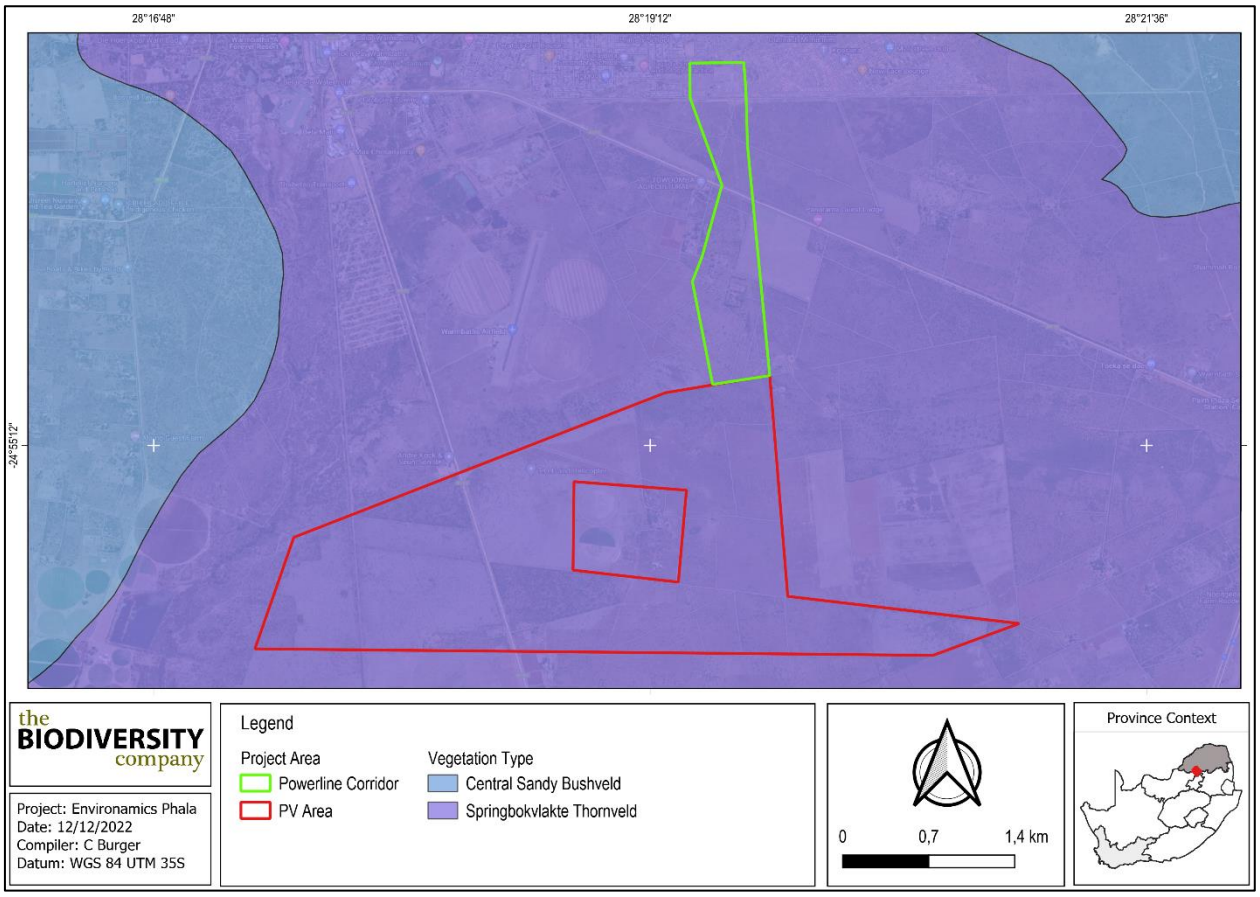


Figure 5-10 Map illustrating the vegetation types associated with the region

5.1.2.2 Springbokvlakte Thornveld

This vegetation type occurs on open to dense, low thorn savanna dominated by *Vachellia* species or shrubby grassland with a very low shrub layer and on flat to slightly undulating plains (Mucina & Rutherford, 2006). This vegetation type occurs in the Limpopo, Mpumalanga, North-West and Gauteng Provinces: Flats from Zebediela in the northeast to Hammanskraal and Assen in the southwest as well as from Bela-Bela and Mookgophong in the northwest to Marble Hall and Rust de Winter in the southeast.

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the **Springbokvlakte Thornveld** vegetation type:

Small Trees: *Vachellia karroo (d), Vachellia luederitzii var. retinens (d), Senegalia mellifera subsp. detinens (d), Vachellia nilotica (d), Ziziphus mucronata (d), Vachellia tortilis subsp. heteracantha, Boscia foetida subsp. rehmanniana.*

Tall Shrubs*: Euclea undulata (d), Searsia engleri (d), Dichrostachys cinerea, Diospyros lycioides subsp. lycioides, Grewia flava, Tarchonanthus camphoratus.*

Low Shrubs: *Vachellia tenuispina (d), Ptycholobium plicatum.*

Succulent Shrub: *Kleinia longiflora.*

Herbaceous Climbers: *Momordica balsamina, Rhynchosia minima.*

Graminoids: *Aristida bipartita (d), Dichanthium annulatum var. papillosum (d), Ischaemum afrum (d), Setaria incrassata (d), Aristida canescens, Brachiaria eruciformis.*

Herbs: *Aspilia mossambicensis, Indigastrum parviflorum, Nidorella hottentotica, Orthosiphon suffrutescens, Senecio apiifolius.*

Biogeographically Important Taxon (Central Bushveld endemic) Graminoid: *Mosdenia leptostachys*

Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered (EN). The national target for conservation protection for both these vegetation types is 19%, but only 1% is statutorily conserved, mainly in the mainly in the Mkombo Nature Reserve. Approximately 49% is transformed, which includes about 45% cultivated area and 3% urban and built-up areas.

5.1.2.3 Expected Flora Species

The POSA database indicates that over 350 species of plants could be expected to occur within and around the project area (Appendix B). Four (4) of the expected species are classified as SCC, based on its conservation status (Table 5-2). Additionally, the species *Combretum imberbe* (Leadwood) and *Sclerocarya birrea* (Marula) are expected to occur across the project area and the species are listed as a nationally protected tree in terms of the National Forests Act, No. 84 of 1998.

Table 5-2 SCC flora species that may occur within the project area

Family	Species	Author	IUCN	Ecology
Anacardiaceae	*Sclerocarya birrea*	(A.Rich.) Hochst. subsp. caffra (Sond.) Kokwaro	LC (Protected)	Indigenous
Apocynaceae	*Stenostelma umbelluliferum*	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Cleomaceae	*Cleome conrathii*	Burtt Davy	NT	Indigenous
Combretaceae	*Combretum imberbe*	Wawra var. dielsii Engl.	LC (Protected)	Indigenous
Cucurbitaceae	*Cucumis humofructus*	Stent	VU	Indigenous
Fabaceae	*Cullen holubii*	(Burtt Davy) C.H.Stirt.	VU	Indigenous; Endemic

5.1.3 Fauna Assessment

This section of the report details the lists of expected SCC fauna species that may occur within the project area, where the fauna species considered include mammals, reptiles, and amphibians. Where the likelihood of a particular species occurring within the project area is rated by the specialist as being either moderate or high, based on the known habitat and prey/forage preferences of a particular species (linked with the field survey data obtained), the relevant species is then further discussed below a given table.

5.1.3.1 Mammals

The IUCN Red List Spatial Data lists 155 mammal species that could be expected to occur within the area (Appendix C). This excludes large mammal species that are typically limited to protected area. Twenty four (24) (small - medium non protected area restricted species) of these expected species are regarded as threatened (Table 5-3), seventeen of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area. The project area is utilised as a game farm and as such various antelope and game species could be introduced to the area, however, *Giraffa Camelopardalis* (Giraffe) and *Equus quagga* (Plains Zebra) were the only SCC recorded to be introduced across the project area. Descriptions of species with a moderate likelihood of occurrence are discussed below.

Table 5-3 SCC mammal species that may occur within the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
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
Damaliscus lunatus	Tsessebe	VU	LC	Low
Damaliscus pygargus ssp. pygargus	Bontebok	VU	VU	Low
Dasymys incomtus	African Marsh rat	NT	LC	Low
Dasymys robertsii	Robert's Marsh Rat	VU	Unlisted	Low
Equus quagga	Plains Zebra	LC	NT	Confirmed
Equus zebra hartmannae	Hartmann's Mountain Zebra	VU	VU	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Giraffa camelopardalis	Giraffe	LC	VU	Confirmed
Hippotragus equinus	Roan Antelope	EN	LC	Low
Hippotragus niger	Sable Antelope	VU	LC	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Moderate
Neamblysomus julianae	Juliana's Golden Mole	EN	EN	Low
Otomys auratus	Vlei Rat (Grassland type)	NT	NT	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Moderate
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate
Redunca fulvorufula	Mountain Reedbuck	EN	EN	Low
Rhinolophus blasii	Blasius's horseshoe bat	NT	LC	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Atelerix frontalis (South African Hedgehog) has a tolerance to a degree for 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. Suitable grasslands occur in the project area, although somewhat disturbed, that can function as habitat for this species, as such the likelihood of occurrence is rated as moderate.

Equus quagga (Plains Zebra) occurs from the northern region of South Africa northwards to southern Sudan and Ethiopia, and westwards into northern Namibia and southern Angola. Plains Zebra thrive across a broad range of habitats in Africa within both tropical and temperate climates. Within the assessment region, migration does take place within transfrontier parks, such as KNP and the Greater Mapungubwe Transfrontier Conservation Area (TFCA), however the remaining population is typically restricted to private, provincial and national protected areas. This species was confirmed to be present within the project area during the site visit.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring, is small in size and is nocturnal. These factors have contributed to a lack of

information on this species. The highest densities of this species have been recorded in the more arid Karoo region of South Africa. The habitat in the project area can be considered to be somewhat suitable for the species and the likelihood of occurrence is therefore rated as moderate.

Giraffa Camelopardalis (Giraffe) is listed as Least Concern (LC) on a regional scale and Vulnerable (VU) on a global scale. Giraffes are most often found in savanna/woodland habitats, but range widely throughout Africa. They are browsers that subsist on a variable diet that includes leaves, stems, flowers, and fruits. This species was confirmed to be present within the project area during the site visit.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the project area is high. The presence of medium to large herbivores increases the likelihood of occurrence of this species.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Due to the presence of grassland areas in the project area the likelihood of occurrence for this species 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 project area and the likelihood of occurrence of this species is therefore considered to be moderate.

5.1.3.2 Reptiles

Based on the IUCN Red List spatial database and the ReptileMap database, 100 reptile species may be expected to occur within and nearby to the project area (Appendix D). Three (3) is regarded as SCC (Table 5-4). Of the three species two have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

Table 5-4 SCC reptile species that may occur within the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Lygodactylus waterbergensis	Waterberg Dwarf Gecko	NT	LC	Moderate
Pseudocordylus transvaalensis	Nothern Crag Lizard	NT	LC	Low

Lygodactylus waterbergensis (Waterberg Dwarf Gecko) is classified as Near Threatened 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 across the project area is moderate.

5.1.3.3 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 31 amphibian species are expected to occur within the area (Appendix E). One (1) is regarded as threatened (Table 5-5). Due to no rivers and natural wetlands present within the project area the likelihood of occurrence is rated as low.

Table 5-5 SCC amphibian species that may occur within the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Low

5.2 Biodiversity Field Survey

The following sections discuss the results from the field survey that was conducted for the proposed project, which was undertaken from the 24th to the 27th of October 2022.

5.2.1 Flora Survey

This section is further divided into two subsections:

- Indigenous flora recorded; and
- Invasive Alien Plants (IAPs) of the project area.

5.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area. Various indigenous species associated with the Sprinbokvlakte Thornveld vegetation type were observed across the project area. The dominant floral species observed included *Vachellia karroo, Senegalia mellifera, Vachellia nilotica, Ziziphus mucronate, Vachellia tortilis, Grewia flava, Sclerocarya birrea subsp. Caffra, Euclea undulata, Combretum imberbe, Asparagus laricinus, Aristida bipartite, Senecio apiifolius* and *Nidorella hottentotica.*

The Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003) provides for the consolidation and amendment of the environmental management legislation of, or assigned to the Province, and to provide for matters incidental thereto. In particular, Schedule 11 (Specially protected plants) and Schedule 12 (Protected plants) have relevance to this section. The species *Scadoxus puniceus* and *Aloe greatheadii* were found within the project area and is considered to be protected plants under Schedule 12 of LEMA.

During the field assessment 2 species of protected trees were observed: *Combretum imberbe* (Leadwood), and *Sclerocarya birrea subsp. caffra* (Marula). 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 license 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 information only provides an overview of the protected trees recorded on site and is not a representation of all the specimens present. It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development. Refer to the Figure 5-11 for photos of flora species observed and to Figure 5-12 for the locations of the protected trees.

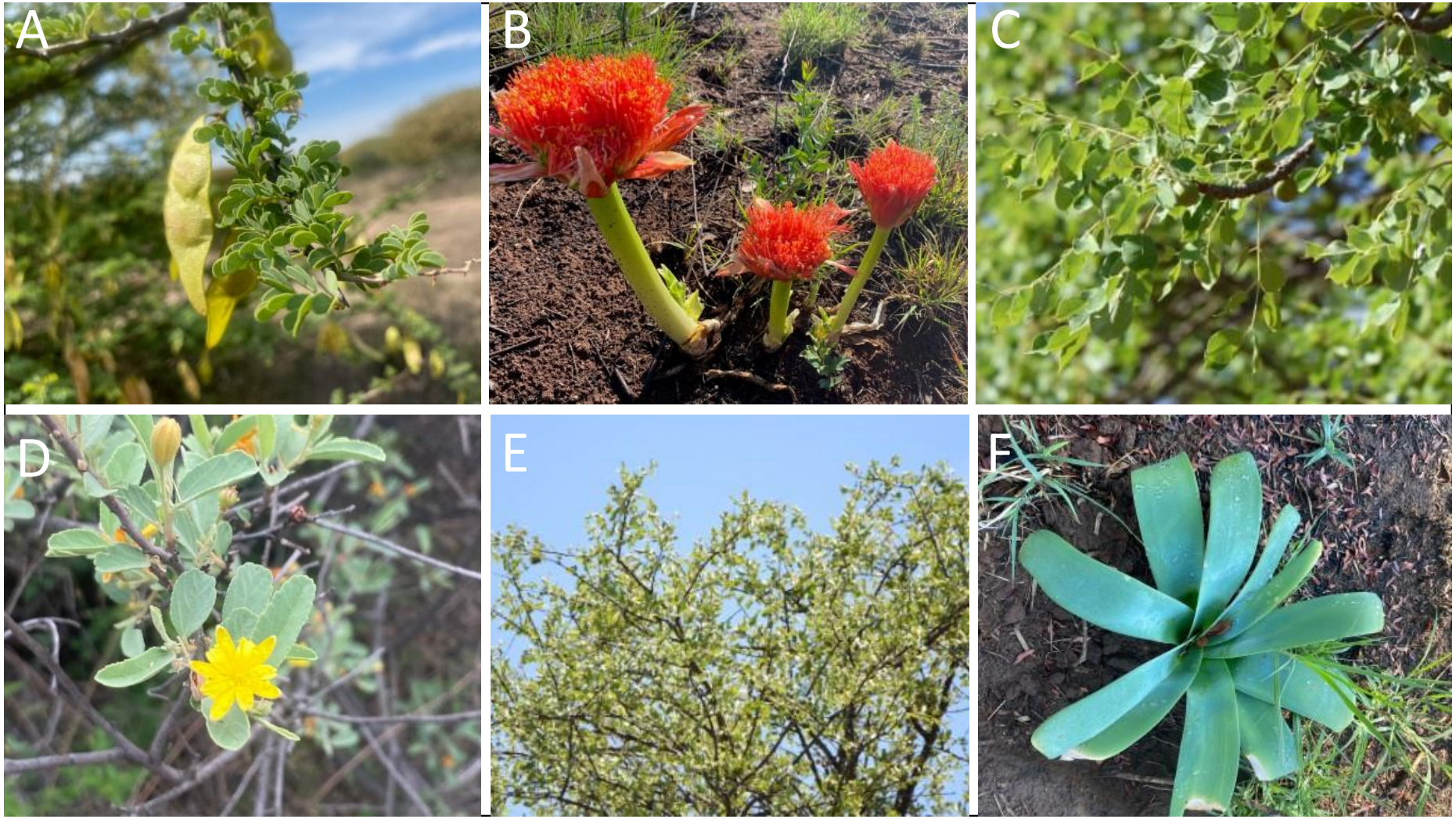


Figure 5-11 ***Photographs illustrating some of the flora species recorded – A) Senegalia mellifera; B) Scadoxus puniceus (Provincially Protected); C) Sclerocarya birrea subsp. Caffra (Protected); D) Grewia flava; E) Combretum imberbe (Protected) and F) Ammocharis coranica.***

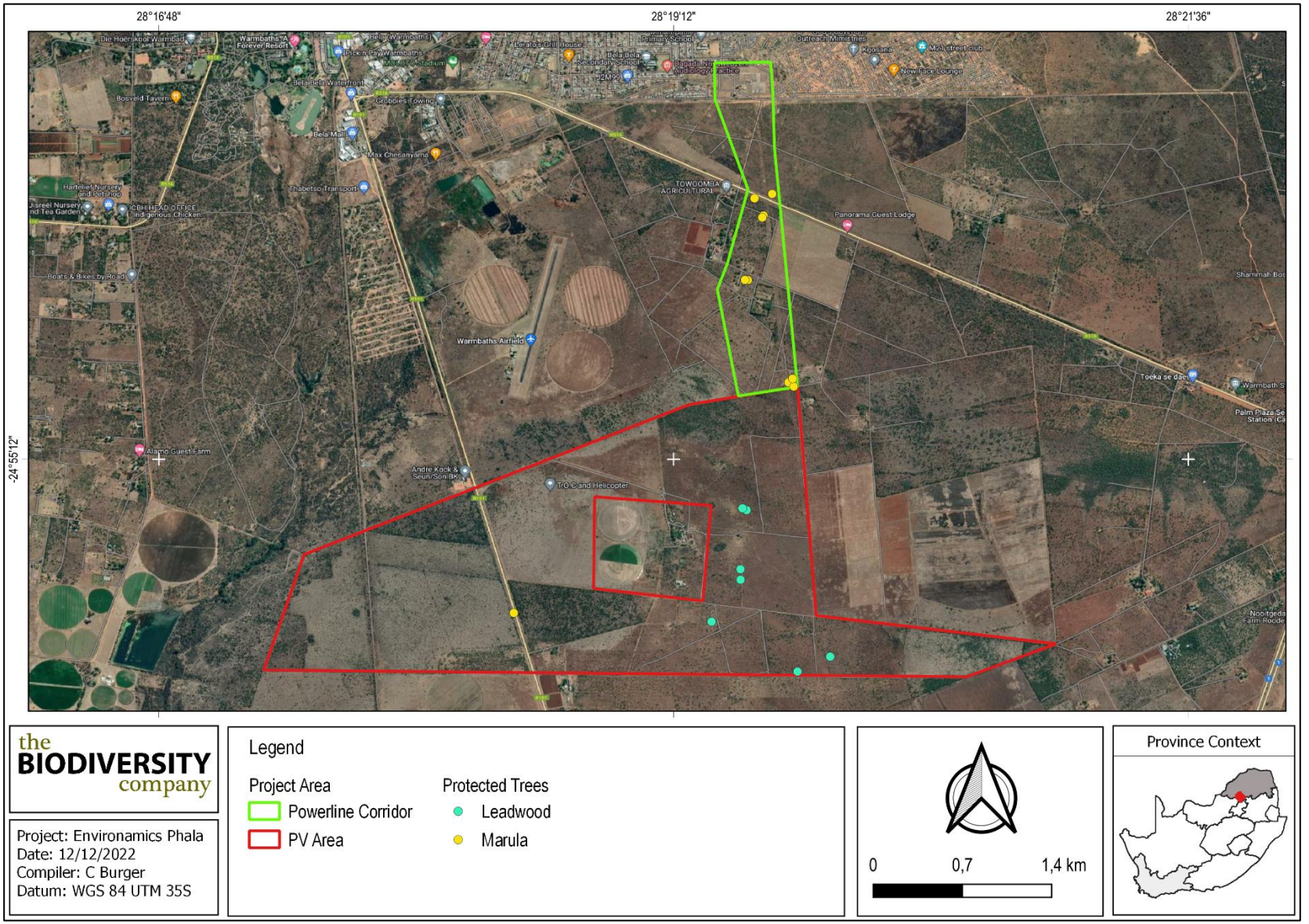


Figure 5-12 Map illustrating the location of protected flora recorded along the project area

5.2.1.2 Invasive Alien Plants

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 18 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 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 NEM:BA:

- **Category 1a:** Invasive species requiring compulsory eradication. 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. Species existing outside of a regulated area shall be classified as category 1b.

- **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 as these will be classified as category 1b species.

Note that according to the regulations, any 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 NEM:BA;
    - The relevant local invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

Eight (8) IAP species were recorded during the field survey, of which five (5) are Category 1b species which must be controlled through the implementation of an IAP Management Programme (Table 5-6). Photographs of the observed species are presented in Figure 5-13 below.

Table 5-6 Alien and Invasive plant species recorded in the project area

Family	Scientific Name	Common Name	NEMBA Category
Papaveraceae	*Argemone mexicana*	Yellow-flowered Mexican poppy	Category 1b
Asteraceae	*Bidens pilosa*	Blackjack	
Asteraceae	*Cirsium vulgare*	Spear Thistle, Scotch Thistle	Category 1b
Asteraceae	*Conyza bonariensis*	Flax-leaf Fleabane	
Cactaceae	*Opuntia ficus-indica*	Mission Prickly Pear, Sweet Prickly Pear	Category 1b
Solanaceae	*Solanum sisymbriifolium*	Wild Tomato, Dense; Thorned Bitter Apple	Category 1b
Asteraceae	*Tagetes minuta*	Khaki Bush, Khaki Weed, African Marigold	
Verbenaceae	*Verbena bonariensis*	Wild Verbena	Category 1b

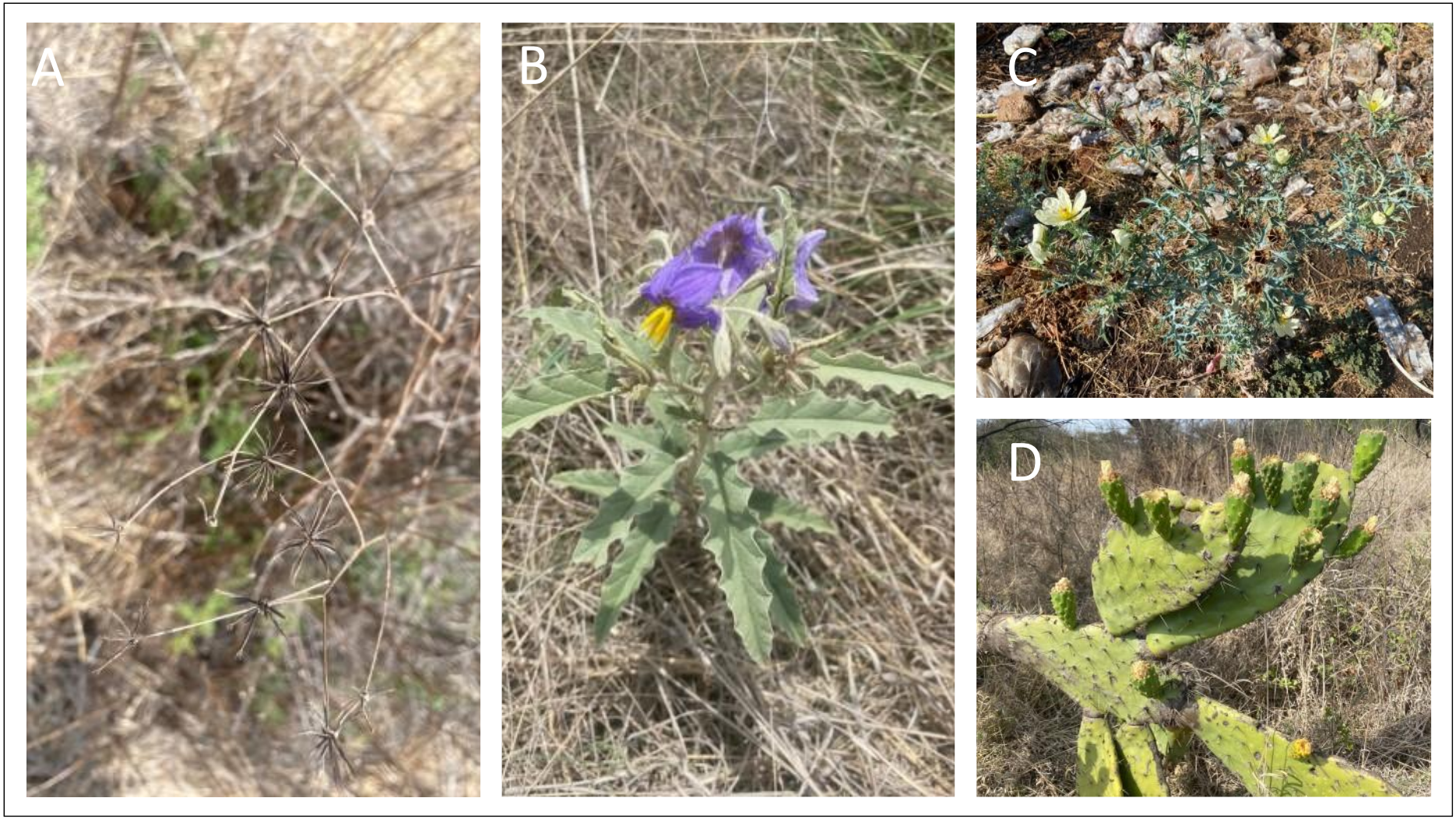


Figure 5-13 ***Photographs illustrating the IAP flora species recorded within the project area – A) Bidens pilosa; B) Solanum sisymbriifolium; C) Argemone mexicana and D) Opuntia ficus-indica.***

5.2.2 Fauna Survey

Mammal activity was good, where twelve (12) mammal species were recorded, either through direct observations or evidence of species. Two (2) reptile species were recorded (Table 5-7) and no amphibian species were observed during the survey. However, there is the possibility of at least several reptile species being present, as certain reptile species are secretive and require longer-term surveys in order to ensure adequate sampling. Due to the lack of suitable aquatic habitat across the project area limited amphibian species are expected to occur.

The species *Equus quagga* (Plains Zebra) listed as LC regionally but as NT internationally and *Giraffa camelopardalis* (Giraffe) listed as LC regionally but as VU internationally were observed within the project area. These species are considered to be introduced to the area since portions of the project area is utilised as a game farm.

Refer to Figure 5-14 and Figure 5-15 for photographs of some of the recorded fauna species.

Table 5-7 The fauna species recorded during the field survey

Species	Common Name	Conservation Status	
		SANBI (2022)	IUCN (2021)
	Mammals		
Aepyceros melampus	Impala	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus pygargus	Blesbok	LC	LC
Equus quagga	**Plains Zebra**	**LC**	**NT**
Giraffa camelopardalis	**Giraffe**	**LC**	**VU**
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Tragelaphus oryx	Common Eland	LC	LC
Tragelaphus strepsiceros	Greater Kudu	LC	LC
	Reptiles		
Pelusios sinuatus	Serrated Hinged Terrapin	LC	Unlisted
Trachylepis punctatissima	Speckled Rock Skink	LC	LC

Note: For results pertaining to the avifaunal species of the area refer to the avifaunal specialist assessment report.

Figure 5-14 ***Photographs: Mammal species and/or sign thereof recorded during the survey – A) Cynictis penicillate (Yellow Mongoose); B) Giraffa camelopardalis (Giraffe) (VU); C) Lepus saxatilis (Scrub Hare); D) Tragelaphus strepsiceros (Greater Kudu); and E) Equus quagga (Plains Zebra) (NT).***

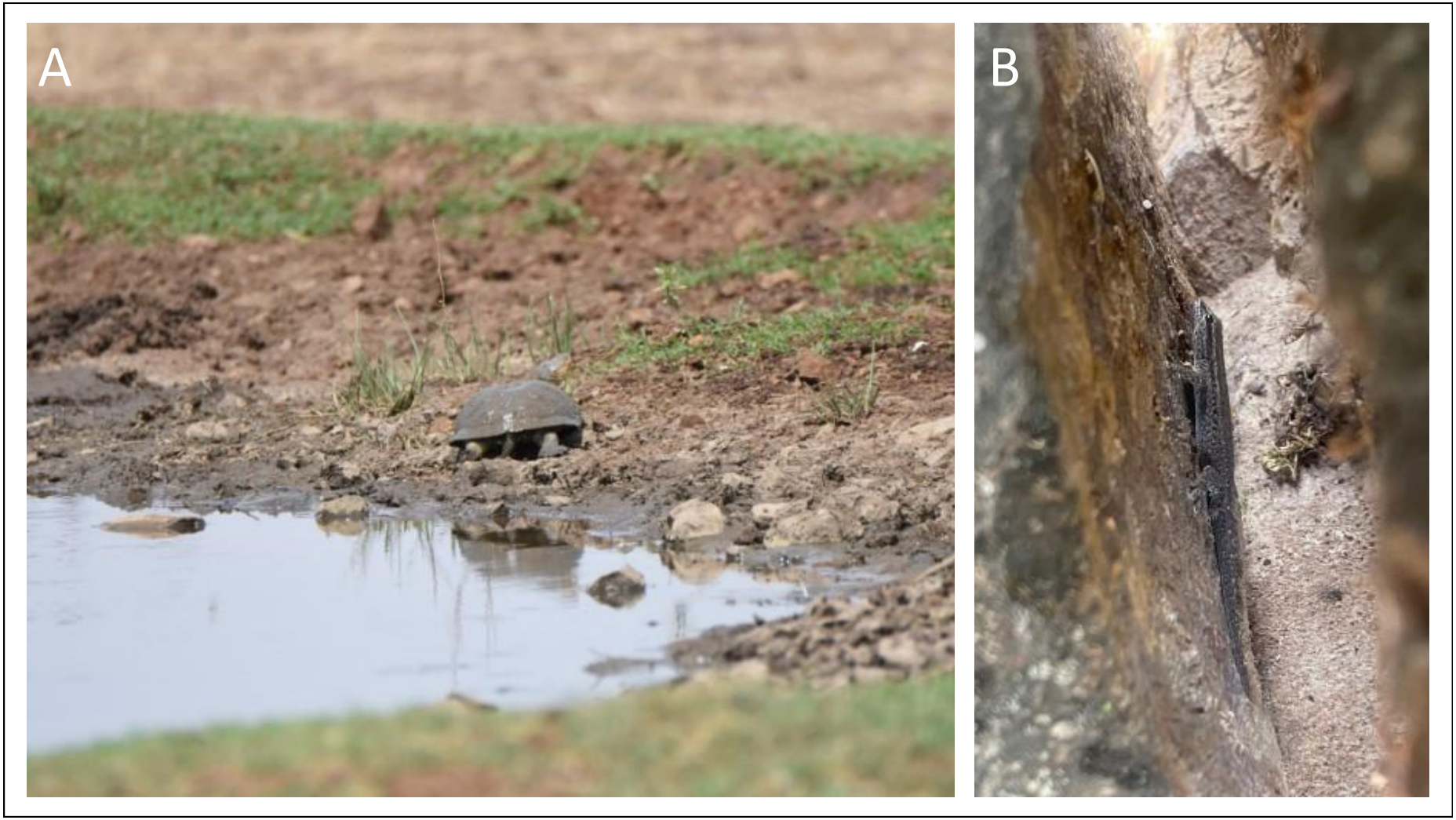


Figure 5-15 Photographs: Reptile species recorded during the survey – A) Pelusios sinuatus (Serrated Hinged Terrapin) and B) Trachylepis punctatissima (Speckled Rock Skink).

5.3 Habitat Assessment

The main habitat types identified across the project 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 5-16. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC.

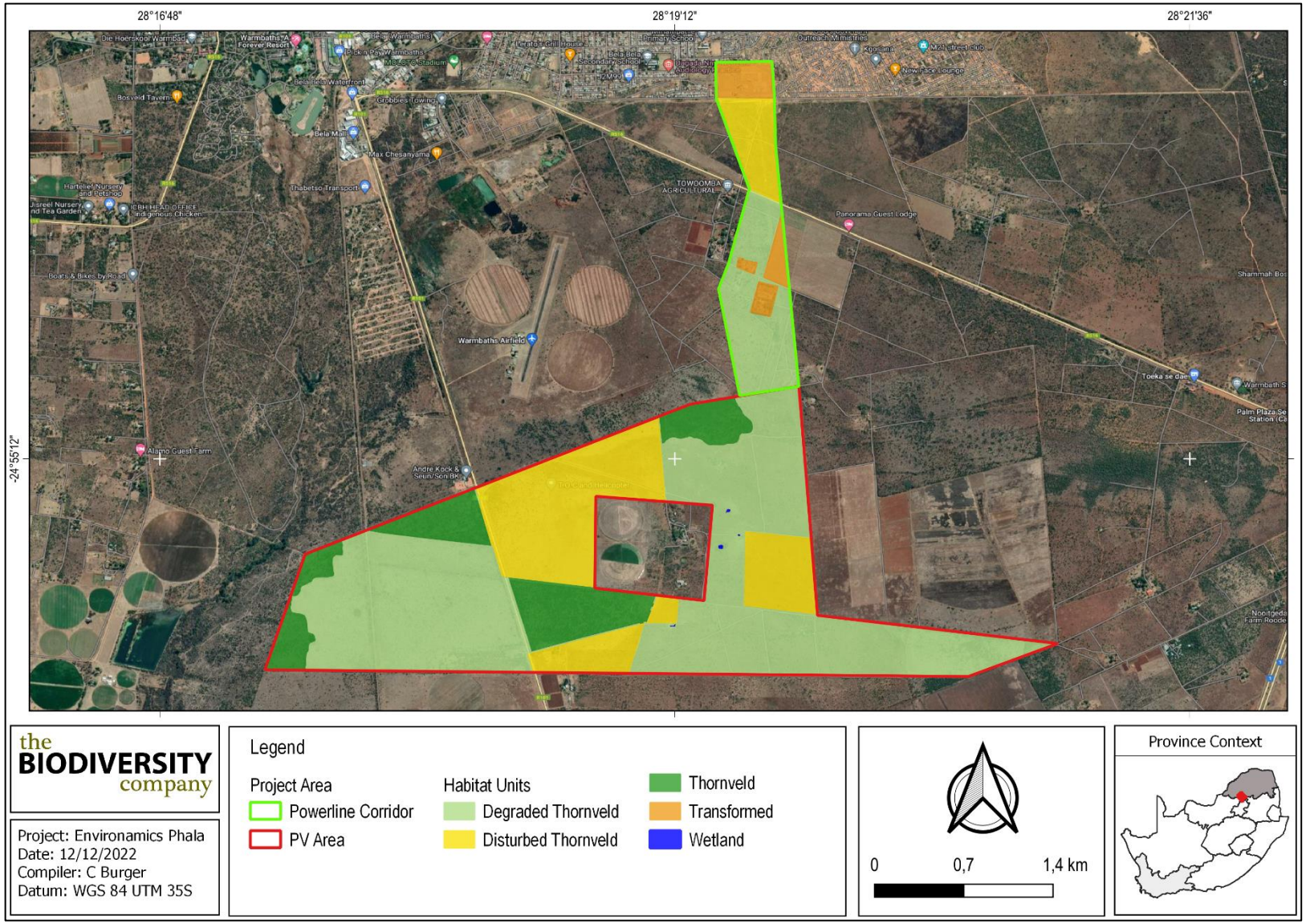


Figure 5-16 Map illustrating the habitats identified in the project area

5.3.1 Thornveld

Four portions associated with the western and central section of the project area were identified to be thornveld habitat and is typically characterised by dense stands of large trees of the species *Vachellia, Senegalia,* and *Ziziphus* clustered together accompanied by tall shrubs and grass species (Figure 5-17). This habitat is considered to be in a largely natural state and still representative of the Springbokvlakte thornveld vegetation type as limited negative impacts occurred across these areas. The dominant vegetation across the habitat unit included *Vachellia karroo, Senegalia mellifera, Vachellia nilotica, Ziziphus mucronate, Vachellia tortilis, Grewia flava, Sclerocarya birrea subsp. Caffra, Euclea undulata, Combretum imberbe, Asparagus laricinus, and Aristida bipartite.*

This habitat unit can be regarded as important, not only within the local landscape, but also regionally. The unit functions as remaining greenfields which supports viable indigenous plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a fragmented landscape. The habitat sensitivity is regarded as high sensitivity due to the role of this intact habitat to biodiversity within an area being more fragmented locally, which is supported by the various ecological datasets. This habitat functions as the CBA 1, CBA 2 and ESA 1 as it is classified as well as a viable constituent of a VU ecosystem.

Figure 5-17 A representative photograph of the Thornveld habitat

5.3.2 Degraded Thornveld Habitat

The majority of the project area comprised of degraded thornveld habitat, which is typically characterised by stands of medium size trees and shrubs and were dominated by the species *Vachellia karroo, Senegalia mellifera* and *Grewia flava*. This habitat type is regarded as semi-natural thornveld, but slightly disturbed due to the presence of roads, powerlines, and human infringement as the area is utilised for grazing by both wild game and livestock. The difference between the thornveld habitat, the degraded thornveld and the disturbed thornveld is the extent of the disturbance taken place in each habitat. With the severity of disturbance increasing from the degraded thornveld to the disturbed thornveld.

Alien and invasive species such as *Bidens Pilosa, Tagetes minuta, Conyza bonariensis*, and *Opuntia ficus-indica* were also observed within this habitat unit. As such within the habitat unit there is a

difference in the condition pertaining to some areas being exposed to more invasion by alien vegetation, disturbance from grazing practises and other anthropogenic related activities than others.

During the field assessment 2 species of protected trees were observed within this habitat units: *Combretum imberbe* (Leadwood), and *Sclerocarya birrea subsp. caffra* (Marula). 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).

This habitat unit can also be regarded as important, not only within the local landscape, but also regionally as it supports viable indigenous plant species populations and is also used for foraging by various fauna species.

Figure 5-18 and Figure 5-19 presents a representative photograph of this habitat type.

Figure 5-18 A representative photograph of the Degraded Thornveld habitat

Figure 5-19 A representative photograph of the Degraded Thornveld habitat

5.3.3 Disturbed Thornveld

The disturbed habitat unit can be found along the central, eastern and northern section of the project area. This habitat is regarded as areas that have been impacted more by historic land clearing, mismanagement and land use. Historical vegetation clearing for what is assumed cultivation/agricultural practices has led to an absence of large woody plants and an area dominated by grasses and/or an infestation of alien and invasive vegetation, with current grazing activities by game also taking place within this area. In the northern portion this habitat is located in close proximity to a residential area and is used as a throughfare by local residents and as such has been exposed to impacts such as dumping of waste and harvesting of woody material.

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. 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 thornveld and the transformed areas.

Figure 5-20 and Figure 5-21 presents a representative photograph of this habitat type.

Figure 5-20 A representative photograph of the Disturbed Thornveld habitat

Figure 5-21 A representative photograph of the Disturbed Thornveld habitat

5.3.4 Transformed Habitat

The transformed habitat is associated with the existing substation and agricultural areas located in the northern portion of the powerline corridor area. The transformed area has little to no remaining natural vegetation due to land transformation to accommodate the substation and agricultural activities. These habitats exist in a constant disturbed state as they cannot recover to a more natural state unless through human intervention.

Figure 5-22 presents a photograph of the transformed habitat type.

Figure 5-22 A representative photograph of the Transformed habitat

5.3.5 Wetlands

Wetlands/water resources are identified in the wetland report (TBC, 2022). The ecological integrity, importance and functioning of the wetland areas associated with the project area plays a crucial role as a water resource system and an important habitat for various fauna and flora (Figure 5-23).

Figure 5-23 Illustration of wetland habitat from the project area

5.4 Site Ecological Importance

Based on the criteria provided in section 4.3 of this report, the five delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 5-8 below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in Figure 5-24 below.

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

Table 5-8 Sensitivity summary of the habitat types delineated within the Project Area of Influence

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Thornveld	Medium -Any area of natural habitat of threatened ecosystem type with status of VU	High - Only minor current negative ecological impacts, with no signs of major past disturbance.	**Medium**	Low	**High**
Degraded Thornveld	Medium - Confirmed or highly likely occurrence of populations of NT species	Medium - Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used	**Medium**	Medium	**Medium**

		road network between intact habitat patches.			
Disturbed Thornveld	Medium - > 50% of receptor contains natural habitat with potential to support SCC.	Low - Several minor and major current negative ecological impacts.	**Low**	Medium	**Low**
Wetlands	Medium - Any area of natural habitat of threatened ecosystem type with status of VU.	Medium - Mostly minor current negative ecological impacts with some major impacts.	**Medium**	Medium	**Medium**
Transformed	Low - < 50% of receptor contains natural habitat with limited potential to support SCC	Low - Several minor and major current negative ecological impacts.	**Low**	High	**Very Low**

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

- Very Low: Minimisation mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Medium: Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.
- 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.

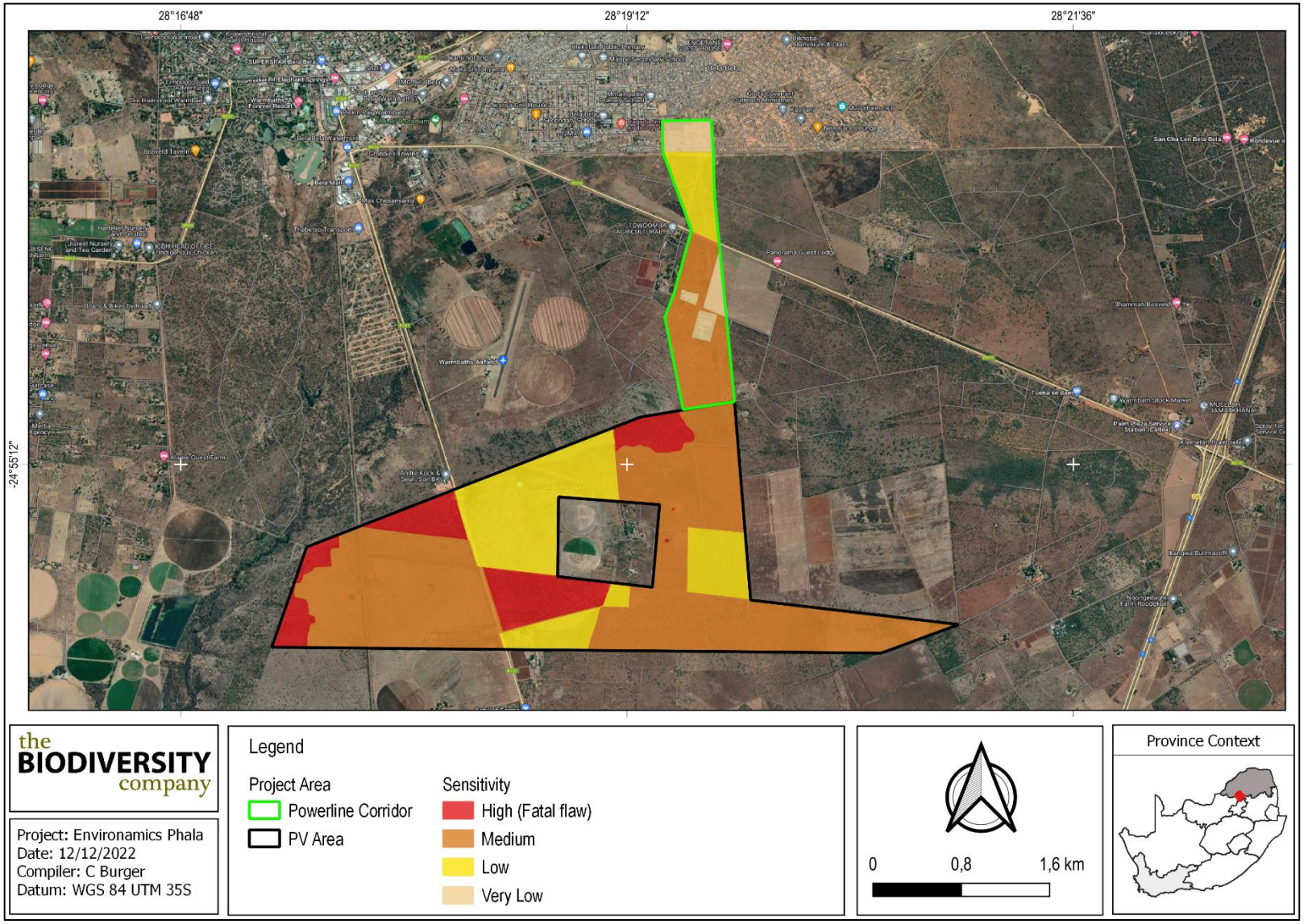
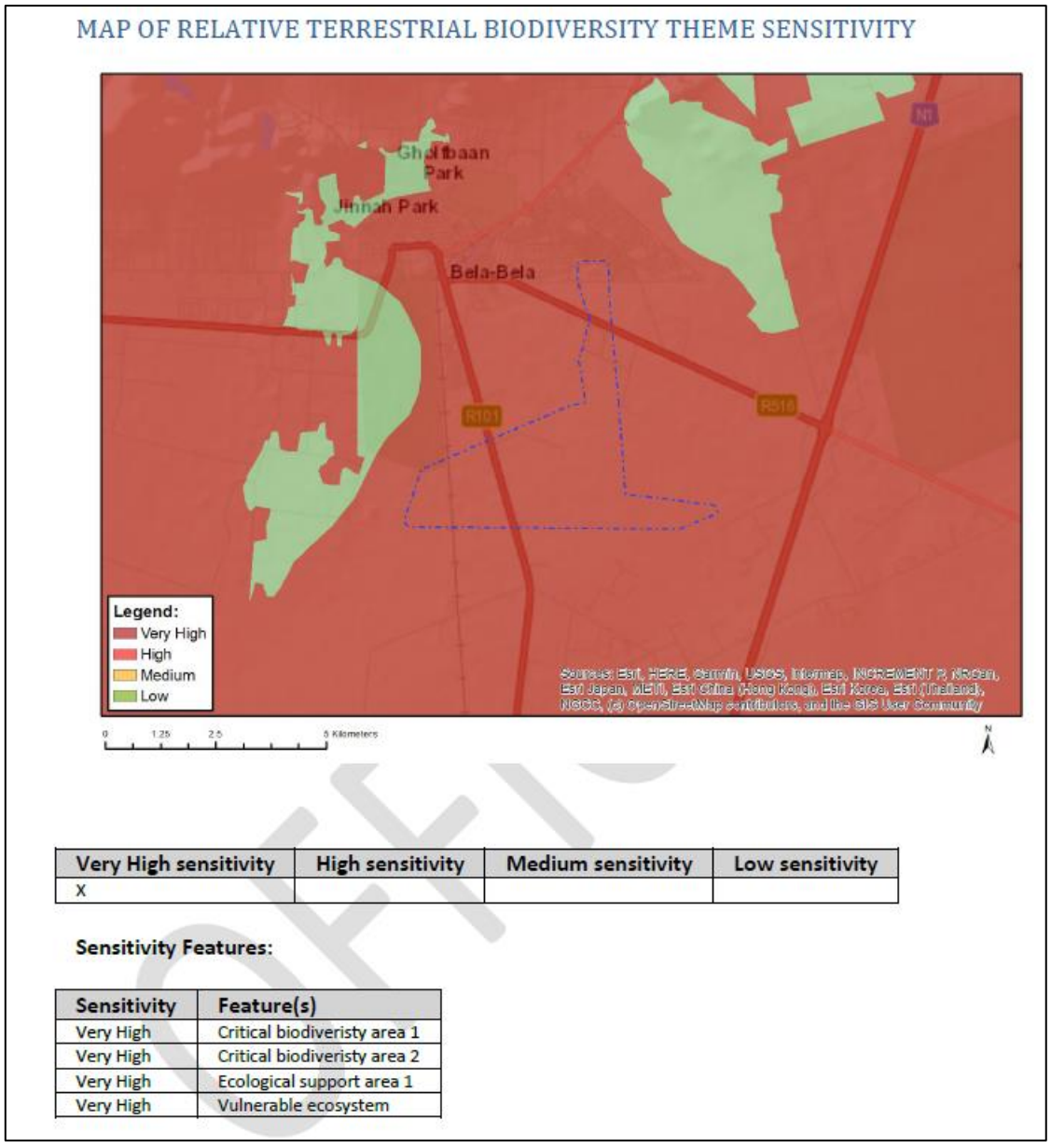


Figure 5-24 Map illustrating the sensitivities of the habitats delineated within the overall project area

5.4.1 Screening Tool Comparison

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the project area overlapping with a CBA 1, CBA 2, ESA 1 and VU Ecosystem (Figure 5-25).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	Ecological support area 1
Very High	Vulnerable ecosystem

Figure 5-25 Terrestrial Biodiversity Theme Sensitivity for the Project Area of Influence (National Environmental Screening Tool, 2022)

The completion of the terrestrial biodiversity assessment confirmed the high sensitivity of the thornveld habitats that overlap with the screening report, but also disputes the high sensitivity assigned to some areas across the project area as these were found to be in a degraded and/or transformed state and as such has been assigned a sensitivity of Medium – Very Low instead.

The screening report classified both the animal and plant species theme as “Medium” sensitivity. Following the findings of the field survey, the animal species theme (from a mammal and herpetofauna perspective) should retain its “medium” sensitivity, based on the confirmed presence of international SCC species (which is considered to be introduced to the area), and the plant species theme should also retain its “Medium” sensitivity due to the presence of certain protected species.

6 Impact Assessment and Management Plan

The sections below serve to outline and summarise the types of perceived impacts from the proposed activities on the terrestrial biodiversity and ecology of the project area. The associated significance of each impact is evaluated as relevant to the local biodiversity and the likely project activities.

6.1 Biodiversity Risk Assessment

6.1.1 Impact Assessment Considerations and Procedure

The project activities will have a negative effect on the natural environment of the area. Anthropogenic activities drive habitat destruction leading to the displacement of fauna and flora and possibly causing direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, foraging and nesting/burrowing sites, and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation is likely to reduce the habitat available for all types of fauna species and hence reduce animal populations and species compositions within the area.

Potential impacts were evaluated against the data captured during the desktop assessment and field survey to identify associated relevance to the habitats within the project area. The impacts associated with the proposed activities were then subjected to a prescribed impact assessment methodology as provided by the client, which is available on request. The planning, decommissioning and/or rehabilitation phases were not considered based on the nature of the likely activities and the associated negatable impacts expected during these phases. Refer to section 6.2 below for the full impact assessment.

6.1.2 Present Impacts to Biodiversity

Considering the fact that anthropogenic activities have historically taken place throughout most of the region, and continue to do so, several significantly negative impacts to biodiversity were observed within and adjacent to the project area. These include:

- Historic land modification largely in the form of road and powerline infrastructure, and the associated land clearing and edge effects;
- Livestock and game grazing;
- Minor and major gravel roads (and associated vehicle traffic and the possibility of wildlife road mortalities);
- Invasive Alien Plant infestations;
- Dumping of waste; and
- Fences and the associated infrastructure.

Figure 6-1 illustrates some of the negative impacts to biodiversity currently observed within and adjacent to the project area.

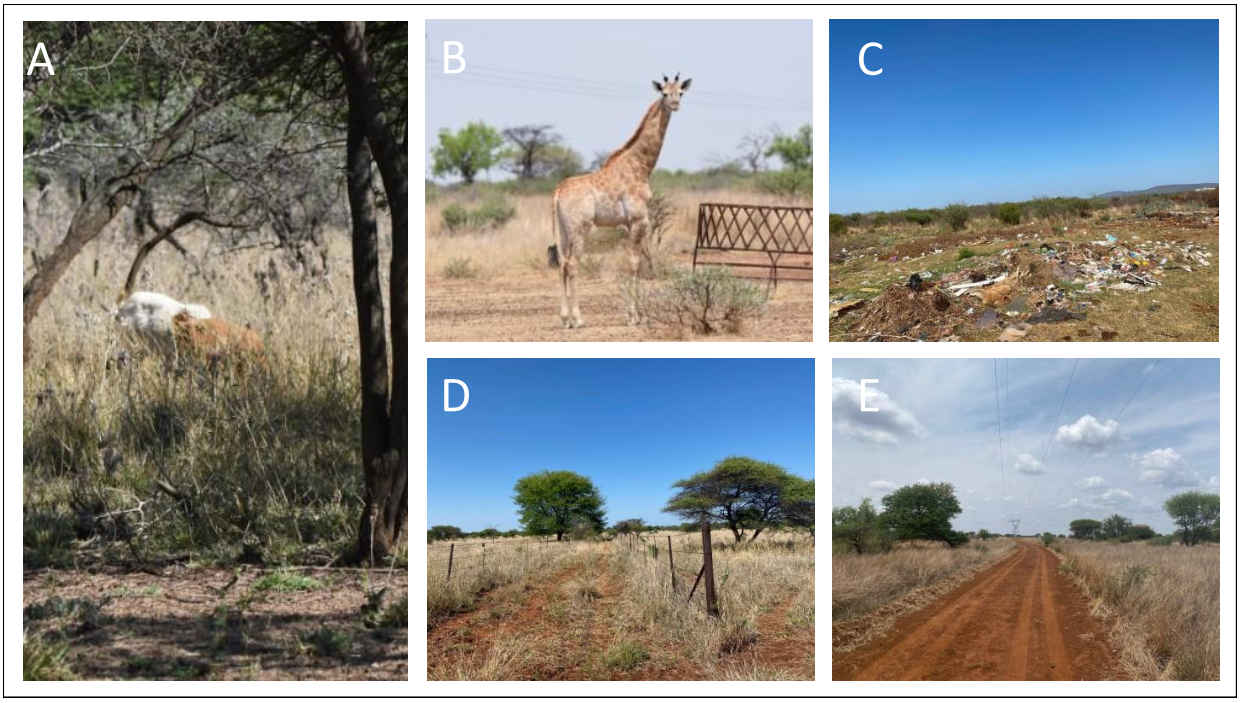


Figure 6-1 ***Photograph illustrating current negative impacts associated with the project area: A & B) Livestock and game grazing, C) Dumping of waste, D) Fences and the associated infrastructure and E) Powerline infrastructure and secondary roads.***

6.1.3 Loss of Irreplaceable Resources

The proposed activities are likely to be of a high impact and relatively large footprint, and the careful placement of certain developments is therefore important so as to minimise the damage to natural resources.

The proposed activities will be conducted over portions of the project area that are comprised of thornveld, degraded thornveld, disturbed thornveld and wetland areas and these sections encompass indigenous vegetation that may be considered functional in nature. Thus, any irresponsible and/or medium to high impact activities will likely result in the loss of the following resources:

- Critical Biodiversity Areas1 (Irreplaceable), Critical Biodiversity Area 2 and Ecological Support Areas;
- Wetland areas providing important foraging resources;
- Protected flora;
- SCC fauna species (through direct mortality during clearing and construction activities, or through indirect mortality via the inappropriate control of waste material); and
- Foraging and traversing routes, and/or burrowing sites, relevant to the wide diversity of fauna that will occasionally make use of the areas.

As the majority of the areas are in a functional state, the loss of these resources would be considered significant. Therefore, mitigations must be put in place and implemented to prevent the total and widespread destruction of valuable natural resources (see section 6.4).

6.1.4 Anticipated Impacts

The project activities will lead to several significant impacts to terrestrial biodiversity, which are presented as an overview in Table 6-1 below. It is important to predict and quantify these impacts so as to assess the magnitude and effect that each may have on the local terrestrial biodiversity and ecology.

The impacts described are to be used as a guideline for the main impact assessment procedure that is to be followed.

Table 6-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project activities that are likely to cause the impact	Secondary impacts anticipated
Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species Development of access roads and servitudes Soil dust precipitation Dumping of waste products Random events such as fire (cooking fires or cigarettes) Walking and driving outside of demarcated routes (roads and paths)	• Displacement/loss of flora & fauna (including SCC); • Loss of protected species; • Increased potential for soil erosion; • Habitat fragmentation; and • Increased potential for the establishment of IAP vegetation.
Spread and/or establishment of Invasive Alien Plants	The removal of indigenous vegetation Vehicles and people spreading seed Unsanitary conditions surrounding infrastructure, promoting the establishment of alien and/or invasive rodents Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	• Habitat loss for native flora & fauna (including SCC); • Spreading of potentially dangerous diseases due to invasive and pest species; • Alteration of fauna assemblages due to habitat modification; and • Displacement of indigenous fauna species
Direct mortality of fauna	Clearing of vegetation and the mass dumping of earth waste Roadkill due to vehicle collision (non-compliance with speed limits etc.) Pollution of water resources due to dust effects, chemical spills, etc. Intentional killing of fauna for food or sale	• Loss of habitat; • Loss of ecosystem services; • Increase in rodent populations and associated disease risk; and • Deterioration of local ecology
Reduced dispersal/migration of fauna	Activities causing significant noise (heavy machinery) Construction of linear infrastructure (large roads and powerlines) Compacted roads Removal of vegetation	• Loss of landscape used as a corridor; • Reduced dispersal/migration of fauna; • Loss of ecosystem services; and • Reduced plant seed dispersal
Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills Erosion Poor maintenance and control of vehicles and machinery Pipe leaks (poor maintenance)	• Faunal mortality (direct and indirect – such as through poisoning); • Groundwater pollution; • Pollution of wetlands and the surrounding environment; and • Loss of ecosystem services

Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, and light pollution	Operation of machinery (Large earth moving machinery, vehicles)	• Disruption/alteration of ecological life cycles due to noise; • Loss of ecosystem services; and • Loss of local faunal community
	Vehicle traffic	
	Large, intense fluorescent and mercury vapor lighting	
Loss of SCCs and/or protected species	All unregulated/unsupervised activities outdoors	• Loss of SCCs and/or protected species; and • Harm to people (dangerous fauna)
	Poaching and trapping	
	Staff and others interacting directly with fauna (potentially dangerous), or flora	

6.1.5 Unplanned Events

The planned activities will have anticipated impacts as discussed above; however, unplanned events may occur on any project, and these could lead to potential impacts which will require appropriate management and response.

Table 6-2 is a summary of the findings of an unplanned event assessment conducted from a terrestrial ecology perspective. Note that not all potential unplanned events may be captured herein, and this process must therefore be managed throughout all phases and according to events that take place or have a high likelihood of taking place.

Table 6-2 Summary of unplanned events, potential impacts and mitigations

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on, and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural savannah.	An appropriate fire management plan needs to be compiled and implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the roads and cleared areas.	A storm water management plan must be compiled and implemented.

6.1.6 Alternatives considered

No alternative footprint layout options were provided by the client and thus it is anticipated that most of the project area will be developed.

6.2 Quantitative Biodiversity Impact Assessment

6.2.1 Overview: Assessment of Impact Significance

The assessment of impact significance considers both pre-mitigation as well as post-mitigation scenarios as relevant to each potential impact. Construction phase, operational phase, and cumulative impacts are discussed and assessed below, and the project specific mitigation actions required to lower the risks of the impacts are provided in section 6.4 of this report. No planning or decommissioning/rehabilitation phases were considered based on the nature of the activities.

6.2.2 Construction Phase Impacts

Four main impacts on the terrestrial biodiversity of the project area were considered for the construction phase of the proposed activities (based on the framework discussed above). This phase refers to the period during site preparation, clearing and construction and is considered to have the largest short-term and direct impact on biodiversity - partly as a result of the high levels of regular activity, and the extensive clearing that usually takes place. The following potential impacts to terrestrial biodiversity

were considered, and these are each assessed for their significance in Table 6-3 and Table 6-4 that follows:

- Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community;
- Introduction of IAP species and invasive fauna;
- Destruction of protected plant species; and
- Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).

All likely impacts are rated as Medium-Highly negative pre-mitigation but may be reduced to Medium-Low significance through the proper implementation of effective mitigation measures. The most important mitigation measures for this phase are as follows:

- Ensure that the site footprint is as small as possible and responsibly positioned, the development area must be properly fenced off during construction;
- Protected plants must be avoided or responsibly transplanted according to a search and rescue plan and a permit must be obtained prior to the relocation;
- Land clearing must be done over at least three days and conducted linearly and successively from the north to south; and
- No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard.

Table 6-3 Construction phase Impact Assessment – Pre Mitigation

Impact	Pre Mitigation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	2	4	3	3	3	4	3	
	Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Introduction of IAP species and invasive fauna.	2	4	3	2	3	4	2	
	Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**
Destruction of protected plant species	2	4	3	4	3	4	3	
	Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Irreversible: The impact is irreversible and no mitigation measures exist.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**

	3	3	4	3	3	4	3	
Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Province/region: Will affect the entire province or region.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Permanent: The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**

Table 6-4 Construction phase Impact Assessment – Post Mitigation

Impact	Post Mitigation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	1	4	2	3	3	3	2	
	Site: The impact will only affect the site.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**
Introduction of IAP species and invasive fauna.	1	3	2	2	2	3	2	
	Site: The impact will only affect the site.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Destruction of protected plant species	1	4	3	3	2	3	3	
	Site: The impact will only affect the site.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component, and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease.	**Negative Medium Impact**

			thereafter (10 – 30 years).				High costs of rehabilitation and remediation.	
Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	2	2	3	2	3	3	2	
	Local/district: Will affect the local area or district.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**

6.2.3 Operational Phase Impacts

The impacts of daily activities associated with the operational phase of the project are anticipated to further spread the IAP species, and lead to the further deterioration of habitats due to the continuing presence of dust and other edge effect impacts. Dust inhibits the ability of plants to photosynthesize and thus leads to the degradation of surrounding natural areas. Additionally, moving maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will also lead to displacement and direct faunal mortalities due to collisions.

The operational phase is often the longest phase of a project and as such the effects from impacts have the opportunity to cumulate over long periods of time and cause significant cumulative damage to the environment. It is important to actively and continuously implement and update the relevant mitigation measures for this phase so as to effectively reduce this compounding effect.

The following potential impacts were considered for this phase of the project, and these are each assessed for their significance in Table 6-5 and Table 6-6 below:

- Continued fragmentation and degradation of natural habitats and ecosystems;
- Continuing spread of IAP and weed species; and
- Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.).

All potential impacts may be reduced from a significance rating of High-Medium to Low with the proper implementation of ongoing mitigation measures. The most important mitigation measures to implement during this phase include:

- The continual usage of the same roadways, parking areas and walkways, and the following of speed limits;
- The monitoring of, and enforcement against, any illegal hunting, poaching, and/or trapping activities;
- The responsible management of all waste; and
- An IAP management and habitat rehabilitation plan must be implemented and updated annually.

Table 6-5 Operational phase Impact Assessment – Pre-Mitigation

Impact	Pre Mitigation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Continued fragmentation and degradation of natural habitats and ecosystems.	2	3	3	2	3	4	2	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**
Continuing spread of IAP and weed species.	2	3	3	2	3	4	3	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.).	3	3	4	3	3	4	3	
	Province/region: Will affect the entire province or region.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Permanent: The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**

Table 6-6 Operational phase Impact Assessment – Post Mitigation

Impact	Post Mitigation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Continued fragmentation and degradation of natural habitats and ecosystems.	1	2	2	2	2	3	2	
	Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Continuing spread of IAP and weed species.	1	3	2	2	2	3	2	
	Site: The impact will only affect the site.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.).	2	2	3	2	2	3	2	
	Local/district: Will affect the local area or district.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

6.2.4 Cumulative Impacts

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts pre-existing in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on local fauna and flora specifically.

Cumulative impacts are assessed within the context of the extent of the proposed project area, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include those from operations that are close enough (within 30 km) to potentially cause additive effects on the local environment or any sensitive receptors (relevant operations include nearby large road networks, other solar PV facilities, and power infrastructure). Relevant impacts include the overall reduction of foraging and nesting/burrowing habitat, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, and groundwater and surface water quality depletion.

Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

In order to spatially quantify the cumulative effects of the proposed development, the project in isolation is compared with the overall effects of surrounding development (including total transformation and transformation as a result of new and proposed developments of a similar type, i.e., solar).

According to the 2018 National Biodiversity Assessment, the total amount of Sprinbokvlakte Thornveld habitat within 30 km of the project amounts to 217 816,76 ha, but when considering the transformation that has taken place within this radius – only 931 66,28 ha remains. Therefore, the area within 30 km of the project has experienced approximately 42,77 % loss in natural Springbokvlakte Thornveld habitat. Considering this context, the project footprint is 857,66 ha (assuming the total extent of the project area is developed), and two (2) additional similar project exists in the 30 km region measuring a maximum of 2974,17 ha (as per the latest South African Renewable Energy EIA Application Database). This means that the total amount of remaining habitat lost as a result of solar projects in the region amounts to 4,11% (the sum of all related developments as a percentage of the total remaining habitat). Table 6-7 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 6-7 Loss of Springbokvlakte Thornveld habitat within a 30 km radius of the project

	Total Habitat (ha)	Tot. Remaining Habitat (ha)	Total Historical Loss	Project Footprint (ha)	Similar Projects (ha)	Cumulative Habitat Lost
Solar development cumulative effects (Spatial)	217 816,76	931 66,28	**42,77%**	857,66	2974,17	**4,11%**

The overall cumulative impact assessment is presented in Table 6-8 and Table 6-9 below. Note that this also accounts for the relative importance of the habitats within and adjacent to the project area, in the context of the value of the regional habitat.

Approximately 42,77 % of the Springbokvlakte Thornveld vegetation type has been lost, and as discussed above the proposed development will result in a further loss of approximately 4,11 % from only similar developments (Solar) in the area, as such the cumulative impact from the proposed development is rated as "medium". It is imperative that careful spatial management and planning of the

entire region be a priority, and existing large infrastructure projects must be carefully monitored over the long term.

Table 6-8 Cumulative Impacts to biodiversity associated with the proposed project – Project in Isolation

Impact	Project in Isolation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	1	4	3	2	2	2	2	
	Site: The impact will only affect the site.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 6-9 Cumulative Impacts to biodiversity associated with the proposed project – Cumulative Effect

Impact	Cumulative Effect							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	3	4	3	3	3	3	2	
	Province/region : Will affect the entire province or region.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**

			processes thereafter (10 – 30 years).					

6.3 No-Go Scenario

The current land use is predominantly grazing and foraging habitat for local indigenous fauna (as well as herds of game and livestock), and the associated impacts caused by this to the terrestrial ecology is considered to be low to medium. If the land use is well managed, then the long-term impacts to the local ecology will continue to be low to medium - this will require that grazing areas are rotated, alien and invasive species be removed and controlled, grazing capacities are sustained, and stocking densities are controlled. Under the current circumstances, the 'no-go' alternative is considered to represent a low to medium long-term negative impact on the environment. However, it is noted that if the grazing land use is left unmanaged for the foreseeable future, and the alien and invasive species are not eradicated, it is probable that the ecological integrity and functioning of the grassland area will deteriorate.

6.4 Impact Management and Mitigation Plan

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr), and possible biodiversity management programme, for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 6-10 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators relative to the terrestrial assessment.

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

- Prevent the significant loss and fragmentation of vegetation communities within the ESA/CBA areas within the project area and the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of fauna species;
- Prevent the direct and indirect loss and disturbance of flora and fauna species and communities, including SCC and protected species; and
- Adequately follow the guidelines for interpreting the Site Ecological Importance ratings assigned to the project area (see Table 4-6).

Special attention must be paid to the 'Vegetation and Habitats' and 'Fauna' sections below as these sections provide recommended and important mitigation measures pertaining to the confirmed SCC and protected species.

Table 6-10 Project specific mitigation measures including requirements for timeframes, roles and responsibilities

Management outcome: Vegetation and Habitats				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Brush cutting should be implemented beneath the panels, no vegetation clearing should be permitted as far as possible.	Construction Phase	Project manager & Environmental Officer	Development footprint	Ongoing
Areas rated as High sensitivity in proximity to the development areas must be avoided as much is feasible. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. Mitigated development in medium sensitivity areas is permissible.	Planning and Construction Phase	Project manager, Environmental Officer, Contractor	Environmental Control Officer	Monthly
Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
All laydown, chemical toilets etc. should be restricted to Low and Very 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 phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials where possible. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Contractor/Operator, Environmental Officer & Design Engineer	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual to be removed or destroyed due to the development. High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected plants should be relocated where feasible. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process.	Construction/Operational Phase	Project manager, Environmental Officer, Contractor/Operator	Environmental Control Officer during construction and the developer's Environmental Officer during operation	Monthly
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
Existing access routes, especially roads, must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing

Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • **Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.** • **No servicing of equipment on site unless necessary.** • **All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.** • **Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.** • **Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.** • **All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.**	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
It must 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 would have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
All construction waste must be removed from site at the closure of the construction phase.	Construction phase	Environmental Officer & Contractor	Construction waste	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	

	Phase	Responsible Party	Aspect	Frequency
A qualified Environmental Control Officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season. Should any SCC be noted and/or the 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 SCC	During phase
Clearing and disturbance activities must be conducted in a progressive linear manner, from the north to the south of the project area and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.	Construction Phase	Environmental Officer & Contractor	Progressive land clearing operations and the movement of fauna	Ongoing
The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard.	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 be enforced to ensure that road kills 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	Ongoing

Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed every 50 m, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.	Planning and construction	Environmental Officer & Contractor, Engineer	Fauna movement corridor	Ongoing
Use environmentally friendly cleaning and dust suppressant products.	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed.	Planning/Construction Phase	Environmental Officer & Design Engineer	Areas not to be developed and construction direction	Ongoing

Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition.	Life of operation	Project manager, Environmental Officer & Contractor	Manage and 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. Footprints of the roads must be kept to prescribed widths.	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. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas.	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 to control pests.	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 must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. **No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.**	Construction phase	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 effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.	Construction Phase	Environmental Officer & Contractor	Cement mixing and spills	Every occurrence
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste	Ongoing

Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste	Ongoing
Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors are 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 sensitive flora and fauna species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.** **Contractors and employees must all undergo the induction and must be made aware of the sensitive areas to be avoided.**	Pre-construction phase	Health and Safety Officer, Environmental 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. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Only existing access routes and walking paths may 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 etc.	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

7 Conclusion and Impact Statement

The project 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, land clearing and the subsequent mismanagement has led to the deterioration of most of the area to a disturbed habitat that has not recovered since.

However, the Thornveld habitat in the wider project area can be regarded as important, not only within the local landscape, but also regionally; as it remains functional and serves as an important greenfields area that supports indigenous flora and fauna, including fauna SCC and protected tree species. The Thornveld habitat in the project area have a High ecological theme sensitivity.

During the field assessment 2 species of protected trees were observed: *Combretum imberbe* (Leadwood) and *Sclerocarya birrea subsp. caffra* (Marula). Additionally, the species *Scadoxus puniceus* and *Aloe greatheadii* were found within the project area and is considered to be protected plants under Schedule 12 of the LEMA. It is of importance that a search a rescue along with permit applications be done prior to the commencement of the development. *Equus quagga* (Plains Zebra) listed as LC regionally but as NT internationally and *Giraffa camelopardalis* (Giraffe) listed as LC regionally but as VU internationally were observed within the project area. These species are considered to be introduced to the area since portions of the project area is utilised as a game farm.

The sensitivity of the majority of the project area were classified as medium and high, which means as per the SEI guidelines the following is applicable to the project area:

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

Development within the high sensitivity areas within the project area 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.

7.1 Impact Statement

The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of CBA1, CBA2 and ESA1 areas);
- Degradation of surrounding habitat;
- Destruction of protected flora;
- Disturbance and displacement of SCC fauna (including direct mortality of fauna); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from ‘Medium’ – ‘High’ to ‘Medium-Low’). Considering

that this area that has been identified as being of significance for biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed in Medium, Low and Very Low areas but with caution and only with the implementation of mitigation measures.

The cumulative impact of the project, taking into account the transformation of surrounding land, is rated as 'medium' and as such it is important to consider careful regional spatial planning and management in order to maintain the functionality of the remaining corridors of habitat.

It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

7.2 Specialist Recommendations

It is recommended that a wet season walkthrough of the project area be conducted, and a plant rescue and protection plan be developed for the proposed project, and implemented prior to the start of the construction phase. This is to limit the loss of both provincially and nationally protected plant species that were confirmed to occur within the project area.

All 'High' sensitivity habitat features (Thornveld Habitat) are considered 'fatal flaw' areas and should be avoided. These areas represent important and unique biodiversity resources within a degraded landscape and some still serve as Critical Biodiversity Areas considered important for reaching biodiversity targets and maintaining ecosystem services. Loss of these areas will likely require offset mitigation.

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9 Appendix Items

9.1 Appendix A – Specialist Declarations

DECLARATION

I, Carami Burger, 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.

Carami Burger

Ecologist

The Biodiversity Company

December 2022

DECLARATION

I, Andrew Husted, 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.

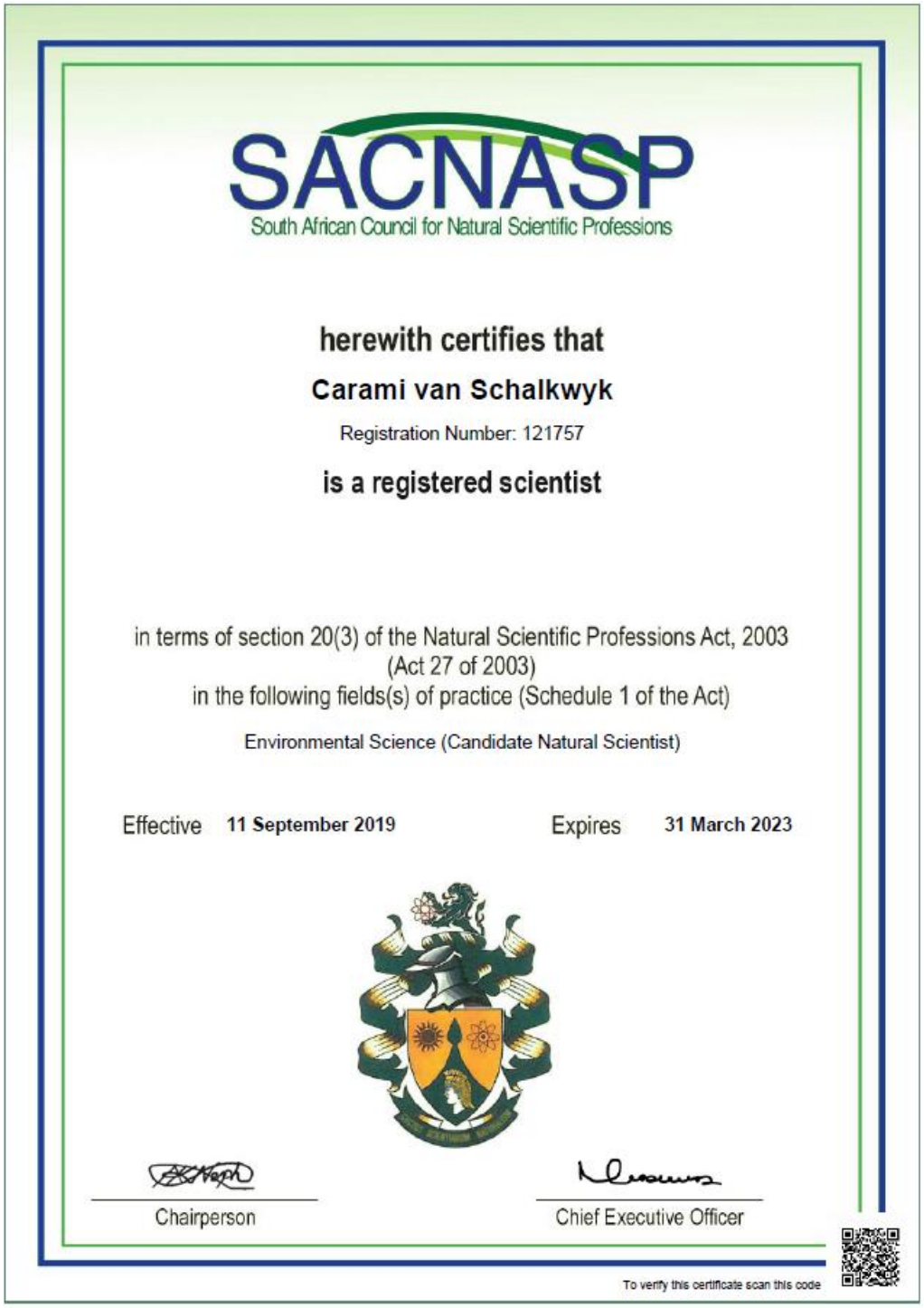
Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

December 2022

9.1.1 South African Council for Natural Scientific Professions Certificate



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Carami van Schalkwyk

Registration Number: 121757

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Environmental Science (Candidate Natural Scientist)

Effective 11 September 2019 Expires 31 March 2023

Chairperson

Chief Executive Officer

To verify this certificate scan this code

9.2 Appendix B: Expected Flora

Family	Taxon	IUCN	Ecology
Acanthaceae	*Crabbea hirsuta*	LC	Indigenous
Acanthaceae	*Justicia minima*	LC	Indigenous; Endemic
Acanthaceae	*Barleria macrostegia*	LC	Indigenous
Acanthaceae	*Blepharis subvolubilis*	LC	Indigenous
Acanthaceae	*Justicia anagalloides*	LC	Indigenous
Acanthaceae	*Justicia betonica*	LC	Indigenous
Acanthaceae	*Dyschoriste costata*	LC	Indigenous; Endemic
Aizoaceae	*Delosperma cooperi*	LC	Indigenous
Amaranthaceae	*Achyranthes aspera var. aspera*		Not indigenous; Naturalised
Amaranthaceae	*Cyphocarpa angustifolia*	LC	Indigenous
Amaranthaceae	*Hermbstaedtia odorata var. aurantiaca*	NE	Indigenous
Amaranthaceae	*Hermbstaedtia odorata*	LC	Indigenous
Amaranthaceae	*Achyranthes aspera var. sicula*		Indigenous
Amaranthaceae	*Gomphrena celosioides*		Not indigenous; Naturalised
Amaranthaceae	*Chenopodium album*		Not indigenous; Naturalised; Invasive
Amaranthaceae	*Pupalia lappacea var. lappacea*	LC	Indigenous
Amaranthaceae	*Hermbstaedtia odorata var. odorata*	NE	Indigenous
Amaranthaceae	*Aerva leucura*	LC	Indigenous
Amaryllidaceae	*Ammocharis coranica*	LC	Indigenous
Amaryllidaceae	*Boophone disticha*	LC	Indigenous
Anacardiaceae	*Ozoroa paniculosa var. paniculosa*	LC	Indigenous
Anacardiaceae	*Searsia magalismontana subsp. magalismontana*	LC	Indigenous
Anacardiaceae	*Lannea edulis var. edulis*	LC	Indigenous
Anacardiaceae	*Searsia rigida var. dentata*	LC	Indigenous; Endemic
Anacardiaceae	*Lannea discolor*	LC	Indigenous
Annonaceae	*Hexalobus monopetalus var. monopetalus*	LC	Indigenous
Apocynaceae	*Cascabela thevetia*		Not indigenous; Cultivated; Naturalised; Invasive
Apocynaceae	*Pentarrhinum insipidum*	LC	Indigenous
Apocynaceae	*Raphionacme velutina*	LC	Indigenous
Apocynaceae	*Stenostelma ligulatum*		Indigenous; Endemic
Apocynaceae	*Nerium oleander*	NE	Not indigenous; Naturalised; Invasive
Apocynaceae	*Xysmalobium brownianum*	LC	Indigenous
Apocynaceae	*Cryptolepis oblongifolia*	LC	Indigenous
Apocynaceae	*Stenostelma umbelluliferum*	NT	Indigenous; Endemic
Archidiaceae	*Archidium sp.*		
Aspleniaceae	*Asplenium aethiopicum*	LC	Indigenous
Asteraceae	*Callilepis laureola*	LC	Indigenous

Asteraceae	*Helichrysum mixtum var. mixtum*	NE	Indigenous
Asteraceae	*Senecio affinis*	LC	Indigenous
Asteraceae	*Callilepis lancifolia*	LC	Indigenous; Endemic
Asteraceae	*Laggera decurrens*	LC	Indigenous
Asteraceae	*Brachylaena rotundata*	LC	Indigenous
Asteraceae	*Senecio venosus*	LC	Indigenous
Asteraceae	*Flaveria bidentis*		Not indigenous; Naturalised; Invasive
Asteraceae	*Conyza scabrida*		Indigenous
Asteraceae	*Senecio inornatus*	LC	Indigenous
Asteraceae	*Brachylaena sp.*		
Asteraceae	*Dicoma macrocephala*	LC	Indigenous
Asteraceae	*Seriphium plumosum*		Indigenous
Asteraceae	*Lactuca inermis*	LC	Indigenous
Asteraceae	*Helichrysum stenopterum*	LC	Indigenous
Asteraceae	*Gazania krebsiana subsp. serrulata*	LC	Indigenous
Asteraceae	*Senecio latifolius*	LC	Indigenous
Asteraceae	*Nolletia sp.*		
Asteraceae	*Pegolettia tenuifolia*	LC	Indigenous; Endemic
Asteraceae	*Oocephala staehelinoides*		Indigenous; Endemic
Asteraceae	*Geigeria elongata*	LC	Indigenous; Endemic
Asteraceae	*Senecio pentactinus*	LC	Indigenous
Asteraceae	*Denekia capensis*	LC	Indigenous
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	LC	Indigenous
Asteraceae	*Hilliardiella sutherlandii*		Indigenous
Asteraceae	*Helichrysum harveyanum*	LC	Indigenous
Asteraceae	*Berkheya zeyheri subsp. zeyheri*	LC	Indigenous
Asteraceae	*Kleinia longiflora*	LC	Indigenous
Asteraceae	*Helichrysum mundtii*	LC	Indigenous
Asteraceae	*Helichrysum caespititium*	LC	Indigenous
Asteraceae	*Senecio erubescens var. crepidifolius*	NE	Indigenous
Asteraceae	*Dicoma anomala subsp. gerrardii*	LC	Indigenous
Asteraceae	*Callilepis salicifolia*	LC	Indigenous
Asteraceae	*Felicia muricata subsp. muricata*	LC	Indigenous
Asteraceae	*Helichrysum kraussii*	LC	Indigenous
Asteraceae	*Geigeria burkei subsp. burkei var. burkei*	NE	Indigenous
Asteraceae	*Haplocarpha scaposa*	LC	Indigenous
Aytoniaceae	*Asterella bachmannii*		Indigenous
Bartramiaceae	*Philonotis dregeana*		Indigenous
Bignoniaceae	*Jacaranda mimosifolia*	NE	Not indigenous; Naturalised; Invasive

Boraginaceae	*Cynoglossum lanceolatum*	LC	Indigenous
Bryaceae	*Bryum cellulare*		Indigenous
Bryaceae	*Bryum argenteum*		Indigenous
Bryaceae	*Bryum aubertii*		Indigenous
Bryaceae	*Rosulabryum capillare*		Indigenous
Bryaceae	*Bryum dichotomum*		Indigenous
Burseraceae	*Commiphora mollis*	LC	Indigenous
Cactaceae	*Opuntia ficus-indica*	NE	Not indigenous; Cultivated; Naturalised; Invasive
Cactaceae	*Harrisia bonplandii*		Not indigenous; Naturalised; Invasive
Cactaceae	*Harrisia martinii*	NE	Not indigenous; Naturalised; Invasive
Campanulaceae	*Wahlenbergia undulata*	LC	Indigenous
Cannaceae	*Canna generalis*	NE	Not indigenous; Naturalised; Invasive
Celastraceae	*Gymnosporia polyacantha subsp. vaccinifolia*	LC	Indigenous; Endemic
Ceratophyllaceae	*Ceratophyllum demersum*		Indigenous
Cleomaceae	*Cleome rubella*	LC	Indigenous
Cleomaceae	*Cleome monophylla*	LC	Indigenous
Cleomaceae	*Cleome conrathii*	NT	Indigenous
Cleomaceae	*Cleome maculata*	LC	Indigenous
Colchicaceae	*Gloriosa modesta*	LC	Indigenous
Combretaceae	*Combretum nelsonii*	LC	Indigenous; Endemic
Combretaceae	*Combretum molle*	LC	Indigenous
Combretaceae	*Terminalia prunioides*	LC	Indigenous
Combretaceae	*Combretum apiculatum subsp. apiculatum*	LC	Indigenous
Combretaceae	*Terminalia sericea*	LC	Indigenous
Combretaceae	*Combretum zeyheri*	LC	Indigenous
Combretaceae	*Combretum hereroense*		Indigenous
Commelinaceae	*Floscopa glomerata*	LC	Indigenous
Commelinaceae	*Commelina livingstonii*	LC	Indigenous
Convolvulaceae	*Ipomoea obscura var. obscura*	LC	Indigenous
Convolvulaceae	*Ipomoea bolusiana*	LC	Indigenous
Convolvulaceae	*Evolvulus alsinoides*	LC	Indigenous
Convolvulaceae	*Ipomoea crassipes var. crassipes*	LC	Indigenous
Convolvulaceae	*Ipomoea ommanneyi*	LC	Indigenous
Corbichoniaceae	*Corbichonia decumbens*	LC	Indigenous
Crassulaceae	*Crassula capitella subsp. nodulosa*	LC	Indigenous
Cucurbitaceae	*Momordica cardiospermoides*	LC	Indigenous
Cucurbitaceae	*Cucumis humofructus*	VU	Indigenous
Cucurbitaceae	*Momordica balsamina*	LC	Indigenous
Cupressaceae	*Widdringtonia nodiflora*	LC	Indigenous

Cyperaceae	*Schoenoplectus muricinux*	LC	Indigenous
Cyperaceae	*Fimbristylis dichotoma subsp. dichotoma*	LC	Indigenous
Cyperaceae	*Pycreus pumilus*	LC	Indigenous
Cyperaceae	*Eleocharis acutangula*	LC	Indigenous
Cyperaceae	*Pycreus nitidus*	LC	Indigenous
Cyperaceae	*Fimbristylis complanata*	LC	Indigenous
Cyperaceae	*Cyperus denudatus*	LC	Indigenous
Cyperaceae	*Kyllinga erecta var. erecta*	LC	Indigenous
Cyperaceae	*Cyperus sphaerospermus*	LC	Indigenous
Cyperaceae	*Pycreus flavescens*	LC	Indigenous
Cyperaceae	*Fuirena pubescens var. pubescens*	LC	Indigenous
Cyperaceae	*Cyperus rupestris var. rupestris*	LC	Indigenous
Cyperaceae	*Bulbostylis contexta*	LC	Indigenous
Cyperaceae	*Pycreus macranthus*	LC	Indigenous
Cyperaceae	*Bulbostylis pusilla*	LC	Indigenous
Ditrichaceae	*Ditrichum sp.*		
Ditrichaceae	*Eccremidium exiguum*		Indigenous
Ditrichaceae	*Ceratodon purpureus subsp. stenocarpus*		Indigenous
Ebenaceae	*Euclea crispa subsp. crispa*	LC	Indigenous
Ebenaceae	*Euclea natalensis subsp. angustifolia*	LC	Indigenous
Ebenaceae	*Diospyros lycioides subsp. lycioides*	LC	Indigenous
Ebenaceae	*Euclea undulata*	LC	Indigenous
Euphorbiaceae	*Euphorbia heterophylla*	NE	Not indigenous; Naturalised
Euphorbiaceae	*Euphorbia trichadenia*		Indigenous
Euphorbiaceae	*Croton gratissimus var. subgratissimus*	LC	Indigenous
Euphorbiaceae	*Croton gratissimus var. gratissimus*	LC	Indigenous
Euphorbiaceae	*Euphorbia hirta*	NE	Not indigenous; Naturalised
Euphorbiaceae	*Tragia rupestris*	LC	Indigenous
Euphorbiaceae	*Jatropha schlechteri subsp. setifera*	LC	Indigenous
Euphorbiaceae	*Jatropha zeyheri*	LC	Indigenous
Exormothecaceae	*Exormotheca holstii*		Indigenous
Fabaceae	*Vachellia robusta subsp. robusta*	LC	Indigenous
Fabaceae	*Sesbania punicea*	NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Cullen holubii*	VU	Indigenous; Endemic
Fabaceae	*Bauhinia variegata var. variegata*	NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Indigofera daleoides var. daleoides*	NE	Indigenous
Fabaceae	*Crotalaria lotoides*	LC	Indigenous
Fabaceae	*Chamaecrista absus*	LC	Indigenous
Fabaceae	*Crotalaria globifera*	LC	Indigenous

Fabaceae	*Senna pendula var. glabrata*	NE	Not indigenous; Naturalised; Invasive
Fabaceae	*Sphenostylis angustifolia*	LC	Indigenous
Fabaceae	*Indigastrum costatum subsp. macrum*	LC	Indigenous
Fabaceae	*Neonotonia wightii*	LC	Indigenous
Fabaceae	*Eriosema psoraleoides*	LC	Indigenous
Fabaceae	*Vachellia karroo*	LC	Indigenous
Fabaceae	*Indigofera melanadenia*	LC	Indigenous
Fabaceae	*Senna italica subsp. arachoides*	LC	Indigenous
Fabaceae	*Sesbania transvaalensis*	LC	Indigenous
Fabaceae	*Pterocarpus rotundifolius subsp. rotundifolius*	LC	Indigenous
Fabaceae	*Chamaecrista mimosoides*	LC	Indigenous
Fabaceae	*Indigofera egens*	LC	Indigenous; Endemic
Fabaceae	*Senegalia galpinii*	LC	Indigenous
Fabaceae	*Elephantorrhiza burkei*	LC	Indigenous
Fabaceae	*Indigofera sordida*	LC	Indigenous
Fabaceae	*Ophrestia oblongifolia var. oblongifolia*	LC	Indigenous
Fabaceae	*Argyrolobium transvaalense*	LC	Indigenous
Fabaceae	*Indigofera lupatana*	LC	Indigenous
Fabaceae	*Sesbania sesban*		Indigenous
Fabaceae	*Zornia milneana*	LC	Indigenous
Fabaceae	*Stylosanthes fruticosa*	LC	Indigenous
Fabaceae	*Pseudarthria hookeri var. hookeri*	LC	Indigenous
Fissidentaceae	*Fissidens rufescens*		Indigenous
Gentianaceae	*Exochaenium grande*	LC	Indigenous
Gentianaceae	*Chironia purpurascens subsp. humilis*	LC	Indigenous
Geraniaceae	*Pelargonium dolomiticum*	LC	Indigenous
Geraniaceae	*Pelargonium luridum*	LC	Indigenous
Geraniaceae	*Monsonia angustifolia*	LC	Indigenous
Hyacinthaceae	*Dipcadi viride*	LC	Indigenous
Hyacinthaceae	*Ledebouria revoluta*	LC	Indigenous
Hyacinthaceae	*Ornithogalum juncifolium var. juncifolium*	NE	Indigenous
Hyacinthaceae	*Drimia calcarata*	LC	Indigenous
Hypericaceae	*Hypericum lalandii*	LC	Indigenous
Iridaceae	*Gladiolus oatesii*	LC	Indigenous
Iridaceae	*Iris pseudacorus*		Not indigenous; Cultivated; Naturalised; Invasive
Iridaceae	*Moraea pallida*	LC	Indigenous
Iridaceae	*Afrosolen sandersonii subsp. sandersonii*		Indigenous
Iridaceae	*Gladiolus crassifolius*	LC	Indigenous
Lamiaceae	*Leonotis neuflizeana*	LC	Indigenous

Lamiaceae	*Syncolostemon pretoriae*	LC	Indigenous
Lamiaceae	*Aeollanthus buchnerianus*	LC	Indigenous
Lamiaceae	*Rotheca louwalbertsii*	LC	Indigenous
Lamiaceae	*Vitex pooara*	LC	Indigenous; Endemic
Lamiaceae	*Teucrium trifidum*	LC	Indigenous
Lamiaceae	*Pycnostachys reticulata*	LC	Indigenous
Lamiaceae	*Plectranthus montanus*		Indigenous
Lamiaceae	*Syncolostemon canescens*	LC	Indigenous
Lamiaceae	*Salvia runcinata*	LC	Indigenous
Leucobryaceae	*Campylopus robillardei*		Indigenous
Leucobryaceae	*Campylopus introflexus*		Indigenous
Limeaceae	*Limeum fenestratum var. fenestratum*	LC	Indigenous
Linderniaceae	*Craterostigma wilmsii*	LC	Indigenous; Endemic
Lobeliaceae	*Monopsis decipiens*	LC	Indigenous
Loranthaceae	*Agelanthus natalitius subsp. zeyheri*	LC	Indigenous
Malpighiaceae	*Sphedamnocarpus pruriens subsp. pruriens*	LC	Indigenous
Malpighiaceae	*Sphedamnocarpus pruriens subsp. galphimiifolius*	LC	Indigenous
Malvaceae	*Triumfetta sonderi*	LC	Indigenous; Endemic
Malvaceae	*Sida sp.*		
Malvaceae	*Grewia avellana*	LC	Indigenous
Malvaceae	*Hermannia coccocarpa*	LC	Indigenous
Malvaceae	*Abutilon grandifolium*	LC	Not indigenous; Naturalised; Invasive
Malvaceae	*Grewia flava*	LC	Indigenous
Malvaceae	*Hermannia burkei*	LC	Indigenous
Malvaceae	*Pavonia transvaalensis*	LC	Indigenous; Endemic
Malvaceae	*Grewia subspathulata*	LC	Indigenous
Malvaceae	*Grewia retinervis*	LC	Indigenous
Malvaceae	*Grewia flavescens*	LC	Indigenous
Malvaceae	*Triumfetta rhomboidea var. rhomboidea*	LC	Indigenous
Malvaceae	*Hermannia modesta*	LC	Indigenous
Malvaceae	*Corchorus schimperi*	LC	Indigenous
Malvaceae	*Hermannia boraginiflora*	LC	Indigenous
Malvaceae	*Melhania prostrata*	LC	Indigenous
Melastomataceae	*Antherotoma naudinii*	LC	Indigenous
Molluginaceae	*Paramollugo nudicaulis*		Indigenous
Moraceae	*Ficus glumosa*	LC	Indigenous
Myrtaceae	*Eucalyptus camaldulensis subsp. camaldulensis*		Not indigenous; Cultivated; Naturalised
Myrtaceae	*Eucalyptus camaldulensis*		Not indigenous; Cultivated; Naturalised; Invasive
Myrtaceae	*Eucalyptus sp.*		

Ochnaceae	*Ochna pulchra*	LC	Indigenous
Ochnaceae	*Ochna holstii*	LC	Indigenous
Olacaceae	*Ximenia caffra var. caffra*	LC	Indigenous
Oleaceae	*Olea capensis subsp. enervis*	LC	Indigenous
Oleaceae	*Jasminum breviflorum*	LC	Indigenous
Onagraceae	*Ludwigia octovalvis*	LC	Indigenous
Ophioglossaceae	*Ophioglossum gomezianum*	LC	Indigenous
Orchidaceae	*Eulophia streptopetala*	LC	Indigenous
Orchidaceae	*Orthochilus welwitschii*	LC	Indigenous
Orchidaceae	*Disa welwitschii subsp. welwitschii*	LC	Indigenous
Orchidaceae	*Satyrium hallackii subsp. ocellatum*	LC	Indigenous
Orchidaceae	*Disa woodii*	LC	Indigenous
Orchidaceae	*Habenaria filicornis*	LC	Indigenous
Orchidaceae	*Bonatea antennifera*	LC	Indigenous
Orobanchaceae	*Striga elegans*	LC	Indigenous
Orobanchaceae	*Melasma scabrum var. scabrum*	LC	Indigenous
Oxalidaceae	*Oxalis obliquifolia*	LC	Indigenous
Pedaliaceae	*Harpagophytum zeyheri subsp. zeyheri*	LC	Indigenous
Pedaliaceae	*Ceratotheca triloba*	LC	Indigenous
Petiveriaceae	*Rivina humilis*		Not indigenous; Naturalised; Invasive
Phyllanthaceae	*Phyllanthus incurvus*	LC	Indigenous
Poaceae	*Sporobolus fimbriatus*	LC	Indigenous
Poaceae	*Eragrostis lappula*	LC	Indigenous
Poaceae	*Cymbopogon caesius*	LC	Indigenous
Poaceae	*Echinochloa jubata*	LC	Indigenous
Poaceae	*Eragrostis nindensis*	LC	Indigenous
Poaceae	*Bewsia biflora*	LC	Indigenous
Poaceae	*Chloris virgata*	LC	Indigenous
Poaceae	*Panicum hygrocharis*	LC	Indigenous
Poaceae	*Loudetia pedicellata*	LC	Indigenous; Endemic
Poaceae	*Eragrostis inamoena*	LC	Indigenous
Poaceae	*Digitaria velutina*	LC	Indigenous
Poaceae	*Paspalum dilatatum*	NE	Not indigenous; Naturalised; Invasive
Poaceae	*Digitaria eriantha*	LC	Indigenous
Poaceae	*Alloteropsis semialata subsp. eckloniana*	LC	Indigenous
Poaceae	*Andropogon schirensis*	LC	Indigenous
Poaceae	*Paspalum distichum*	LC	Not indigenous; Naturalised; Invasive
Poaceae	*Hyparrhenia anamesa*	LC	Indigenous
Poaceae	*Echinochloa holubii*	LC	Indigenous

Poaceae	*Echinochloa colona*	LC	Indigenous
Poaceae	*Sacciolepis typhura*	LC	Indigenous
Poaceae	*Andropogon eucomus*	LC	Indigenous
Poaceae	*Lophacme digitata*	LC	Indigenous
Poaceae	*Aristida aequiglumis*	LC	Indigenous
Poaceae	*Schmidtia pappophoroides*	LC	Indigenous
Poaceae	*Enneapogon scoparius*	LC	Indigenous
Poaceae	*Oropetium capense*	LC	Indigenous
Poaceae	*Eragrostis heteromera*	LC	Indigenous
Poaceae	*Eragrostis capensis*	LC	Indigenous
Poaceae	*Loudetia flavida*	LC	Indigenous
Poaceae	*Aristida junciformis subsp. junciformis*	LC	Indigenous
Poaceae	*Leersia hexandra*	LC	Indigenous
Poaceae	*Sorghastrum nudipes*		Indigenous
Poaceae	*Eragrostis stapfii*	LC	Indigenous
Poaceae	*Perotis patens*	LC	Indigenous
Poaceae	*Aristida stipitata subsp. stipitata*	LC	Indigenous
Poaceae	*Panicum dregeanum*	LC	Indigenous
Poaceae	*Sporobolus festivus*	LC	Indigenous
Polygalaceae	*Polygala sphenoptera var. sphenoptera*	LC	Indigenous
Polygalaceae	*Securidaca longepedunculata var. longepedunculata*	LC	Indigenous
Polygalaceae	*Polygala producta*	LC	Indigenous
Polygonaceae	*Persicaria lapathifolia*		Not indigenous; Naturalised; Invasive
Polygonaceae	*Oxygonum dregeanum subsp. canescens var. canescens*	NE	Indigenous
Polygonaceae	*Oxygonum sinuatum*		Indigenous
Polygonaceae	*Rumex crispus*		Not indigenous; Naturalised; Invasive
Polytrichaceae	*Polytrichum commune*		Indigenous
Portulacaceae	*Portulaca sp.*		
Pottiaceae	*Syntrichia chisosa*		Indigenous
Pottiaceae	*Barbula eubryum*		Indigenous
Pottiaceae	*Trichostomum brachydontium*		Indigenous
Proteaceae	*Faurea saligna*	LC	Indigenous
Proteaceae	*Protea welwitschii*	LC	Indigenous
Pteridaceae	*Pellaea calomelanos var. calomelanos*	LC	Indigenous
Ranunculaceae	*Clematis brachiata*	LC	Indigenous
Rhamnaceae	*Ziziphus zeyheriana*	LC	Indigenous
Rhamnaceae	*Phyllogeiton zeyheri*		Indigenous
Ricciaceae	*Riccia okahandjana*		Indigenous
Ricciaceae	*Riccia atropurpurea*		Indigenous

Ricciaceae	*Riccia volkii*		Indigenous
Ricciaceae	*Riccia microciliata*		Indigenous
Ricciaceae	*Riccia natalensis*		Indigenous; Endemic
Ricciaceae	*Riccia stricta*		Indigenous
Rubiaceae	*Oldenlandia herbacea var. herbacea*	LC	Indigenous
Rubiaceae	*Pavetta gardeniifolia var. subtomentosa*	LC	Indigenous
Rubiaceae	*Empogona kirkii*		Indigenous
Rubiaceae	*Cordylostigma virgatum*		Indigenous
Rubiaceae	*Pavetta gracilifolia*	LC	Indigenous
Rubiaceae	*Agathisanthemum bojeri subsp. bojeri*	LC	Indigenous
Rubiaceae	*Spermacoce senensis*	LC	Indigenous
Rubiaceae	*Fadogia homblei*	LC	Indigenous
Ruscaceae	*Eriospermum porphyrovalve*	LC	Indigenous
Ruscaceae	*Sansevieria aethiopica*	LC	Indigenous
Santalaceae	*Viscum combreticola*	LC	Indigenous
Santalaceae	*Thesium gracilarioides*	LC	Indigenous
Santalaceae	*Thesium goetzeanum*	LC	Indigenous
Santalaceae	*Thesium resedoides*	LC	Indigenous
Santalaceae	*Viscum tuberculatum*	LC	Indigenous
Santalaceae	*Osyris lanceolata*	LC	Indigenous
Santalaceae	*Thesium magalismontanum*	LC	Indigenous
Sapotaceae	*Mimusops zeyheri*	LC	Indigenous
Sapotaceae	*Englerophytum magalismontanum*	LC	Indigenous
Scrophulariaceae	*Aptosimum elongatum*	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia burkeana*	LC	Indigenous
Solanaceae	*Solanum elaeagnifolium*		Not indigenous; Naturalised; Invasive
Solanaceae	*Solanum supinum*		Indigenous
Solanaceae	*Solanum campylacanthum*		Indigenous
Talinaceae	*Talinum caffrum*	LC	Indigenous
Thelypteridaceae	*Thelypteris confluens*	LC	Indigenous
Thymelaeaceae	*Lasiosiphon sericocephalus*	LC	Indigenous
Typhaceae	*Typha capensis*	LC	Indigenous
Velloziaceae	*Xerophyta viscosa*	LC	Indigenous
Verbenaceae	*Chascanum pinnatifidum var. pinnatifidum*	LC	Indigenous
Verbenaceae	*Lantana camara*		Not indigenous; Cultivated; Naturalised; Invasive
Verbenaceae	*Lantana rugosa*	LC	Indigenous
Verbenaceae	*Chascanum hederaceum var. hederaceum*	LC	Indigenous
Verbenaceae	*Lippia javanica*	LC	Indigenous
Violaceae	*Afrohybanthus serratus*		Indigenous

Vitaceae	*Cyphostemma puberulum*	LC	Indigenous
Vitaceae	*Cyphostemma anatomicum*	LC	Indigenous; Endemic
Vitaceae	*Rhoicissus revoilii*	LC	Indigenous

9.3 Appendix C: Mammals expected

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Acinonyx jubatus	Cheetah	VU	VU
Acomys spinosissimus	Spiny Mouse	LC	LC
Aepyceros melampus	Impala	LC	LC
Aethomys chrysophilus	Red Veld Rat	LC	LC
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Alcelaphus buselaphus	Hartebeest	LC	LC
Alcelaphus buselaphus caama	Red Hartebeest	LC	LC
Antidorcas marsupialis	Springbok	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
Ceratotherium simum	White Rhinoceros	NT	NT
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Civettictis civetta	African Civet	LC	LC
Cloeotis percivali	Short-eared Trident Bat	EN	LC
Connochaetes taurinus	Blue Wildebeest	LC	LC
Cricetomys gambianus	Gambian Rat	Unlisted	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
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus lunatus	Tsessebe	VU	LC
Damaliscus pygargus	Blesbok	LC	LC
Damaliscus pygargus ssp. pygargus	Bontebok	VU	VU

Dasymys incomtus	African Marsh rat	NT	LC
Dasymys robertsii	Robert's Marsh Rat	VU	Unlisted
Dendromus melanotis	Grey Climbing Mouse	LC	LC
Dendromus mystacalis	Chestnut Climbing Mouse	LC	LC
Diceros bicornis	Black Rhinoceros	EN	CR
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT
Elephantulus brachyrhynchus	Short-snouted Sengi	LC	LC
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Epomophorus crypturus	Gambian epauletted fruit bat	LC	LC
Epomophorus wahlbergi	Wahlberg's epauletted fruit bat	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Equus grevyi	Grevy's Zebra	Unlisted	EN
Equus quagga	Plains Zebra	LC	NT
Equus zebra hartmannae	Hartmann's Mountain Zebra	VU	VU
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
Genetta maculata	Rusty-spotted Genet	LC	LC
Genetta tigrina	Cape Genet	LC	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC
Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Giraffa camelopardalis	Giraffe	LC	VU
Grammomys dolichurus	Woodland Mouse	LC	LC
Graphiurus murinus	Woodland Dormouse	LC	LC
Graphiurus platyops	Rock Dormouse	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
Hippopotamus amphibius	Hippopotamus	LC	VU
Hipposideros caffer	Sundevall's Leaf-nosed Bat	LC	LC
Hippotragus equinus	Roan Antelope	EN	LC
Hippotragus niger	Sable Antelope	VU	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Hydrictis maculicollis	Spotted-necked Otter	VU	NT
Hypsugo anchietae	Anchieta's Pipistrelle	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC

Ichneumia albicauda	White-tailed Mongoose	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Kerivoula lanosa	Lesser Woolly Bat	LC	LC
Kobus ellipsiprymnus	Common Waterbuck	LC	LC
Lemniscomys rosalia	Single-striped Mouse	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus capensis	Cape Hare	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Lepus victoriae	African Savanna Hare	LC	LC
Loxodonta africana	African Savanna Elephant	LC	EN
Lycaon pictus	African Wild Dog	EN	EN
Mastomys coucha	Multimammate Mouse	LC	LC
Mastomys natalensis	Natal Multimammate Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC
Miniopterus natalensis	Natal long-fingered bat	LC	LC
Miniopterus schreibersii	Schreiber's Bent-winged Bat	Unlisted	VU
Mungos mungo	Banded Mongoose	LC	LC
Mus minutoides	Pygmy Mouse	LC	LC
Mus indutus	Desert Pygmy Mouse	LC	LC
Myosorex varius	Forest Shrew	LC	LC
Myotis tricolor	Temminck's Hairy Bat	LC	LC
Myotis welwitschii	Welwitsch's Hairy Bat	LC	LC
Neamblysomus julianae	Juliana's Golden Mole	EN	EN
Neoromicia capensis	Cape Serotine Bat	LC	LC
Neoromicia nana	Banana Bat	LC	LC
Neoromicia zuluensis	Aloe Bat	LC	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC
Nycticeinops schlieffeni	Schlieffen's Bat	LC	LC
Oreotragus oreotragus	Klipspringer	LC	LC
Orycteropus afer	Aardvark	LC	LC
Oryx gazella	Gemsbok	LC	LC
Otocyon megalotis	Bat-eared Fox	LC	LC
Otolemur crassicaudatus	Thick-tailed Bushbaby	LC	LC
Otomops martiensseni	Large-eared Free-tailed Bat	LC	NT
Otomys angoniensis	Angoni Vlei Rat	LC	LC
Otomys auratus	Vlei Rat (Grassland type)	NT	NT
Panthera leo	Lion	LC	VU
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
Pipistrellus rusticus	Rusty Bat	LC	LC
Pipistrellus rusticus	Rusty Bat	LC	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Potamochoerus larvatus	Bushpig	LC	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
Raphicerus melanotis	Cape Grysbok	LC	LC
Rattus rattus	House Rat	Exotic (Not listed)	LC
Redunca arundinum	Southern Reedbuck	LC	LC
Redunca fulvorufula	Mountain Reedbuck	EN	EN
Rhabdomys bechuanae	Arid Four-striped Grass Mouse	LC	Unlisted
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus blasii	Blasius's horseshoe bat	NT	LC
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	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
Rhinolophus smithersi	Smithers's Horseshoe Bat	LC	NT
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 krebsii	Krebs's Fat Mouse	LC	LC
Steatomys pratensis	Fat Mouse	LC	LC
Suncus lixus	Greater Dwarf Shrew	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Syncerus caffer	African Buffalo	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 angasii	Nyala	LC	LC
Tragelaphus oryx	Common Eland	LC	LC
Tragelaphus scriptus	Cape Bushbuck	LC	LC
Tragelaphus strepsiceros	Greater Kudu	LC	LC
Vulpes chama	Cape Fox	LC	LC

9.4 Appendix D: Reptiles Expected

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acanthocercus atricollis	*Southern Tree Agama*	LC	LC
Acontias occidentalis	*Savanna Legless Skink*	LC	Unlisted
Afroedura nivaria	*Drankensberg Flat Gecko*	LC	LC
Afroedura waterbergensis	*Waterberg Flat Gecko*	LC	LC
Afrotyphlops bibronii	*Bibron's Blind Snake*	LC	LC
Afrotyphlops schlegelii	*Schlegel's Beaked Blind Snake*	LC	Unlisted
Agama aculeata distanti	*Eastern Ground 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
Atractaspis duerdeni	*Duerden's Stilleto Snake*	LC	Unlisted
Bitis arietans arietans	*Puff Adder*	LC	Unlisted
Boaedon capensis	*Brown House Snake*	LC	LC
Causus defilippii	*Snouted Night Adder*	LC	Unlisted
Causus rhombeatus	*Rhombic Night Adder*	LC	LC
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
Dalophia pistillum	*Pestle-tailed Worm Lizard*	LC	Unlisted
Dasypeltis scabra	*Rhombic Egg-eater*	LC	LC
Dendroaspis polylepis	*Black Mamba*	LC	LC
Dispholidus typus	*Boomslang*	LC	Unlisted
Elapsoidea sundevallii	*Sundevall's Garter Snake*	LC	LC
Gerrhosaurus flavigularis	*Yellow-throated Plated Lizard*	LC	Unlisted

Gonionotophis capensis	*Common File Snake*	LC	LC
Gracililima nyassae	*Black File Snake*	LC	LC
Hemidactylus mabouia	*Common Tropical House Gecko*	LC	Unlisted
Homopholis arnoldi		LC	LC
Homopholis wahlbergii	*Wahlberg's Velvet Gecko*	LC	LC
Ichnotropis capensis	*Ornate Rough-scaled Lizard*	LC	Unlisted
Kinixys lobatsiana	*Lobatse hinged-back Tortoise*	LC	LC
Lamprophis aurora	*Aurora House Snake*	LC	LC
Leptotyphlops distanti	*Distant's Tread Snake*	LC	LC
Leptotyphlops incognitus	*Incognito Thread Snake*	LC	Unlisted
Leptotyphlops scutifrons scutifrons	*Peters' Thread Snake*	LC	Unlisted
Limaformosa capensis	*Common File Snake*	LC	Unlisted
Lycodonomorphus inornatus	*Olive House Snake*	LC	LC
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	LC
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
Myriopholis longicauda	*Long-tailed Thread Snake*	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
Pachydactylus vansoni	*VAN Son's Gecko*	LC	LC
Panaspis wahlbergii	*Wahlberg's Snake-eyed Skink*	LC	LC
Pedioplanis lineoocellata lineoocellata	*Spotted Sand Lizard*	LC	Unlisted
Pelomedusa galeata	*South African Marsh Terrapin*	Not evaluated	Unlisted
Pelusios sinuatus	*Serrated Hinged Terrapin*	LC	Unlisted
Pelusios subniger	*Black-bellied Hinged Terrapin*	LC	LC
Philothamnus hoplogaster	*South Eastern Green Snake*	LC	Unlisted
Philothamnus occidentalis	*Western Nalal Green Snake*	Unlisted	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
Prosymna sundevallii	*Sundevall's Shovel-snout*	LC	LC
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 rhombeatus	Spotted Grass Snake	LC	Unlisted
Psammophylax tritaeniatus	Striped Grass Snake	LC	LC
Pseudaspis cana	Mole Snake	LC	Unlisted
Pseudocordylus transvaalensis	Nothern Crag Lizard	NT	LC
Python natalensis	Southern African Python	LC	Unlisted
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Smaug breyeri	Waterberg Dragon Lizard	LC	LC
Smaug vandami	Van Dam's 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 laevigata	Variable Skink	DD	DD
Trachylepis margaritifera	Rainbow Skink	LC	LC
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis striata	Striped Skink	LC	Unlisted
Trachylepis varia	Eastern 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
Zygaspis quadrifrons	Kalahari Dwarf Worm Lizard	LC	Unlisted

9.5 Appendix E: Amphibians Expected

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Amietia angolensis	Angolan River Frog	Unlisted	LC
Amietia delalandii	Delalande's River Frog	LC	Unlisted

Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Chiromantis xerampelina	Southern Foam Nest Frog	LC	LC
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
Poyntonophrynus vertebralis	Southern 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	NT	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