Proposed Development of the Tafelkop Solar PV Facility – Terrestrial Biodiversity Assessment

De Aar, Northern Cape, South Africa

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CLIENT

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Submitted to	savannah environmental
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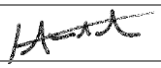
Report Reviewer	**Andrew Husted** 
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Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation 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.

List of Abbreviations

BI	Biodiversity Importance
BSP	Biodiversity Spatial Plan
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
EN	Endangered
ESA	Ecological Support Area
FI	Functional Integrity
HGM	Hydro-geomorphic
IBA	Important Bird and Biodiversity Areas
IUCN	International Union for Conservation of Nature
LC	Least Concern
MASL	Metres Above Sea Level
MP	Moderately Protected
NBA	National Biodiversity Assessment
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NP	Not Protected
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PES-EIES	Present Ecological State – Ecological Importance and Ecological Sensitivity
POSA	Plants of Southern Africa
PP	Poorly Protected
SABAP2	Southern African Bird Atlas Project 2
SACAD	South Africa Conservation Areas Database
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SAPAD	South Africa Protected Areas Database
SCC	Species of Conservation
SEI	Site Ecological Importance
SWSA	Strategic Water Source Area
VU	Vulnerable
WP	Well Protected

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1 Introduction

1.1 Background

The Biodiversity Company (TBC) was appointed to undertake a terrestrial biodiversity assessment for the proposed Tafelkop Solar Photovoltaic (PV) facility near De Aar, Northern Cape Province. The project area is located approximately 20km north of Philipstown and 30km west of Petrusville.

The National Web based Environmental Screening Tool has characterised the terrestrial theme sensitivity of the project area as "Very High". Accordingly, this assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020): "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation" (Reporting Criteria). See Appendix A for the protocol checklist and where they can be found within the report.

The purpose of the specialist studies is to provide relevant input into the impact assessment process and to provide a report for the proposed activities associated with the development. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed project.

1.2 Project Information

Tafelkop Solar Energy (Pty) Ltd (a consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading) propose to develop the Tafelkop Solar PV Facility and its associated electrical infrastructure on Portion 3 of the Farm Grass Pan 40 in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Project (Tafelkop Solar PV Facility) is part of a cluster known as the Crossroads Green Energy Cluster. The Cluster entails the development of up to Twenty-one (21) solar energy facilities.

A technically suitable project site of ~1703ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 240MW and will include the following infrastructure:

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system);
- Inverters and transformers;
- Cabling between the project components;
- Battery Energy Storage System (BESS);
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process);
- Site offices, Security office, operations and control, and maintenance and storage laydown areas; and
- Access roads, internal distribution roads.

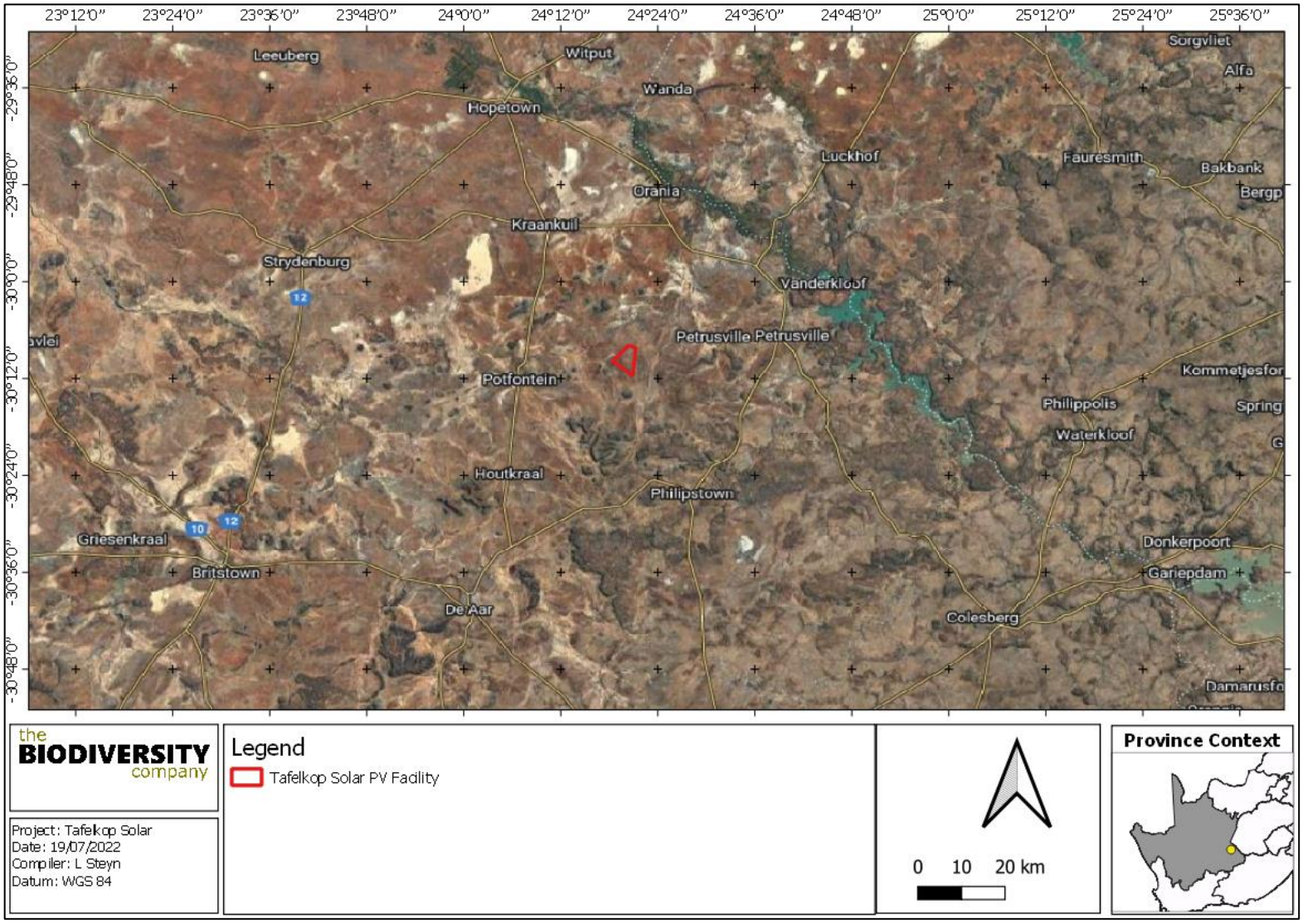

Figure 1-1 Map illustrating the location of the project area

1.3 Scope of Work

The aim of the biodiversity assessment was to provide information to guide the risk of the proposed activity to the current state of the associated ecosystems within the development area. This was achieved through the following:

- Desktop assessment to identify the ecologically important features within the landscape comprising of terrestrial & freshwater features;
- Desktop assessment to identify possible Species of Conservation Concern (SCC) that occur within the landscape;
- Field survey to record flora and fauna species, especially Species of Conservation Concern (SCC);
- Determination of the Site Ecological Importance (SEI), also commonly referred to as sensitivity;
- A biodiversity impact assessment; and
- The prescription of mitigation measures for identified risks, including assigning buffer areas, were necessary.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The GPS used for the assessment is accurate to 5 metres and therefore any spatial features may be offset by this distance;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists); and
- The fieldwork component of the assessment comprised of winter (dry season) survey. The survey was conducted from the 4th of July to the 13th of July 2022. Therefore, the probability of detection of certain faunal species will be lowered as certain species or groups of fauna are inherently secretive and require extensive sampling periods. Spring and summer season flowering flora (particularly geophytes, which require an inflorescence for identification) may have been missed. Although it is not considered necessary for another site visit to be conducted in flowering season (summer), it is considered necessary that a walkover be conducted in the correct season prior to any construction taking place to determine the presence of any SCC or protected species and then the required permit applications undertaken.

1.5 Key Legislative Requirements

The legislation, policies and guidelines listed below in

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

Table 1-1 A list of key legislative requirements relevant to biodiversity and conservation in the Northern Cape

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Northern Cape Nature Conservation act no. 9 of 2009
	Northern Cape Planning and Development Act no. 7 of 1998
	Northern Cape Critical Biodiversity Area 2017

1.6 Definitions

1.6.1 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 1-2 below.

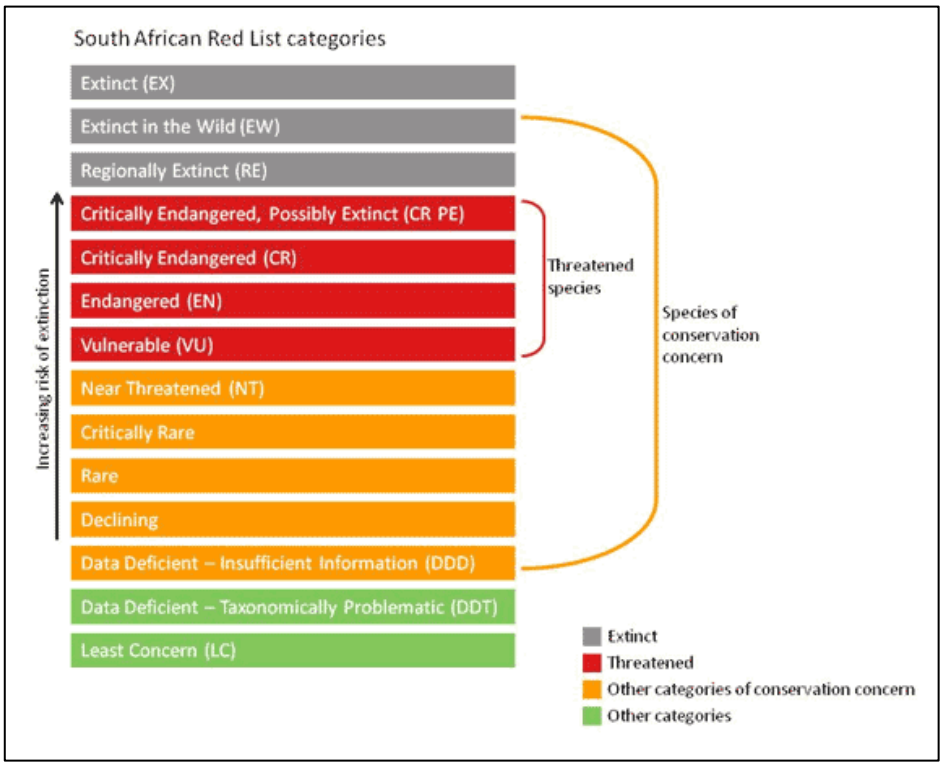

Figure 1-2 Threatened species and Species of Conservation Concern (SANBI, 2016)

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.

1.6.2 Protected Species

Protected species include both flora and fauna 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 Forests 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).

1.6.3 Project Area of Influence

The Project Area of Influence (PAOI) encompasses the geographical extent of the potential impacts of the proposed development on the receiving environment. Essentially, the PAOI is defined according to the important ecosystem processes and functions that may be plausibly affected by the proposed

development and its associated activities. The PAOI was considered to be the proposed footprint of the solar PV infrastructure for the site (Figure 1-3).

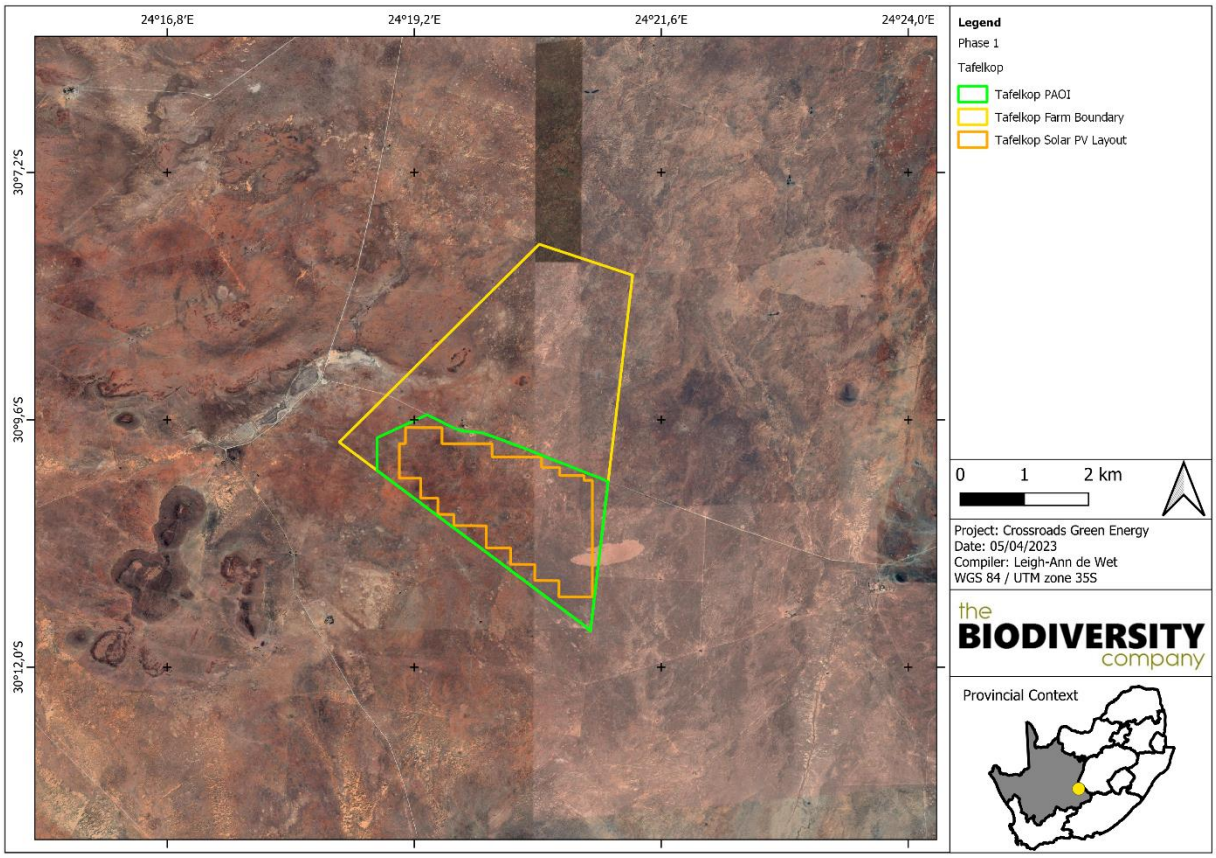

Figure 1-3 Project Area of Influence (PAOI).

2 Methods

2.1 Desktop Assessment

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

2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
- South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2021) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Conservation/Biodiversity Sector Plans:

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of

all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.

The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. These include the:

- Namakwa District Biodiversity Sector Plan;
- Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville); and
- Richtersveld Municipality Biodiversity Assessment.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- Hydrological Setting:
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.
- Strategic Water Source Areas (SWSAs) (Le Maitre *et al*, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.
- National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

2.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used in order to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape (Figure 2-1). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

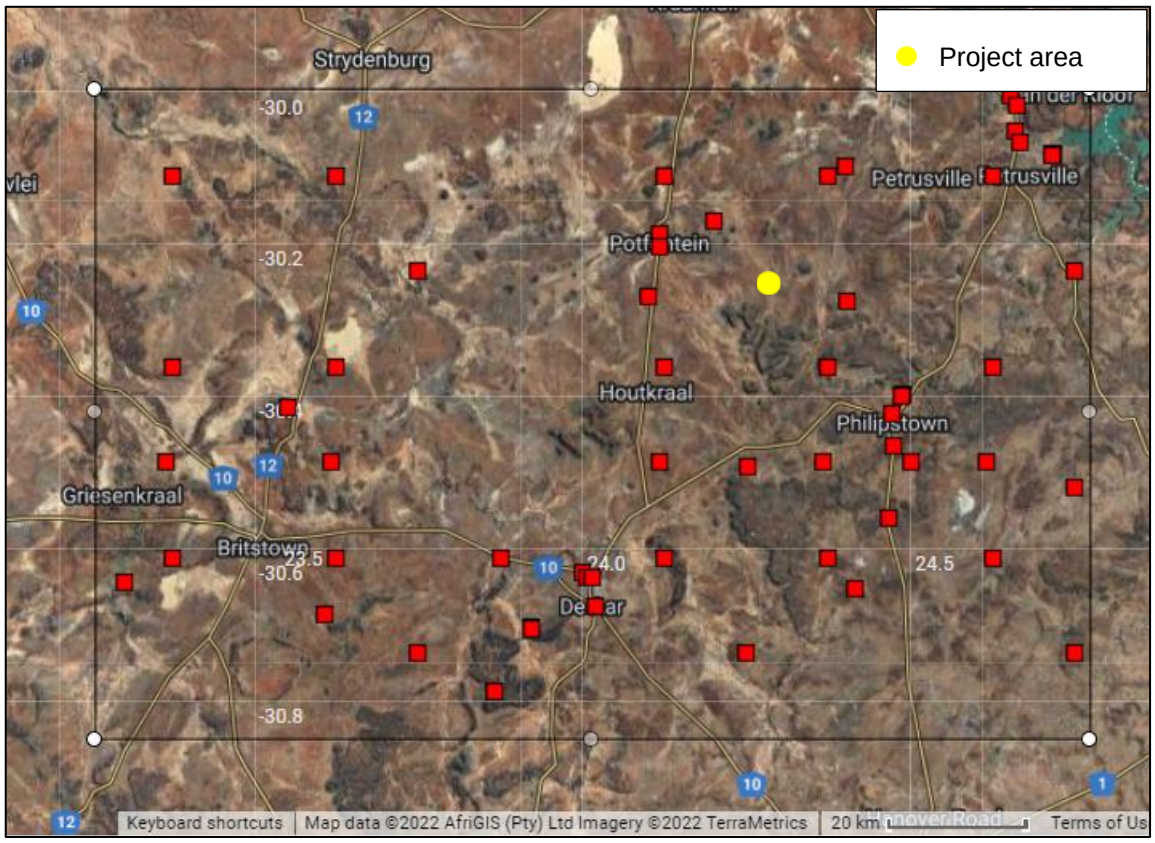

Figure 2-1 Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database

2.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the FrogMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3024-degree square;
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the ReptileMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3024-degree square; and
- Compiling an expected mammal list generated from the IUCN spatial dataset (2017) and the MammalMap database of the Animal Demography Unit (http://vmus.adu.org.za/) using the 3024-degree square.

2.2 Field Assessment

One field survey was undertaken to confirm the presence of SCC, as well as any sensitive habitat features. Table 2-1 summarises the timing and period of the surveys undertaken

Table 2-1 Summary of surveys undertaken for the biodiversity assessment

Survey Number	Season	Date/s	Comments
1	Dry (Winter)	4 July – 13 July 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the PAOI as well as the footprint of the proposed development. Vegetation and habitat units were also identified.

			This included the identification of faunal habitats and any fauna present. Avifauna is presented in a separate report, though the site visit was conducted concurrently.

Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant vegetation species and any sensitive or important features (e.g., drainage lines, rock outcrops, termite mounds etc.).

2.2.1 Flora Assessment

The flora assessment consisted of timed meanders of the survey area. This primarily involved meandering through habitat types and identifying all species observed and particularly locating any species of conservation concern.

Relevant field guides and texts consulted for identification purposes included, but was not limited, to the following:

- Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al*, 2015);
- Karoo: South African Wild Flower Guide 6. (Shearing 2008);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);
- Field Guide to Succulents in Southern Africa (Smith *et al*, 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at https://www.inaturalist.org/home.

2.2.2 Faunal Assessment

The faunal assessment within this report pertains to herpetofauna and mammals. The faunal field survey comprised of the following active and passive techniques:

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls or locating tracks and scat;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically under rocks, rocky crevices, coarse woody debris, etc.); and
- Utilization of local knowledge.

Diagnostic features of the individuals that were captured were photographed at site and released. The locations of the site assessment meanders are illustrated in Figure 2-2.

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

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

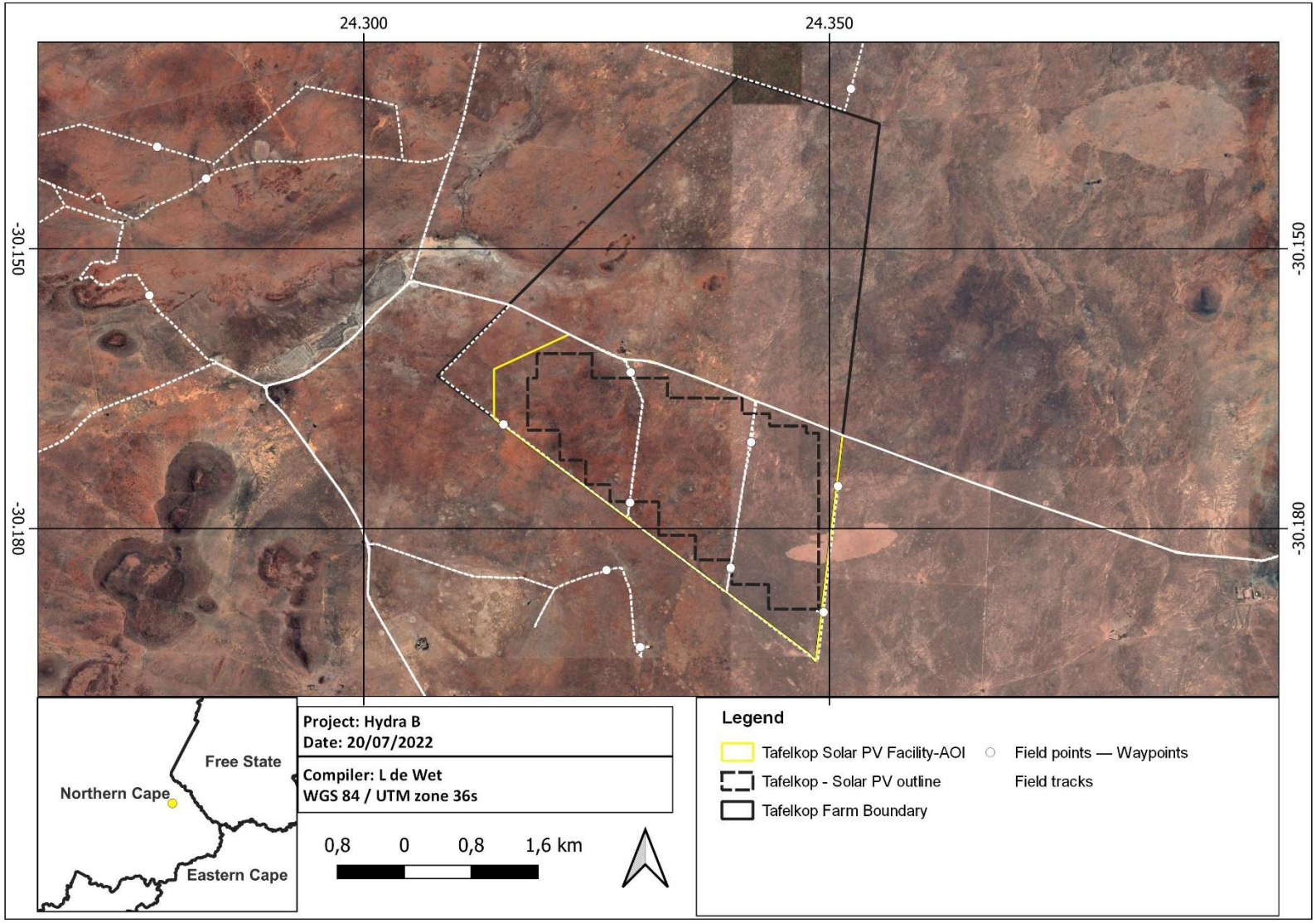

Figure 2-2 Map illustrating the location of the meanders and points utilised for the biodiversity impact assessment

2.3 Site Ecological Importance (SEI)

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

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

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

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

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare 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 NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 2-3 Summary of Functional Integrity (FI) criteria

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

BI can be derived from a simple matrix of CI and FI as provided in Table 2-4

Table 2-4 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity (FI)	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 2-5.

Table 2-5 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of 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 remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of 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 remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-6.

Table 2-6 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance (SEI)		Biodiversity Importance (BI)				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor Resilience (RR)	**Very Low**	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-7.

Table 2-7 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities

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

Site Ecological Importance (SEI)	Interpretation in relation to proposed development 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.

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

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

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Irrelevant – Located within a Least Concern ecosystem	3.1.1.1
Ecosystem Protection Level	Relevant – Located within a Not Protected ecosystem	3.1.1.2
Protected Areas	Irrelevant – The project area is over 30 km away from the nearest Protected Area	-
National Protected Area Expansion Strategy	Irrelevant – Is over 20 km away from the nearest Focus Area	-
Important Bird and Biodiversity Areas	Relevant – The project area is within the Platberg Karoo Conservancy IBA	3.1.1.4
Critical Biodiversity Area	Relevant – Is located within an ESA	3.1.1.4
South African Inventory of Inland Aquatic Ecosystems	Relevant - The project area overlaps with an unclassified wetland	3.1.1.5
Freshwater Ecosystem Priority Areas	Irrelevant – no NFEPA wetlands or rivers are present on within the project area	3.1.1.5
Renewable Energy Development Zones (REDZ)	Irrelevant - The project area is ~129 km for the closest REDZ	-

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed development is located within a LC ecosystem (Figure 3-2).

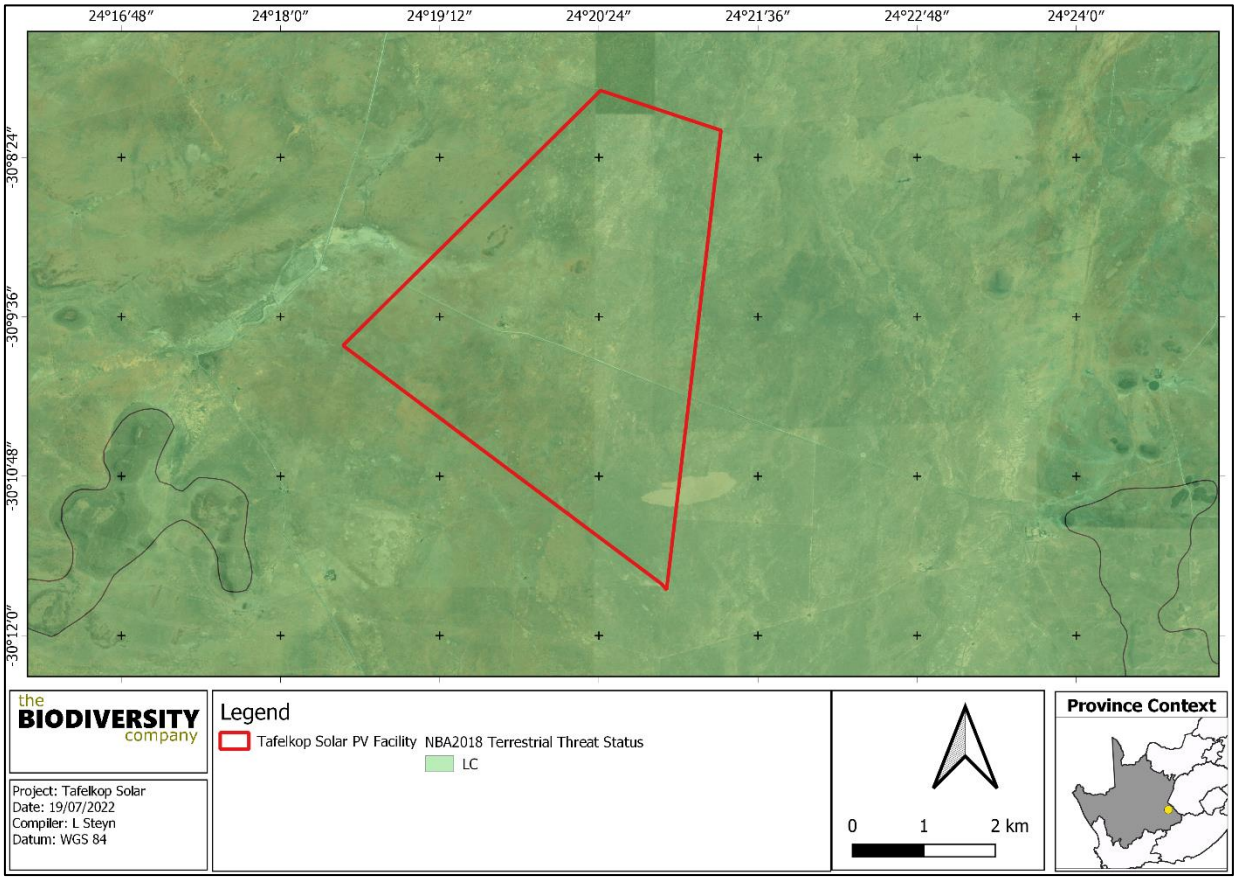

Figure 3-1 Map illustrating the ecosystem threat status associated with the assessment area

3.1.1.2 Ecosystem Protection Level

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

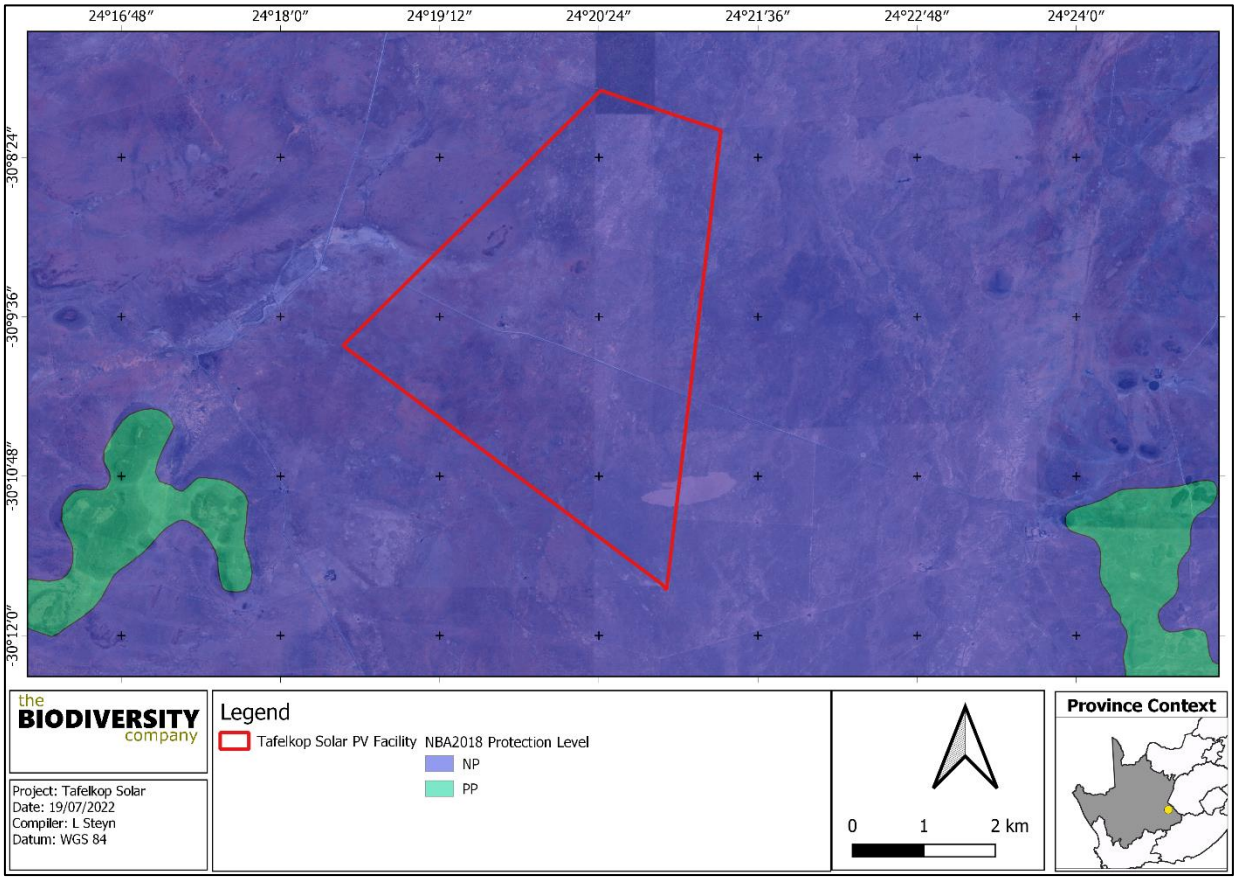

Figure 3-2 Map illustrating the ecosystem protection level associated with the assessment area

3.1.1.3 Important Bird and Biodiversity Areas

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

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

Platberg–Karoo Conservancy IBA can be found in the districts of De Aar, Philipstown and Hanover. This IBA falls across two biomes, the Nama Karroo and the Grassland Biome, which contributes to its diversity of species. In total 289 bird species have been recorded here. Threats in this IBA include overgrazing, erosion and encroachment by Karroo shrubs, all of which result in the loss of habitat and a decrease in available food for large terrestrial birds.

Figure 3-3 shows that the project area is within the Platberg Karoo Conservancy IBA.

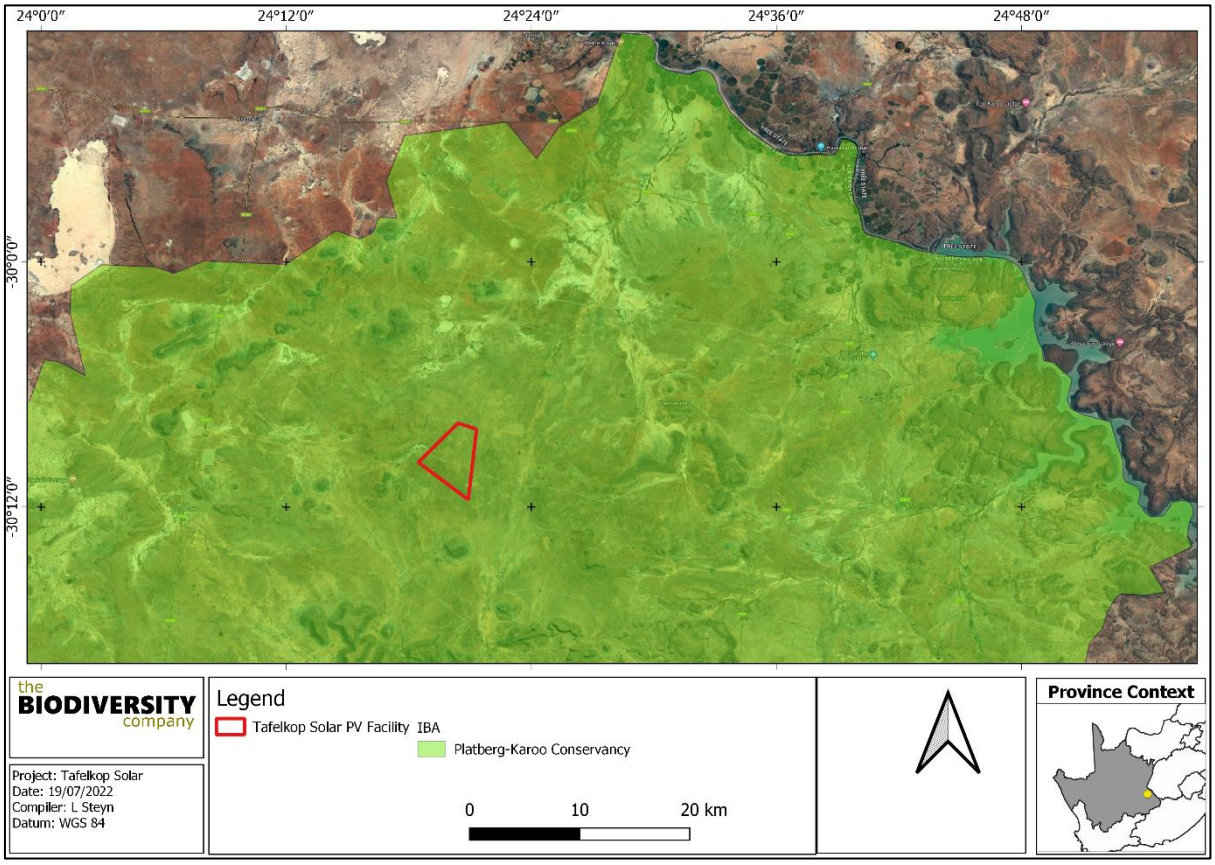

Figure 3-3 Map illustrating the location of the IBAs proximal to the project area

3.1.1.4 Biodiversity Sector Plan

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

The project area includes ESA (Figure 3-3). Development of this nature (ie: Solar PV facilities and associated infrastructure) may occur in an ESA area provided all mitigation measures are adhered to. It must be noted, however, when taken into consideration in conjunction with the other Solar PV facilities planned for all three phases of the overall proposed development, that the cumulative fragmentation of the ESA is very high. The associated cumulative fragmentation impacts are expected to be high for the overall development. This project should ideally not be considered in insolation but rather as a part of the full proposed development when considering impacts to the ESA.

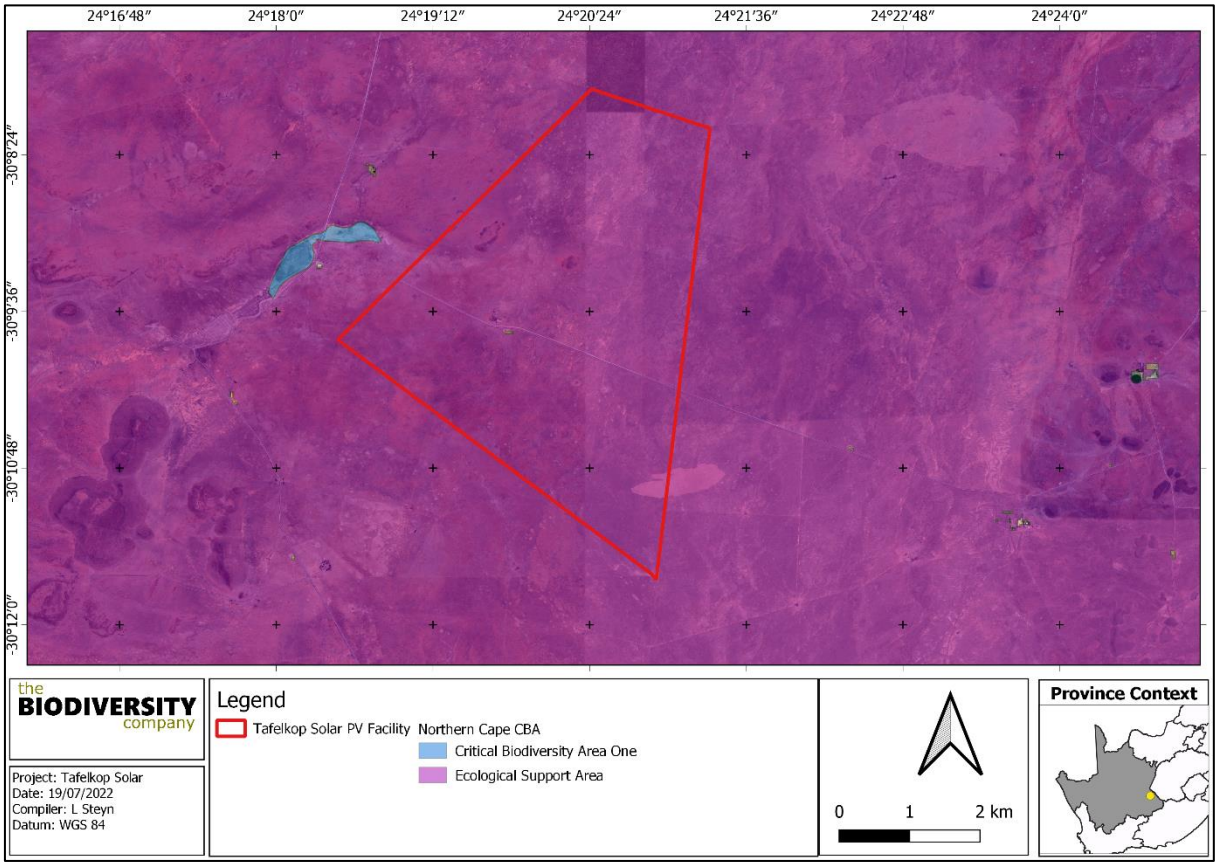

Figure 3-4 Map illustrating the location of Critical Biodiversity Areas proximal to the project area

3.1.1.5 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of ecosystem types is 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. Critically Endangered, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al*., 2019; Skowno *et al*., 2019). The project area overlaps with an unclassified wetland (Figure 3-5).

The National Freshwater Ecosystem Priority Areas (NFEPAs) (Driver *et al*., 2011) spatial data has been incorporated in the above mentioned SAIIAE spatial data set. They are included here as the database is intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.,* 2011). The NFEPA spatial layer indicates that the wetlands do not intersect with a Ramsar site and are not within 500 m of an IUCN threatened frog point locality. No NFEPA wetlands or rivers are present within the project area (Figure 3-6).

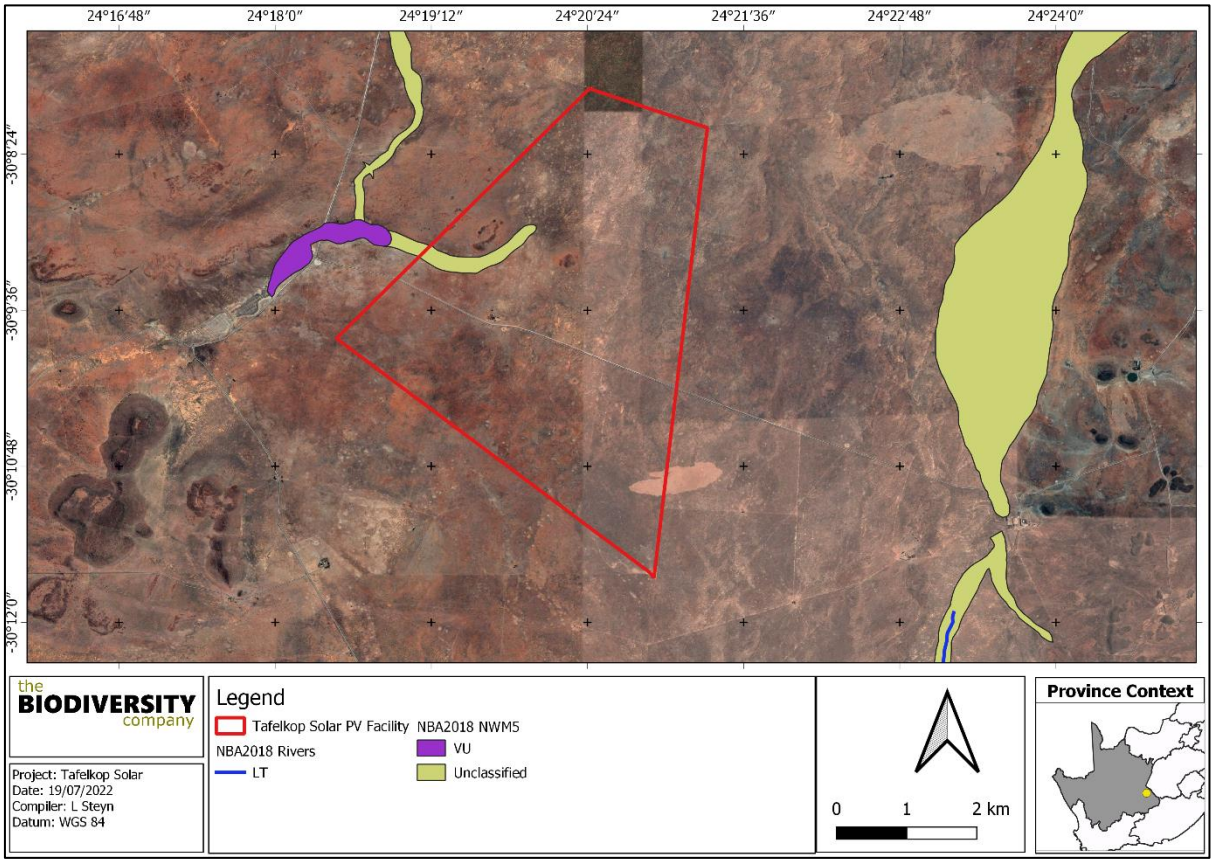

Figure 3-5 The inland water features associated with the project area

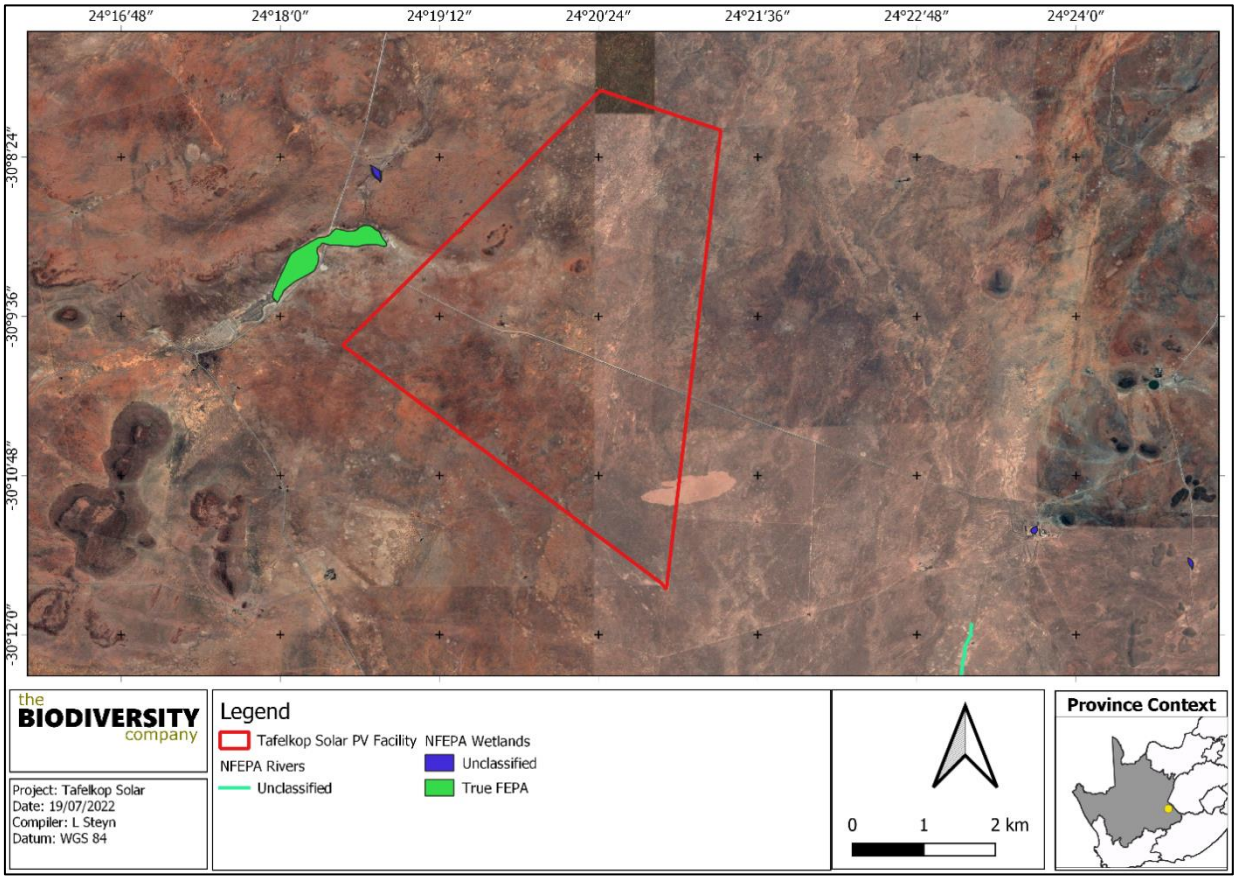

Figure 3-6 Map illustrating the NFEPA wetland and river systems associated with the assessment area

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

The project area is situated in the Northern Upper Karoo vegetation type according to SANBI (2018) (Figure 3-7).

The project area is situated within the Nama Karoo Biome and (SANBI, 2018). The Nama Karoo Biome is found in the central plateau of the western half of South Africa. The geology underlying the biome is varied, as the distribution of this biome is determined primarily by rainfall. The rain falls in summer, and varies between 100 and 520mm per year. This also determines the predominant soil type - over 80% of the area is covered by a lime-rich, weakly developed soil over rock. Although less than 5% of rain reaches the rivers, the high erodibility of soils poses a major problem where overgrazing occurs (SANBI, 2019).

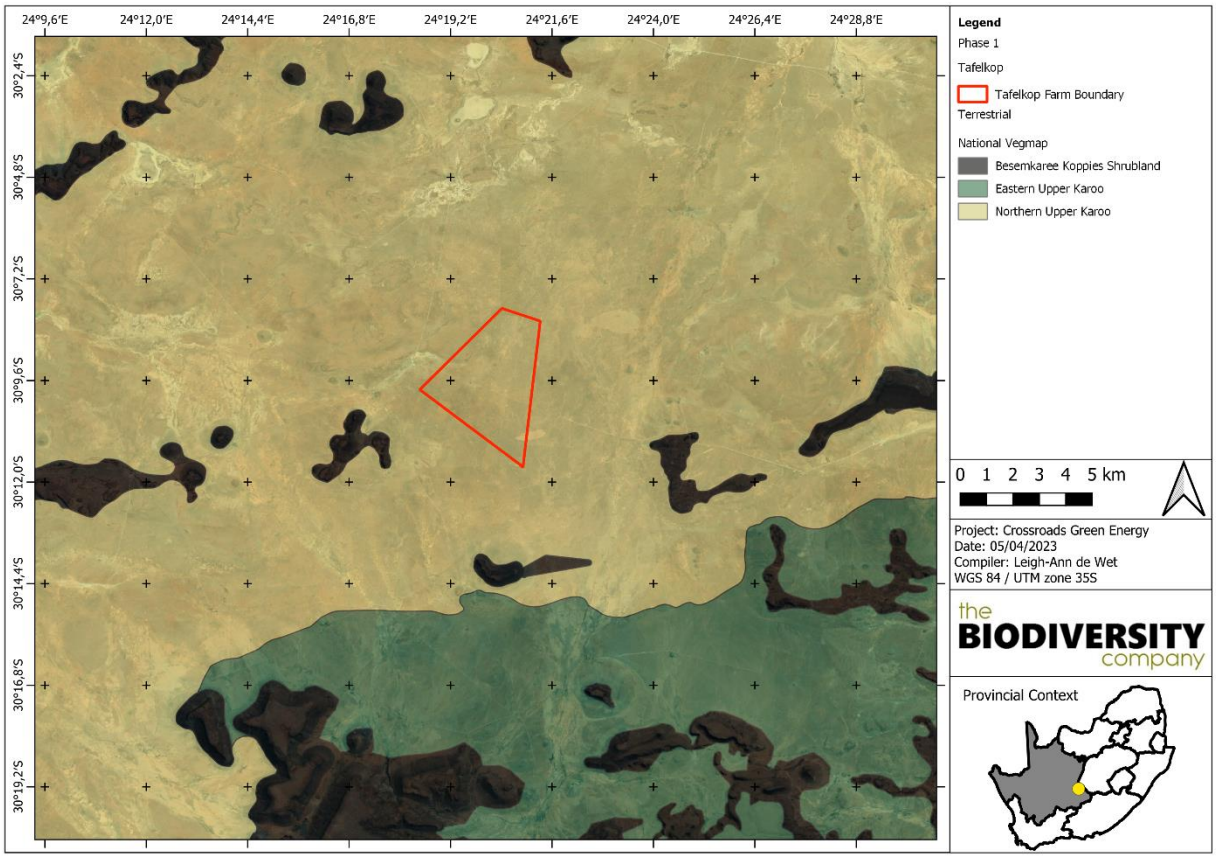

Figure 3-7 Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

The **Northern Upper Karoo** is described as follows:

Northern Upper Karoo occurs in the Northern Cape and Free State Provinces. It occurs on flat to gently sloping terrain with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast with interspersed pans. It is a shrubland dominated by dwarf karoo shrubs, grasses and *Acacia mellifera* subsp. *Deti-nens* and some other low trees. It occurs at an altitude of 1 000 to 1 500 m.

Important 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 Gamka Karoo (d=dominant):

Small trees: *Acacia mellifera* subsp. *detinens*, *Boscia albitrunca*.

Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*, *L. schizocalyx*, *Rhigozum trichotomum*.

Low Shrubs: *Chrysocoma ciliata* (d), *Gnidia polycephala* (d), *Pentzia calcarea* (d), *P. globosa* (d), *P. incana* (d), *P. spinescens* (d), *Rosenia humilis* (d), *Amphiglossa triflora*, *Aptosimum marlothii*, *A. spinescens*, *Asparagus glaucus*, *Barleria rigida*, *Berkheya annectens*, *Eriocephalus ericoides* subsp. *ericoides*, *E. glandulosus*, *E. spinescens*, *Euryops asparagoides*. *Felicia muricata*, *Helichrysum lucilioides*, *Hermannia spinosa*, *Leucas capensis*, *Limeum aethiopicum*, *Melolobium candicans*, *Microloma armatum*, *Osteospermum leptolobum*, *O. spinescens*, *Pegolettia retrofracta*, *Pentzia lanata*, *Phyllanthus maderaspatensis*, *Plinthus karooicus*, *Pteronia glauca*, *P. sordida*, *Selago geniculata*, *S. saxatilis*, *Tetragonia arbuscula*, *Zygophyllum lichtensteinianum*.

Succulent Shrubs: *Hertia pallens*, *Salsola calluna*, *S. glabrescens*, *S. rabieana*, *S. tuberculata*, *Zygophyllum flexuosum*.

Semiparasitic Shrub: *Thesium hystrix* (d),

Herbs: *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Dicoma capensis*, *Gazania krebsiana*, *Hermannia comosa*, *Indigofera alternans*, *Lessertia pauciflora*, *Radyera urens*, *Sesamum capense*, *Sutera pinnatifida*, *Tribulus terrestris*, *Vahlia capensis*.

Succulent Herb: *Psilocaulon coriarium*.

Geophytic Herb: *Moraea pallida.*

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *E. truncata* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtusa* (d), *Eragrostis bicolor*, *E. porosa*, *Fingerhuthia africana*, *Heteropogon contortus*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*, *T. racemosus*.

Biogeographically Important Taxa:

Herb (western distribution limit): *Convolvulus boedeckerianus*.

Tall Shrub (southern limit of distribution): *Gymnosporia szyszylowiczii* subsp. *namibiensis*.

Endemic Taxa

Succulent Shrubs: *Lithops hookeri*, *Stomatium pluridens*.

Low Shrubs: *Atriplex spongiosa*, *Galenia exigua*.

Herb: *Manulea deserticola*.

Conservation Status

According to Mucina & Rutherford (2006), this vegetation type is classified as Least Threatened. The national target for conservation protection is 21% with none statutorily conserved and about 4% cleared for cultivation.

3.1.2.2 Expected Flora Species

The POSA database indicates that 480 species of indigenous plants are expected to occur within the project area (The full list of species can be found in Appendix B). One SCC is expected in the project area as identified by the Screening Tool (none previously recorded as per POSA): *Tridentea virescens*, which is listed as Rare.

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool, the **name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain**. It should be referred to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.

3.1.3 Faunal Assessment

No herpetofauna or mammals are identified by the Screening Tool as important for the site.

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool, the **name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain**. It should be referred to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.

3.1.3.1 Herpetofauna

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2019) 40 reptile species have the potential to occur in the project area (Appendix D). One of the expected species is a SCCs (IUCN, 2017). One (1) are regarded as threatened (Table 3-2).

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2020) 13 amphibian species have the potential to occur in the project area (Appendix C). One (1) are regarded as threatened (Table 3-2).

Table 3-2 Reptile SCC expected in the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Reptile				
Psammophis leightoni	Cape Sand Snake	VU	LC	Moderate
Amphibian				
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Moderate

Psammophis leightoni (Cape Sand Snake) is categorised as vulnerable internationally and locally. Endemic to the western regions of the Western Cape, South Africa. Threatened primarily by habitat loss associated with agriculture and development of human settlements throughout its range. The likelihood of finding the species in the project area is moderate.

Pyxicephalus adspersus (Giant Bull Frog) is a species of conservation concern that will possibly occur in the project area. The Giant Bull Frog is listed as near threatened on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The likelihood of finding the species in the project area is moderate.

3.1.3.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 58 mammal species that could be expected to occur within the project area. Species generally restricted to protected areas such as game reserves were not expected to occur in the project area and were removed from the list (Appendix E).

Of the 58 mammal species, eight (8) are listed as being of conservation concern on a regional or global basis (Table 3-3).

Table 3-3 List of mammal Species of Conservation Concern that may occur in the project area as well as their global and regional conservation statuses.

Species	Common Name	Conservation Status		
		Regional (SANBI, 2016)	IUCN (2021)	Likelihood of Occurrence
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Moderate
Felis nigripes	Black-footed Cat	VU	VU	High
Leptailurus serval	Serval	NT	LC	High
Panthera pardus	Leopard	VU	VU	Moderate
Parahyaena brunnea	Brown Hyaena	NT	NT	Moderate
Parotomys littledalei	Littledale's Whistling Rat	NT	LC	Moderate
Poecilogale albinucha	African Striped Weasel	NT	LC	High

Redunca fulvorufula	Mountain Reedbuck	EN	EN	Moderate

Eidolon helvum (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale. This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). No colonies of this species are known to occur in the Project area or in the immediate vicinity and, although individuals may occasionally be recorded, it is not expected to be resident within the Project area and therefore it's likelihood of occurrence is rated as moderate.

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

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. Suitable habitat, along with sufficient food sources can be found in the project area, therefore the likelihood of occurrence is rated as high.

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although known to occur and persist outside of formally protected areas, the densities in these areas are considered to be low. The likelihood of occurrence in the Project area, is regarded as moderate.

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 moderate. The presence of moderate to large herbivores on adjacent properties increases the likelihood of occurrence of this species.

Parotomys littledalei (Littledale's Whistling Rat) is listed as NT on a regional scale. This diurnal species occurs in shrubland and is dependent on ground cover. Littledale's Whistling Rat is herbivorous only, feeding on fresh plant material, including annuals, succulent perennials, non-succulent perennials, and grasses. The presence of ground cover increases their likelihood of occurrence in the project area.

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 areas and the likelihood of occurrence of this species is therefore considered to be high.

Redunca fulvorufula (Mountain Reedbuck) is listed as EN both regionally and globally. The South African population has undergone a decline of 61-73% in the last three generations (15 years) (IUCN, 2017). Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover). Although there are not extensive mountainous regions in the Project area, the areas adjacent to the project area comprises of a number of mountainous areas and as such the likelihood of occurrence for this species is rated as moderate.

3.2 Field Assessment

The following sections provides the results from the field survey for the proposed development that was undertaken during July 2022.

3.2.1 Land use and Current Impacts

The main impact to the vegetation and habitat types within and surrounding the project area is grazing (Figure 3-8). According to Jan Vlok, Richard Dean and Sue Milton many areas in the Karoo still have a high vegetation cover, but that species composition has altered significantly due to overgrazing (Skowno *et al.* 2009). It could be argued that these areas contribute little to the biodiversity of the region, and that many more habitat types are under threat (Skowno *et al.* 2009). Disturbances noted within the project area include, farm roads and fences, and alien invasive plant infestation (mainly along roads).

Van der Merwe *et al.* (2008) noted that inadequate farming practices, due to lack of infrastructure such as fencing, pose a serious threat to the vegetation. Esler *et al.* (2006) further added that "although damage can happen fast, recovery in the Karoo is very slow, as it depends mainly upon unpredictable rainfall events".

Presently about 12% of the Karoo district's ecosystems are transformed or degraded, with mining, agriculture and urbanization the main reasons of biodiversity loss (Skowno *et al.* 2009). Recently, the prospects of uranium mining and shale gas exploration have also come under the spotlight.

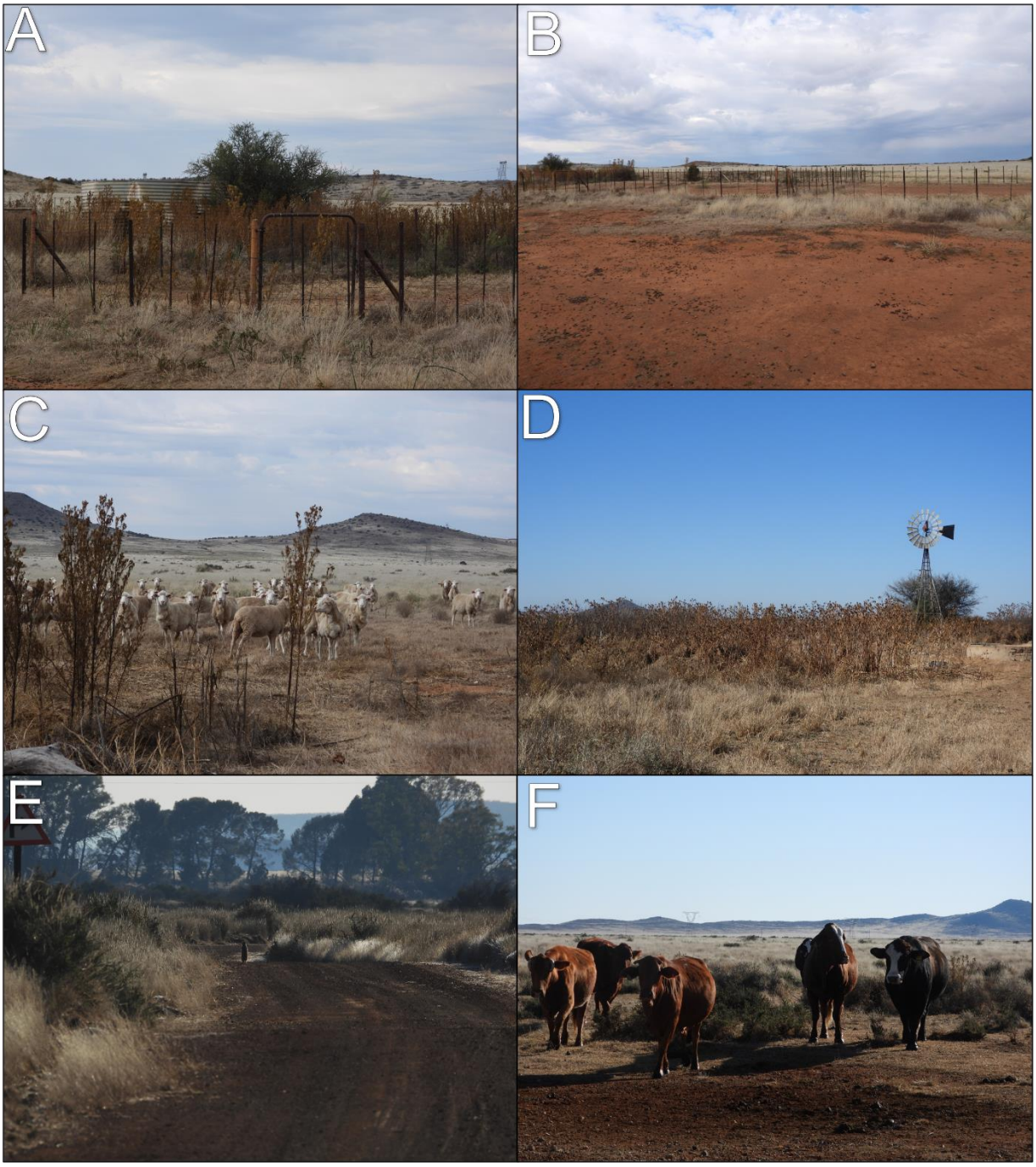

Figure 3-8 Land use and current impacts of the study area in general. A: invasive alien plant species and fences, B: overgrazing and fences, C: Sheep grazing, D: invasive alien plants, E: roads and associated alien plant species and F: Cattle grazing.

3.2.2 Flora Assessment

This section is divided into four sections:

- Vegetation and flora;
- Species of Conservation Concern (SCC); and
- Invasive Alien Plants (IAPs).

3.2.2.1 Vegetation

One vegetation community type can be found in the project area: Karoo Grassland, which approximates Northern Upper Karoo.

The project area is homogenous in terms of vegetation with a low karroid scrub grassland occurring throughout (Figure 3-9). Although the season did not allow for the identification of all grasses, dominant species could be identified. Dominant species of this vegetation community include, but are not limited to *Chrysocoma ciliata, Pentzia incana, Pentzia globose, Lycium cinereum, Aptsimum spinescens, Asparagus sauvolens, Eriocephalus ericoides, Eriocephalus spinscens, Felicia muricata, Ruschia intricata, Roepera lichbtenteinii, Morae pallida, Heteropogon contortus, Aristida congesta, Aristida diffusa,*and *Eragrostis lehmanniana* (Figure 3-10). It must be noted that several geophytic species were recorded but could not be identified and may well be provincially protected, requiring permits to destroy or remove from the provincial authorities. These must be identified through a walk-through in the spring or summer (flowering season) prior to any construction activities.

Figure 3-9 Photographs illustrating the Karoo Grassland of the Tafelkop site.

Figure 3-10 Photographs illustrating some of the dominant plant species A: Asapargus sauvolens B: Ruschia intricata, C: Eriocephalus ericoides, D: Pteronia incana, E Roepera lichtenseinii and F: Chrysocoma ciliate.

3.2.2.2 Species of Conservation Concern

No Species of Conservation Concern (SCC) were recorded from the project area.

3.2.2.3 Invasive Alien Plants

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

controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43726, 18 September 2020. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), 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 National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

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

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

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

Twelve (12) alien invasive species were recorded from the project area and surrounds (and therefore likely to invade as a result of disturbance) representing nine (9) families (Table 3-4 and Figure 3-11).

Table 3-4 Alien Invasive Plants recorded from the project area

Family	Scientific name	Common name	NEM:BA
Asparagaceae	*Agave americana*	American century plant	**3**
Asteraceae	*Bidens Pilosa*	Black jack	
Asteraceae	*Tagetes minuta*	Tall kaki weed	
Cactaceae	*Cereus jamacaru*	Queen-of-the-night	1b
Cactaceae	*Opuntia ficus-indica*	Indian fig opuntia	1b
Cactaceae	*Opuntia robusta*	nopal tapón	1a
Chenopodiaceae	*Salsola kali*	Tumbleweed	1b
Fabaceae	*Prosopis velutina*	velvet mesquite	1b
Malvaceae	*Malva parviflora*	Small mallow	
Myrtaceae	*Eucalyptus camaldulensis*	Red river gum	1b
Papaveraceae	*Argemone ochroleuca*	Mexican Poppy	1b
Solanaceae	*Datura ferox*	Large thorn apple	1b

Considering that the project area is within an ESA it is recommended that any IAP species that may colonize the area in the future be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act as stated above. This is also pertinent to the development as invasive species are linked to enhanced fire effects and risk (Aslan & Dickson, 2020). The following monitoring framework must be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded (Table 3-5). The monitoring of the project area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the wellbeing of indigenous flora and fauna. It is also important to note that while herbicide application has been recommended for control, herbicides should not be applied adjacent to the aquatic ecosystems within the site area and herbicide application should not be used during windy days to prevent drift.

Table 3-5 Proposed monitoring framework for the control of invasive alien plants within the project area

Metric	Frequency	Method	Response
How effective are the control methods?	4-6 months after every operation	Survey the cleared areas and look for regrowth. Before and after photographs are effective for this. Observe for non-target effects of herbicide application.	If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application.
Do the infestation levels decrease?	Annually	Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.	If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are decreasing, then continue current control method.

Metric	Frequency	Method	Response
Quantity of herbicides used	During every operation	Keep track of cost and ensure no wastage. Record herbicide usage	Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost.
Does the indigenous vegetation recover in the cleared areas?	Annually	Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective.	If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.
How many jobs were created?	After every operation	Timesheets	Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions
How many person days (PD) were spent per operations?	After every operation	Timesheets	Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)

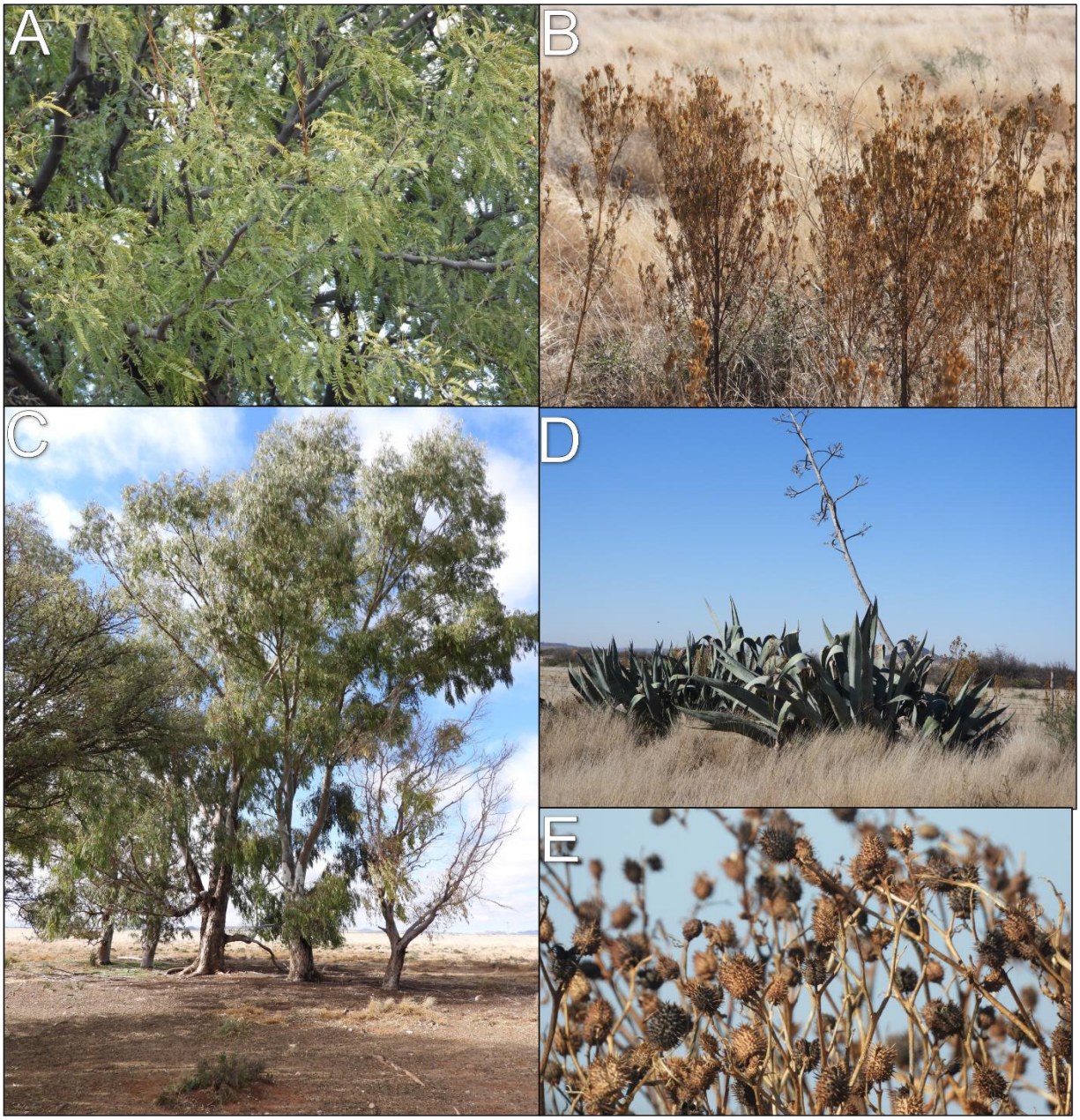

Figure 3-11 Photographs illustrating a portion of the alien invasive species recorded from the project area A: Prosopis velutina, B: Tagetes minuta, C: Eucalyptus camaldulensis, D: Agave americana, E: Datura ferox.

3.2.3 Faunal Assessment

3.2.3.1 Amphibians

One amphibian species was recorded during the survey period (Table 3-6). The lack of species richness was attributed to the dry nature of the project area with most water bodies and perennial drainage lines being dry at the time of the site visit, and no water resources being present within the PAOI. The species expected to occur within the project area are provided in Appendix C.

Table 3-6 Summary of amphibian species recorded within the project area during the survey period. LC = Least Concern

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Pipidae	*Xenopus laevis*	Common Platanna	LC	LC

3.2.3.2 Reptiles

Five reptile species, representing three families were recorded within the project area during the survey periods (Table 3-7 and Figure 3-12). The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (a true representative sample requires an extensive sampling period over several surveys). The presence of suitable habitat suggests that the project area supports a diverse reptile community but as per the screening tool, no SCC are likely to occur within the project area.

Table 3-7 Summary of reptile species recorded within the project area during the survey period. LC = Least Concern

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	LC	Unlisted
Scincidae	*Acontias gracilicauda*	Thin-tailed Legless Skink	LC	LC
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	LC	LC
Scincidae	*Trachylepis variegata*	Variegated Skink	LC	Unlisted
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC	LC

Figure 3-12 Photographs illustrating a portion of the herpetofauna recorded from the project area. A: Stigmochelys pardalis, B: Leptotyphlops scutifrons scutifrons, C: Trachylepis punctatissima, and D: Acontias gracilicauda.

3.2.3.3 Mammals

A total of twenty eight (28) mammal species were recorded across the project area during the survey period (Table 3-8 and Figure 3-13), accounting for 48% of the expected mammal species. It is considered highly likely that additional small mammal species would be recorded from the project area with extensive sampling. The lack of records may have been due to hunting that was observed on site.

Table 3-8 Mammal SCC recorded within the project area during the survey periods.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Aepyceros melampus	Impala	LC	LC
Antidorcas marsupialis	Springbok	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Connochaetes gnou	Black Wildebeest	LC	LC
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus pygargus	Blesbok	LC	LC
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Herpestes pulverulentus	Cape Grey Mongoose	LC	LC
Hippotragus niger	Sable Antelope	VU	LC

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Lepus capensis	Cape Hare	LC	LC
Orycteropus afer	Aardvark	LC	LC
Oryx gazella	Gemsbok	LC	LC
Otocyon megalotis	Bat-eared Fox	LC	LC
Pedetes capensis	Springhare	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Procavia capensis	Rock Hyrax	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Suricata suricatta	Suricate	LC	LC
Tragelaphus strepsiceros	Greater Kudu	LC	LC
Vulpes chama	Cape Fox	LC	LC
Xerus inauris	Cape Ground Squirrel	LC	LC

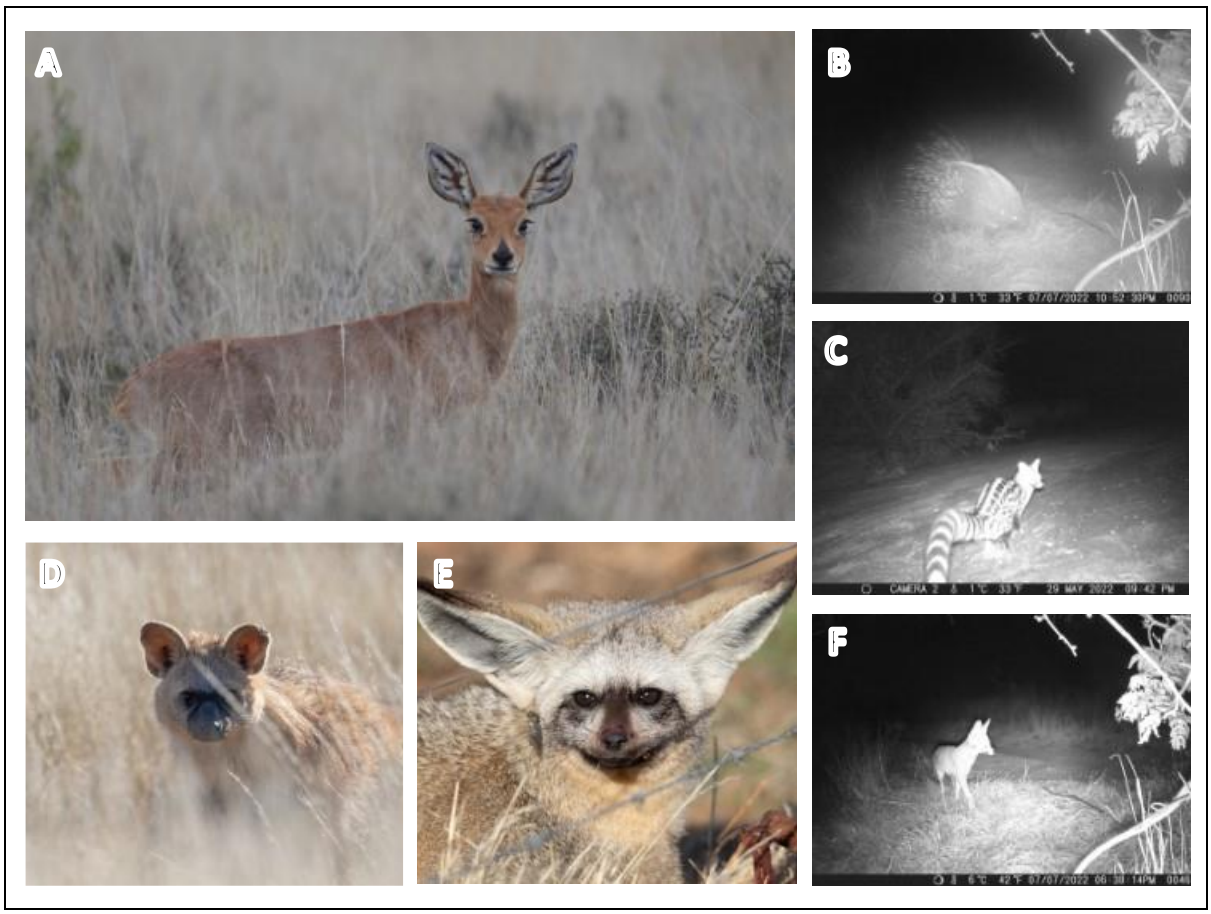

Figure 3-13 Photographs illustrating a portion of the mammals recorded within the project area during the survey period. A: Raphicerus campestis (Steenbok), B: Hystrix africaeaustralis (Cape porcupine), C: Genetta genetta (Small-spotted Genet), D: Proteles cristata (Aardwolf), E: Otocyon megalotis (Bat-eared Fox) and F: Vulpes chama (Cape fox).

4 Site Ecological Importance (SEI)

The combined Terrestrial Biodiversity Theme Sensitivity for the assessment area was derived to be Very High as indicated in the National Environmental Screening Tool due to the location within an ESA (Figure 4-1), it can be downloaded at (https://screening.environment.gov.za/screeningtool/#/pages/welcome).

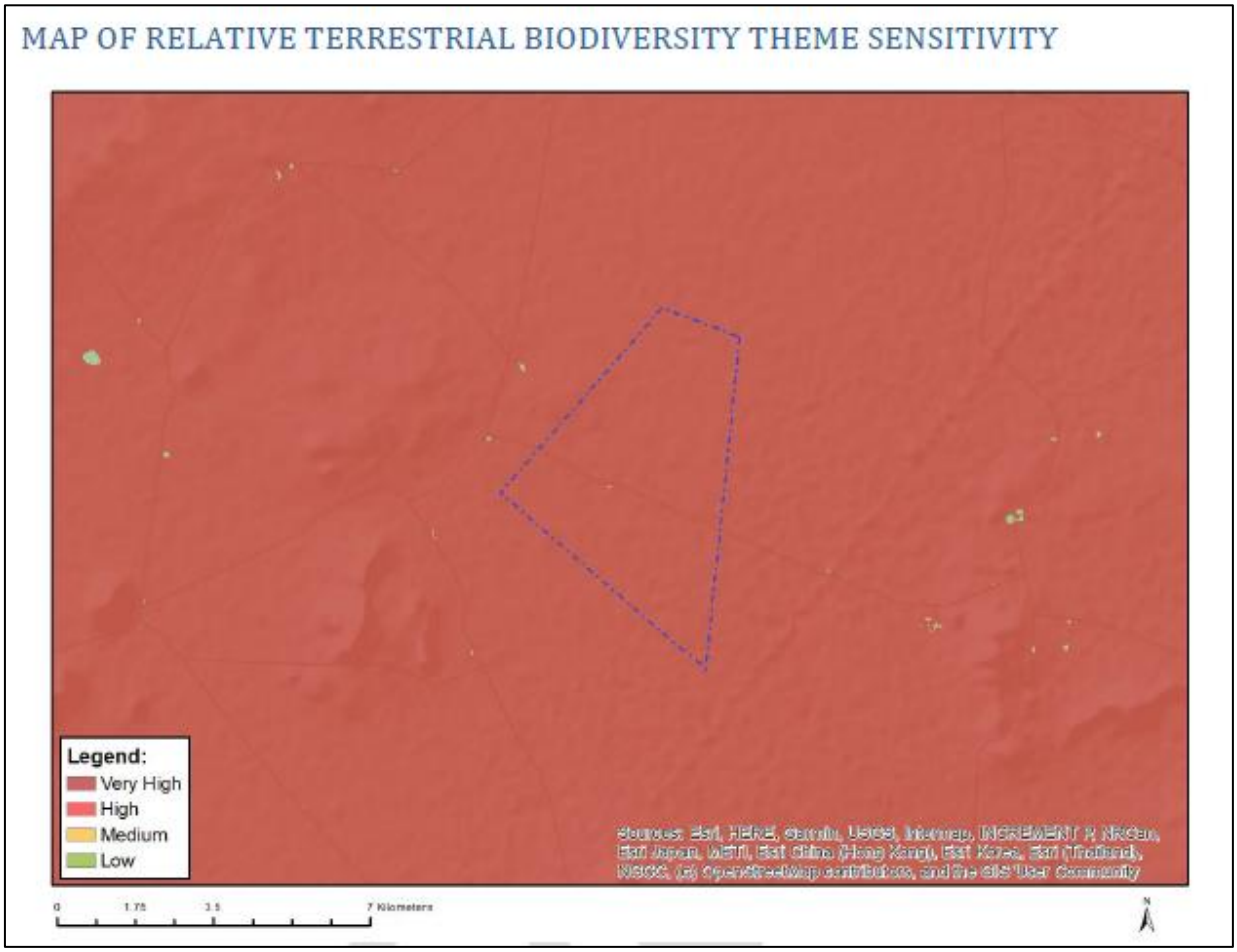

Figure 4-1 Combined Terrestrial Biodiversity Sensitivity of the assessment area

The Animal Species Theme sensitivity, as indicated in the screening report, was derived to be Medium for the PAOI (Figure 4-2). The Medium sensitivity of the project area was due to the likely presence of *Neotis ludwigii* (Ludwig's Bustard) and is therefore applicable to the avifauna assessment.

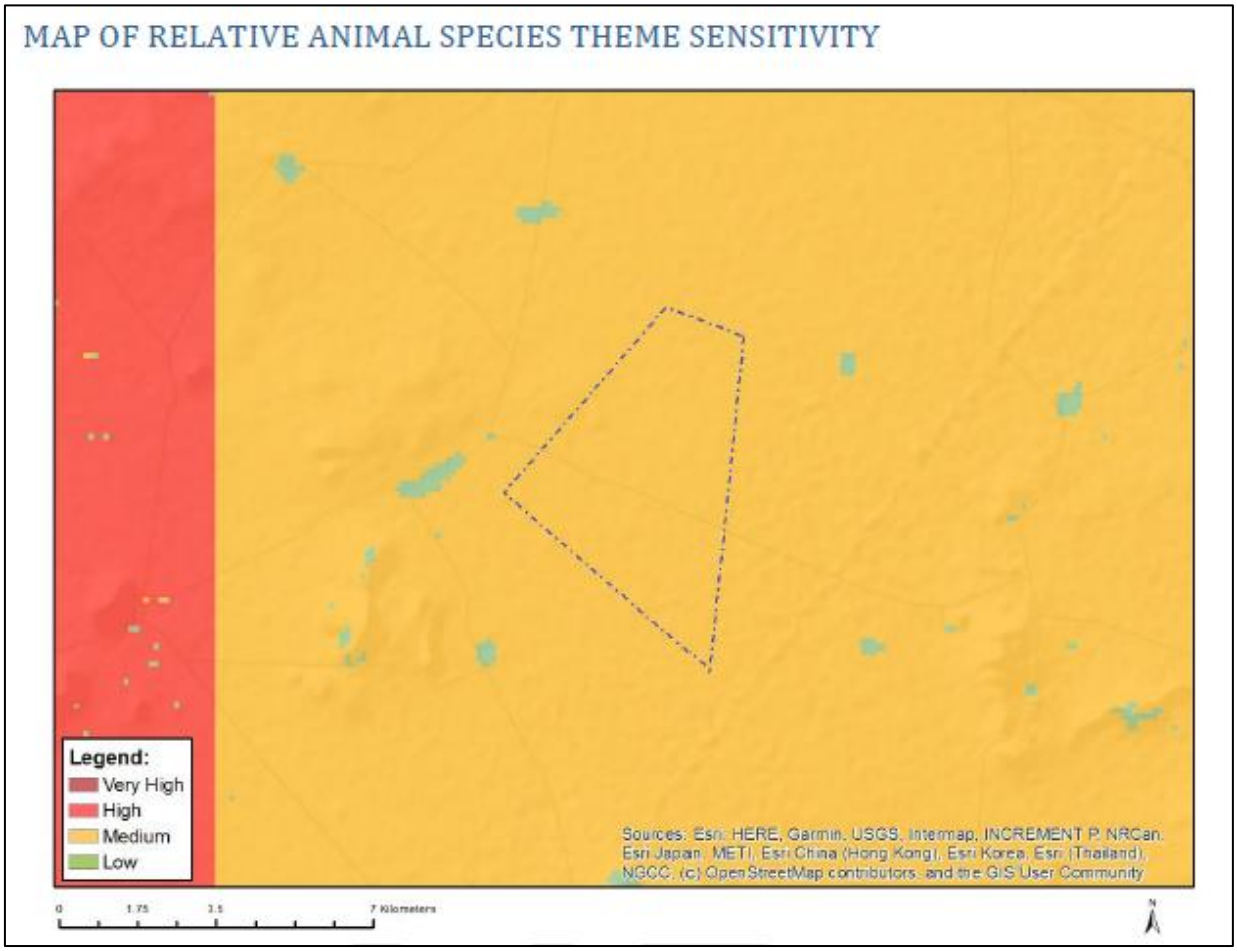

Figure 4-2 Relative Animal Species Theme Sensitivity of the assessment area

The Plant Species Theme sensitivity, as indicated in the screening report, was derived to be Medium for a small section of the PAOI (Figure 4-3). The majority of the site falls within an area of low sensitivity. The Medium sensitivity of the project area was due to the likely presence of the Rare *Tridentea virescens* and is therefore applicable to this assessment. The species was not located on the site however, and it is not expected for the footprint of the proposed PV area.

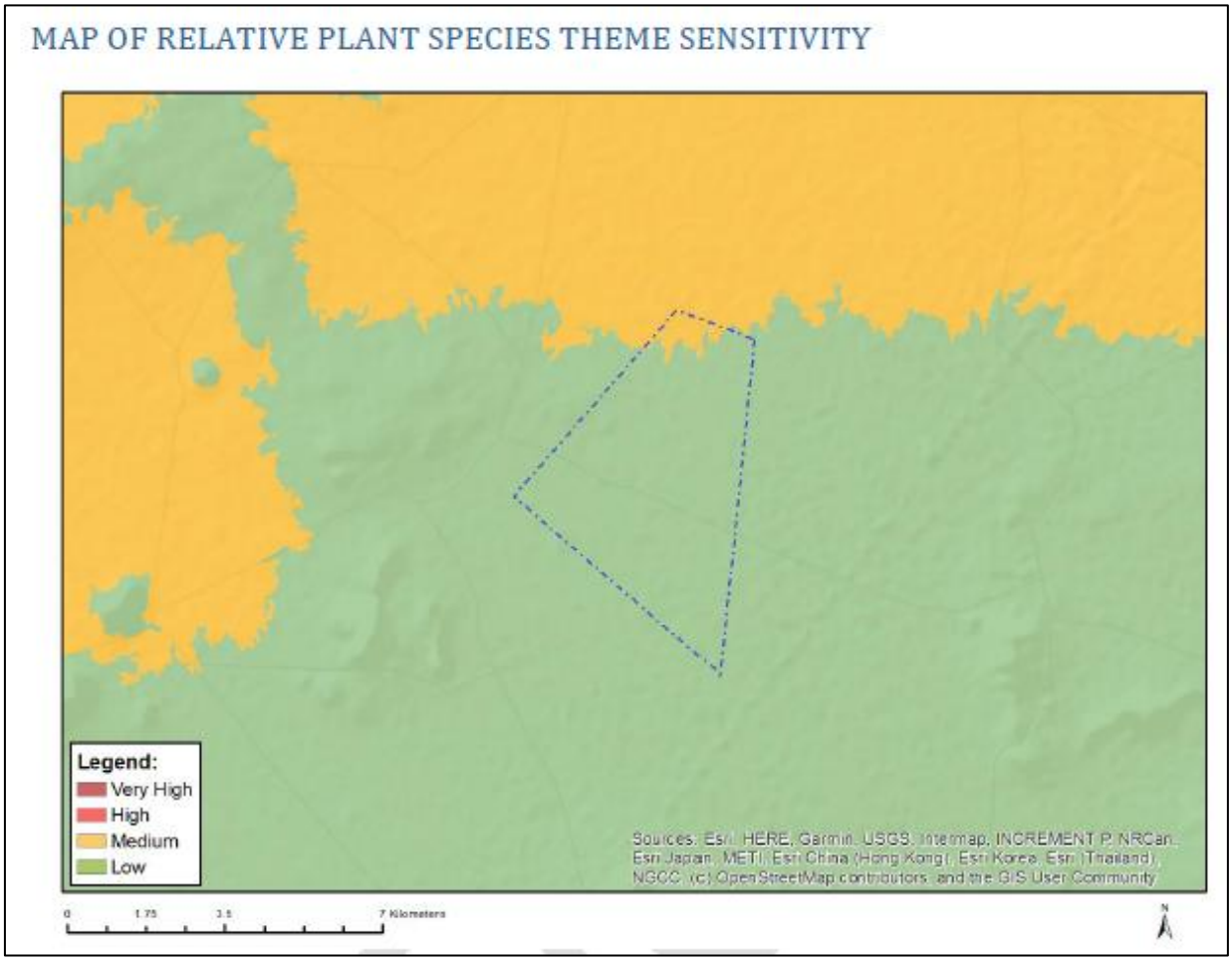

Figure 4-3 Relative Plant Species Theme Sensitivity of the assessment area

One (1) habitat type (vegetation community) was delineated within the assessment area (Table 4-1, Figure 4-4). Descriptions of the habitat types can be seen in Section 3.2.2.1. Based on the criteria provided in Section 2.3 of this report, all habitats within the project area of the proposed development were allocated a sensitivity category or SEI, which is considered a combined SEI for Terrestrial Biodiversity, Animal Species and Plant Species Themes. The sensitivities of the habitat types delineated are illustrated in Figure 4-4. The interpretations of the categories can be found in Table 2-7.

Table 4-1 Habitat types and associated SEI delineated within the field assessment area of the proposed development

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Guidelines for interpreting SEI in the context of the proposed development activities
Karoo Grassland	Karroid shrubs and grasses on flat plains, homogenous in nature.	Provides foraging areas for fauna, provides landscape-level; pollination and dispersal.	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and	**Medium** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Guidelines for interpreting SEI in the context of the proposed development activities
						functionality of the receptor	restoration activities.

Much of the project area comprises large areas of intact indigenous vegetation with little to no existing degradation, making these areas suitable for a wide variety of plant species (not all of which could be identified as a result of the seasonality of the site visit) as well as suitable habitat for a suite of faunal species, most notably various mammals.

In comparison to the screening tool, the themes are either confirmed or disputed as in Table 4-2.

Table 4-2 Summary of the screening tool vs. specialist assigned sensitivities

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Terrestrial Biodiversity Theme	Very High	Medium	Disputed – Although the project area lies within an ESA it is relatively small in size and impacted by grazing activities with low plant species diversity and little to no SCC present.
Animal Theme	Medium	Medium	Confirmed – A high diversity of mammals is expected and recorded for the site. However, this report does not deal with the triggered avifauna species for the medium sensitivity as this is the function of the avifauna report (TBC 2023)
Plant Theme	Medium	Low	Irrelevant – No SCC trigger species are located within the PAOI.

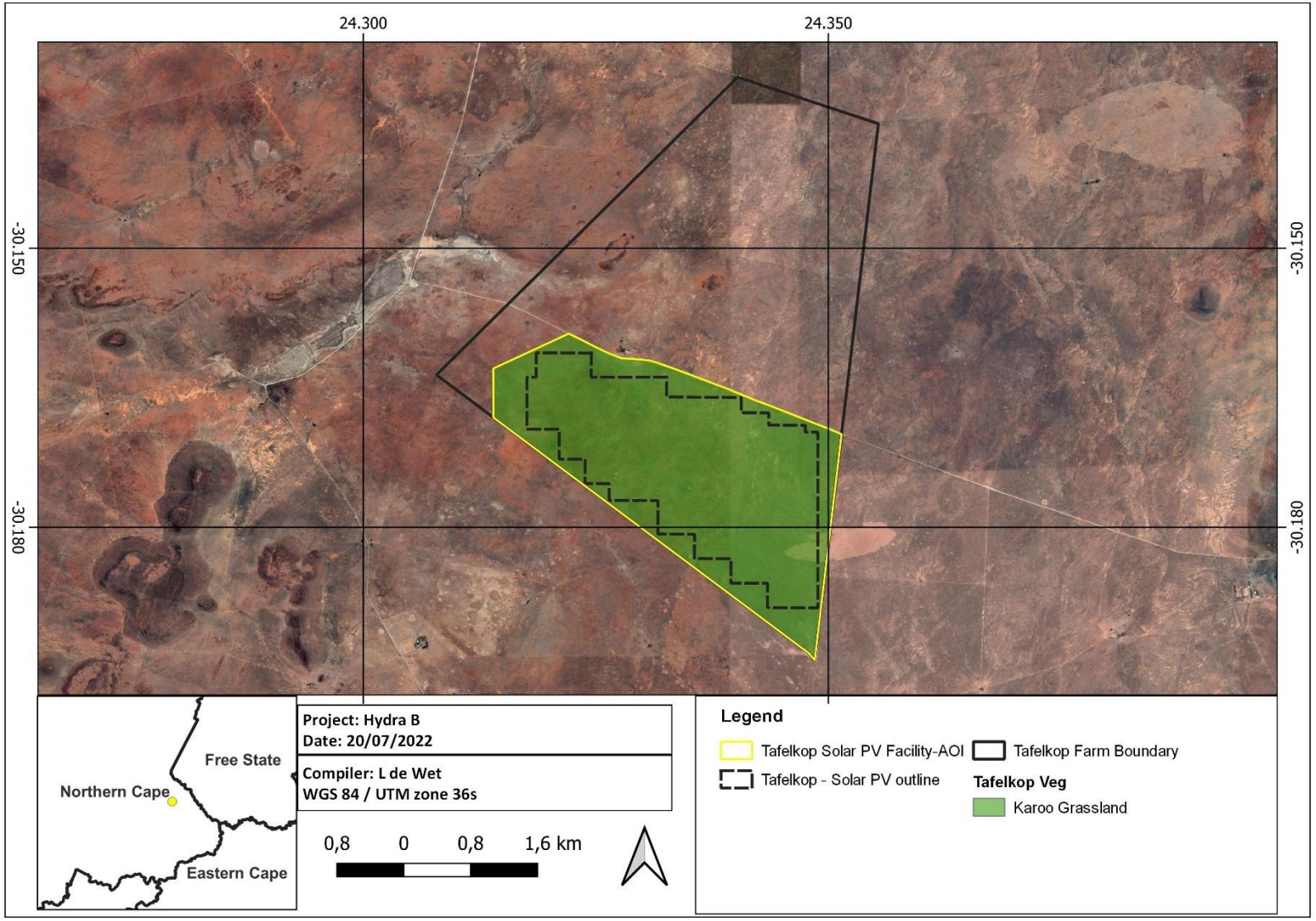

Figure 4-4 Map illustrating the habitats defined within the project area

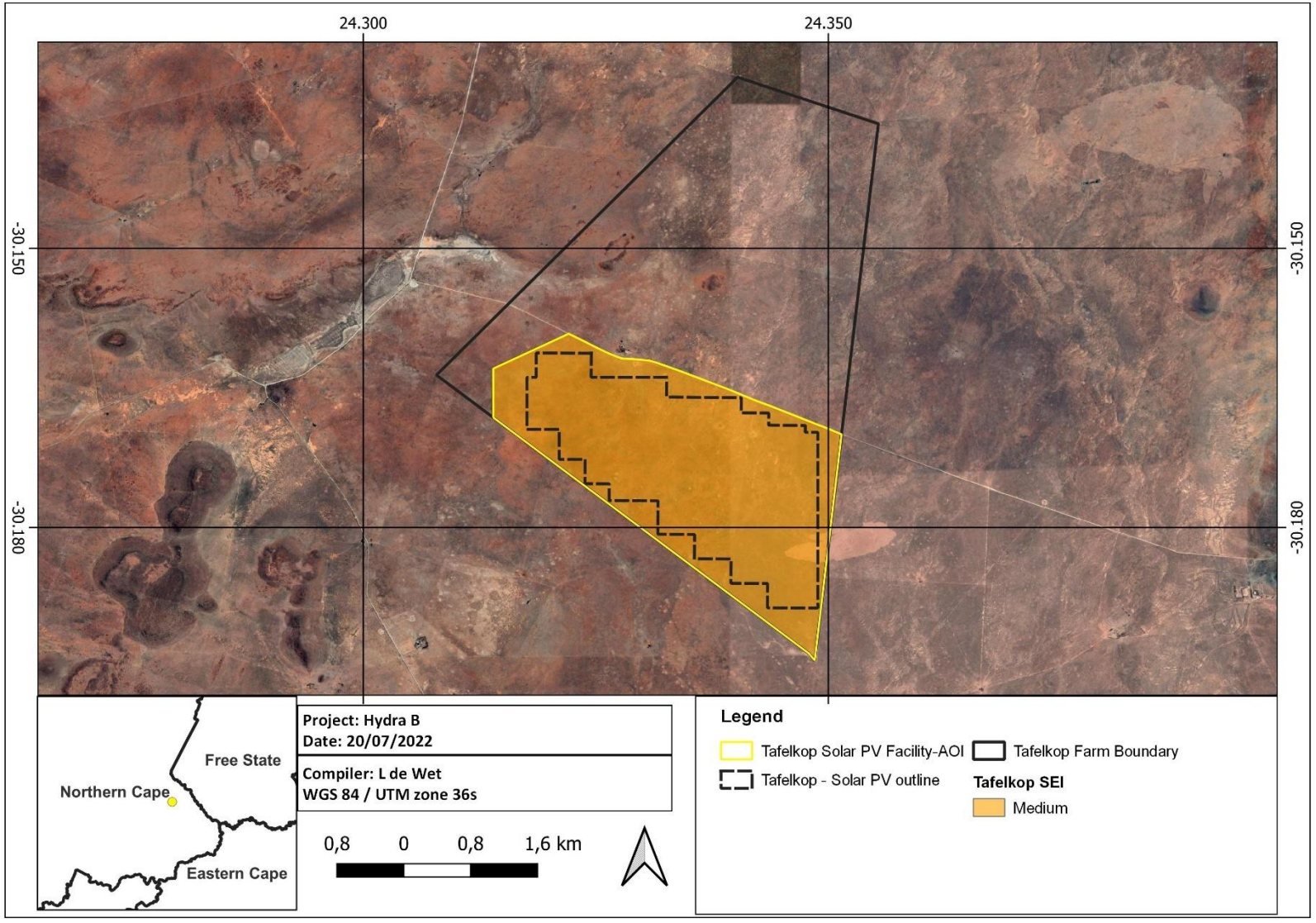

Figure 4-5 Map illustrating Site Ecological Importance (SEI) of the habitat types within the project area

5 Impact Risk Assessment

5.1 Biodiversity Risk Assessment

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

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

5.1.1 Present Impacts to Biodiversity

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

- Cattle and sheep grazing land-use and associated infrastructure;
- Roads and associated vehicle traffic and road kills; and
- Fences.

5.1.2 Identification of Additional Potential Impacts

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

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

Main Impact	Project activities that can cause loss/impacts to habitat (especially with regard to the proposed infrastructure areas):	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species.	Displacement/loss of flora & fauna (including possible SCC)
	Access roads and servitudes	Increased potential for soil erosion

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

8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Loss of SCCs

5.1.3 Alternatives considered

No alternatives were considered.

5.2 Assessment of Impact Significance

The assessment of impact significance was undertaken in accordance with the method developed by Savannah. The various identified impacts are assessed below for the different phases of the development. The impacts assessed are considered for all alternatives as they are considered to have negligible impact significance differences.

5.2.1.1 Construction Phase

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

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

- Table 5-4).

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

Impact Nature: Loss of vegetation within development footprint		
Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, although this impact cannot be fully mitigated as the loss of vegetation is unavoidable.	
Mitigation:		
• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage • Do not clear areas of indigenous vegetation outside of the direct project footprint • Minimise vegetation clearing to the minimum required • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site • Compile and implement a rehabilitation plan from the onset of the project; • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. o Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limits to enforce reduced speeds. o No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. • Rehabilitate areas as soon as they are no longer impacted by construction o The rehabilitated areas must be revegetated with indigenous vegetation • Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

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

Impact Nature: Introduction of alien and invasive species, especially plants		
Degradation and loss of surrounding natural vegetation, competition with indigenous fauna and flora, persecution of indigenous fauna species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Permanent (5)	Short term (2)

Impact Nature: Introduction of alien and invasive species, especially plants		
Degradation and loss of surrounding natural vegetation, competition with indigenous fauna and flora, persecution of indigenous fauna species		
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
• Compile and implement an alien vegetation management plan from the onset of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated; • Implementation of a waste management plan, this plan must also prescribe a monitoring plan and be updated as/when new data is collated. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site. • Refuse bins must be emptied and secured. • Temporary storage of domestic waste shall be in covered waste skips. • Maximum domestic waste storage period will be 7 days. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used.		
Residual Impacts:		
Long-term broad scale. IAP infestation if not mitigated.		

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

Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. • Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance. • Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area • Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs-only basis, as opposed to clearing and disturbing a number of sites simultaneously. • All personnel and contractors must undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed. • Any holes/deep excavations must be done in a progressive manner on a needs-only basis. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling. • Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories. • Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

5.2.1.3 Operation Phase

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

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems (Table 5-5);
- Spread of alien and/or invasive species (

- Table 5-6);
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, noise, light, dust, vibration) (Table 5-7).

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

Impact Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	**With Mitigation**
Extent	Low (2)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
• It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A Rehabilitation Plan must be written for the development area and ensured that it be adhered to. • Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial grass, shrubs and trees.		
Residual Impacts		
There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.		

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

Impact Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation, competition with indigenous faunal species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (52)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		

• Implementation of an alien vegetation management plan.
  ○ Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.
  ○ All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan
• Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.
• A pest control plan must be implemented; it is imperative that poisons not be used.		

Residual Impacts:		
Long term broad scale IAP infestation if not mitigated.		

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

Impact Nature: Ongoing displacement and direct mortalities of faunal community (including potential SCC) due to disturbance (road collisions, noise, light, dust, vibration).		
The operation and maintenance of the proposed development may lead to mortality, disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	**With Mitigation**
Extent	Low (2)	Very low (1)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		

• No vehicle traffic nor the use of vehicle lights should be permitted during the night. • Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals • Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency. • If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun *et al*, 2021). • All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species. • Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual. • All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected. • If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.
Residual Impacts
Disturbance from maintenance activities will occur albeit at a low and infrequent level.

5.2.1.4 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 habitat where reproduction takes place, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, increase risk of collisions; 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).

A total area of 30 km surrounding the PAOI was used to assess the total habitat loss in the area and subsequently the cumulative impact. To determine the intact remnant habitat the NBA (2018) remnant spatial data was utilised. The future renewable energy projects were also considered by utilising the REEA Q4 (2022) spatial dataset. In order to remove any duplication, only the areas that overlap with the remnant areas were considered. The total cumulative loss was found to be 16.8% (Table 5-8), a visual representation of this is shown in Figure 5-1. Table 5-9 rates the cumulative impact as High.

Table 5-8 The cumulative impacts considered for avifauna

Total Area of 30 km²	Intact Remnant Habitat	REEA area that does not overlap with disturbed areas	Total Disturbed/Transformed habitat	Percentage area lost
494454.44 Ha	460532.1 Ha	49369 Ha	83291.31 Ha	16.8%

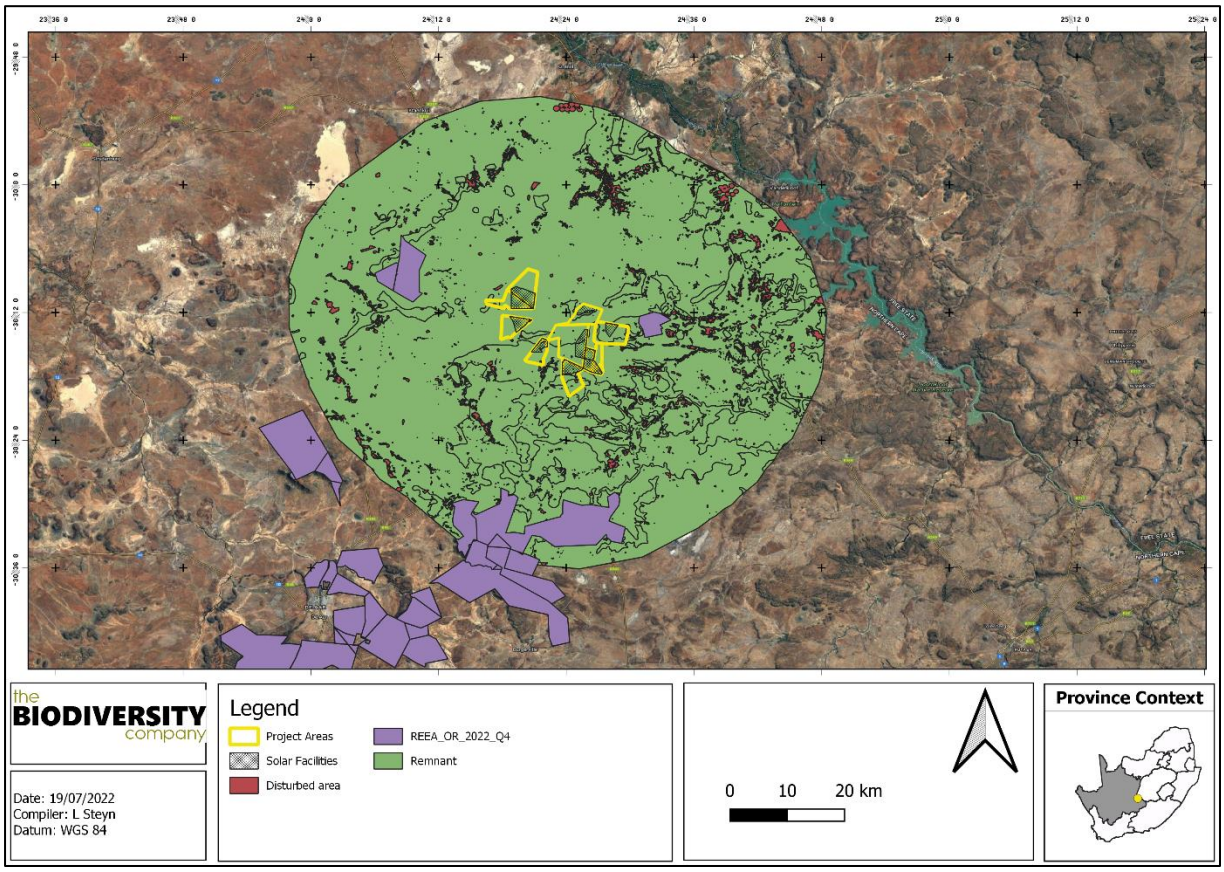

Figure 5-1 Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types

Table 5-9 Cumulative Impacts to biodiversity associated with the proposed project.

Impact Nature: Cumulative habitat loss within the region		
The development of the proposed infrastructure will contribute to cumulative habitat loss within ESAs and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Very low (1)	High (4)
Duration	Moderate term (3)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**High (70)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low

Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated	To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation:		
• Over and above all provided mitigation measures; ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

6 Management Objectives: Biodiversity

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 6-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

Table 6-1 Mitigation measures including requirements for timeframes, roles and responsibilities for this report

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

Project component/s	**PV Footprint, laydown areas and road creation**
Potential Impact	**Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community**
Activity/risk source	**Land clearing, fire and dust.**
Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems**

Mitigation: Action/control	Responsibility	Timeframe
• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage • Where possible, existing access routes and walking paths must be made use of. • Do not clear areas of indigenous vegetation outside of the direct project footprint • Minimise vegetation clearing to the minimum required • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site • Compile and implement a rehabilitation plan from the onset of the project; • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. o Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds. o No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. • Rehabilitate areas as soon as they are no longer impacted by construction o The rehabilitated areas must be revegetated with indigenous vegetation • Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.	Project manager, Environmental Officer	Planning and Construction phase

Performance Indicator	Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation.
Monitoring	Daily during the construction phase

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities in the vicinity of the project area.

Project component/s	**Project Area**
Potential Impact	**Introduction of alien and invasive species, especially plants**
Activity/risk source	**Land clearing, fire and dust.**
Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems**

Mitigation: Action/control	**Responsibility**	**Timeframe**

• Do not clear areas of indigenous vegetation outside of the direct project footprint
• Minimise vegetation clearing to the minimum required
• Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site
• Compile and implement a rehabilitation plan from the onset of the project;
• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.
  o Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds.
  o No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.
• Rehabilitate areas as soon as they are no longer impacted by construction
  o The rehabilitated areas must be revegetated with indigenous vegetation
• Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover
	Project manager, Environmental Officer	Planning and Construction phase

• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.		
Performance Indicator	Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation.	
Monitoring	Daily during the construction phase for all mitigation	

OBJECTIVE: Prevent the direct and indirect loss and disturbance of faunal species and community (including potential SCCs)

Project component/s	**PV Footprint, laydown areas and road creation**
Potential Impact	**Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)**
Activity/risk source	**Land clearing, Fire and human presence as well as roads.**
Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and mortality of fauna**

Mitigation: Action/control	**Responsibility**	**Timeframe**
• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. • Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance. • Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.	Project manager, Environmental Officer	Planning and Construction phase

• Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area • Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs-only basis, as opposed to clearing and disturbing a number of sites simultaneously. • Provide All personnel and contractors with Environmental Awareness Training. A signed register of attendance must be kept for proof. • The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed. • Any holes/deep excavations must be done in a progressive manner on a needs-only basis. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling • Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the Project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories. • Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.		
Performance Indicator	Amount of observable fauna mortalities, Sequence, direction and timing of land clearing. Speed limits adhered to	
Monitoring	Daily during the construction phase for all mitigation	

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

Project component/s	**Operational Area, PV as well as roads.**
Potential Impact	**Continued fragmentation and degradation of habitats and ecosystems**
Activity/risk source	**Dust, unregulated clearing, IAP plant proliferation and edge effects**

Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems**

Mitigation: Action/control	**Responsibility**	**Timeframe**
• It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A Rehabilitation Plan must be written for the development area and ensured that it be adhered to. • Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial grass, shrubs and trees.	Project manager, Environmental Officer	Operational phase
Performance Indicator	Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation.	
Monitoring	Daily during the operational phase for all mitigation	

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

Project component/s	**Project Area**
Potential Impact	**Spread of alien and/or invasive species**
Activity/risk source	**Cleared Areas, laydown areas, fire and dust.**
Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems**

Mitigation: Action/control	Responsibility	Timeframe
• Implementation of an alien vegetation management plan. o Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project. o All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan o Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.	Project manager, Environmental Officer	Operational phase
Performance Indicator	Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation.	
Monitoring	Daily during the construction phase for all mitigation	

OBJECTIVE: Prevent the direct and indirect loss and disturbance of faunal species and community (including potentially/occurring SCCs)

Project component/s	**Operations Area (PV Footprint, laydown areas and roads)**
Potential Impact	**Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, noise, light, dust, vibration)**
Activity/risk source	**Moving vehicles, Fire and human presence and activities**
Mitigation: Target/Objective	**Avoidance / minimisation of the disturbance and degradation of vegetation.**

Mitigation: Action/control	Responsibility	Timeframe
• Outside lighting should be designed and limited to minimize impacts on fauna. Lighting fixtures should be fitted with baffles, hoods or louvres and directed downward. Outside lighting should be directed away from highly sensitive areas such as wetlands. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible; • Where feasible, motion detection lighting must be used to minimise the unnecessary illumination of areas	Project manager, Environmental Officer	Operational phase

• Minimise traffic and the use of vehicle lights of the road during the night. • Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals • Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency. • If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun *et al*, 2021). • All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species. • Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual. • All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected. • If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.		
Performance Indicator	Amount of observable fauna mortalities, Speed limits adhered to	
Monitoring	Daily during the construction phase for all mitigation	

7 Conclusion and Impact Statement

7.1 Conclusion

The PAOI has been altered, albeit limited, both currently and historically. Grazing from livestock and sheep and associated mismanagement has led to (limited) deterioration of the area. Most areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by farming activities. The habitat sensitivity of these habitats is regarded as Medium, and the following aspects support this classification:

- Functions as an ESA as per the Northern Cape Critical Biodiversity Areas spatial database; and
- Supports various organisms and may play an important role in the ecosystem, if left to recover from the superficial impacts.

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

The habitat physiognomy within the PAOI is largely heterogenous and, based on the fauna components recorded within the PAOI and proximal landscape, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties and pollination services. The combined SEI (sensitivity) of the PAOI was determined to be Medium, due to the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the habitat/vegetation type.

7.2 Impact Statement

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

- Habitat loss and fragmentation as well as degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

The primary expected impacts of the proposed project will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the PAOI is considered to have a Medium SEI which indicated that minimisation mitigation must be applied to the site.

It must be noted, when taken into consideration in conjunction with the other Solar PV facilities planned for all three phases of the overall proposed development, that the cumulative fragmentation of the ESA is very high. The associated cumulative fragmentation impacts are expected to be high for the overall development. This project should ideally not be considered in insolation but rather as a part of the full proposed development when considering impacts to the ESA.

Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (ESA), development may proceed but with caution and only with the implementation of mitigation measures. Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures and supporting recommendations are implemented.

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9 Appendix Items

9.1 Appendix A – Protocol Checklist

"Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity" gazetted 20 March 2020, published in Government Notice No. 320

Paragraph	Item	Pages	Comment
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	i	
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	5	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these.	39-63	
2.3.2	Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site	39-45	
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna.	17-28	
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments.	17-28	
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: (a) main vegetation types; (b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified.	17-36	
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	-	No "low" sensitivity areas were identified due to the ecological condition of the site.

2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: (a) the reasons why an area has been identified as a CBA; (b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation; (c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s); (d) the impact on ecosystem threat status; (e) the impact on explicit subtypes in the vegetation; (f) the impact on overall species and ecosystem diversity of the site; and (g) the impact on any changes to threat status of populations of species of conservation concern in the CBA.	17-23 45-55	
2.3.7.2	Terrestrial ecological support areas (ESAs), including: (a) the impact on the ecological processes that operate within or across the site; (b) the extent the proposed development will impact on the functionality of the ESA; and (c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.	17-23 45-55	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- (a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan.	17-23	
2.3.7.4	Priority areas for protected area expansion, including- (a) the way in which in which the proposed development will	17-23	

	compromise or contribute to the expansion of the protected area network.		
2.3.7.5	SWSAs including: (a) the impact(s) on the terrestrial habitat of a SWSA; and (b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses)	17-23	
2.3.7.6	FEPA sub catchments, including- (a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment	17-23	
2.3.7.7	indigenous forests, including: (a) impact on the ecological integrity of the forest; and (b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	-	No forest habitats within the area
3.1.1.	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	i 85 to end	
3.1.2	A signed statement of independence by the specialist.	89-90	
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	3 9-10	
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.	7-17	
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.	3	
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant).	46-50	

3.1.7	Additional environmental impacts expected from the proposed development.	51-60	
3.1.8	Any direct, indirect and cumulative impacts of the proposed development.	60-61	
3.1.9	The degree to which impacts and risks can be mitigated.	51-60	
3.1.10	The degree to which the impacts and risks can be reversed.	-	None
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	52 51-61	
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).	62-64	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate.	-	None
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not;	-	Not provided yet as this is a guidance document
3.1.15	any conditions to which this statement is subjected	65	

9.2 Appendix B – Flora species expected to occur in the project area

Family	Scientific name	Author	IUCN	Ecology
Acanthaceae	Barleria rigida	Willd. ex Nees	LC	Indigenous
Acanthaceae	Barleria rigida var. rigida	Willd. ex Nees	LC	Indigenous
Acanthaceae	Blepharis capensis	(L.f.) Pers.	LC	Indigenous; Endemic
Acanthaceae	Blepharis mitrata	C.B.Clarke	LC	Indigenous
Acanthaceae	Dicliptera clinopodia	Nees	LC	Indigenous
Acanthaceae	Justicia incana	(Nees) T.Anderson	LC	Indigenous
Aizoaceae	Chasmatophyllum maninum	L.Bolus	DD	Indigenous; Endemic
Aizoaceae	Galenia africana	L.	LC	Indigenous
Aizoaceae	Galenia papulosa	(Eckl. & Zeyh.) Sond.	LC	Indigenous
Aizoaceae	Galenia pubescens	(Eckl. & Zeyh.) Druce	LC	Indigenous; Endemic
Aizoaceae	Galenia sarcophylla	Fenzl ex Sond.	LC	Indigenous
Aizoaceae	Galenia secunda	(L.f.) Sond.	LC	Indigenous
Aizoaceae	Malephora smithii	(L.Bolus) H.E.K.Hartmann	LC	Indigenous; Endemic
Aizoaceae	Mesembryanthemum coriarium	Burch. ex N.E.Br.		Indigenous
Aizoaceae	Oscularia deltoides	(L.) Schwantes	LC	Indigenous; Endemic
Aizoaceae	Tetragonia acanthocarpa	Adamson	LC	Indigenous; Endemic
Aizoaceae	Tetragonia calycina	Fenzl	LC	Indigenous
Aizoaceae	Tetragonia fruticosa	L.	LC	Indigenous
Aizoaceae	Trianthema parvifolia var. parvifolia	E.Mey. ex Sond.	LC	Indigenous
Amaranthaceae	Alternanthera pungens	Kunth	NE	Not indigenous; Naturalised
Amaranthaceae	Amaranthus dinteri subsp. dinteri	Schinz	NE	Indigenous
Amaranthaceae	Amaranthus schinzianus	Thell.	LC	Indigenous
Amaranthaceae	Atriplex eardleyae	Aellen		Not indigenous; Naturalised
Amaranthaceae	Atriplex semibaccata	R.Br.		Not indigenous; Naturalised; Invasive
Amaranthaceae	Atriplex suberecta	I.Verd.	LC	Not indigenous; Naturalised; Invasive
Amaranthaceae	Atriplex vestita var. appendiculata	(Thunb.) Aellen	LC	Indigenous
Amaranthaceae	Bassia salsoloides	(Fenzl) A.J.Scott	LC	Indigenous
Amaranthaceae	Chenopodiastrum murale	(L.) S.Fuentes, Uotila & Borsch		Not indigenous; Naturalised; Invasive
Amaranthaceae	Chenopodium mucronatum	Thunb.	LC	Indigenous
Amaranthaceae	Chenopodium phillipsianum	Aellen	NE	Indigenous
Amaranthaceae	Dysphania schraderiana	(Schult.) Mosyakin & Clemants		Indigenous
Amaranthaceae	Pupalia lappacea var. lappacea	(L.) A.Juss.	LC	Indigenous
Amaranthaceae	Salsola calluna	Drege ex C.H.Wright	LC	Indigenous; Endemic
Amaranthaceae	Salsola denudata	Botsch.	LC	Indigenous
Amaranthaceae	Salsola glabrescens	Burtt Davy	LC	Indigenous
Amaranthaceae	Salsola humifusa	A.Bruckn.	LC	Indigenous; Endemic
Amaranthaceae	Salsola kali	L.		Not indigenous; Naturalised; Invasive
Amaranthaceae	Sericocoma avolans	Fenzl	LC	Indigenous
Amaranthaceae	Sericocoma pungens	Fenzl	LC	Indigenous
Amaryllidaceae	Brunsvigia radulosa	Herb.	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Amaryllidaceae	Crinum bulbispermum	(Burm.f.) Milne-Redh. & Schweick.	LC	Indigenous
Amaryllidaceae	Cyrtanthus huttonii	Baker	LC	Indigenous; Endemic
Amaryllidaceae	Nerine laticoma	(Ker Gawl.) T.Durand & Schinz	LC	Indigenous
Anacardiaceae	Searsia burchellii	(Sond. ex Engl.) Moffett	LC	Indigenous
Anacardiaceae	Searsia ciliata	(Licht. ex Schult.) A.J.Mill.	LC	Indigenous
Anacardiaceae	Searsia erosa	(Thunb.) Moffett	LC	Indigenous
Anacardiaceae	Searsia lancea	(L.f.) F.A.Barkley	LC	Indigenous
Anacardiaceae	Searsia pendulina	(Jacq.) Moffett	LC	Indigenous
Anacardiaceae	Searsia pyroides var. pyroides	(Burch.) Moffett	LC	Indigenous
Apiaceae	Apium graveolens	L.		Not indigenous; Naturalised; Invasive
Apocynaceae	Ceropegia multiflora subsp. multiflora	Baker	LC	Indigenous; Endemic
Apocynaceae	Ceropegia rubella	(E.Mey.) Bruyns		Indigenous
Apocynaceae	Fockea sinuata	(E.Mey.) Druce	LC	Indigenous
Apocynaceae	Gomphocarpus fruticosus subsp. fruticosus	(L.) W.T.Aiton	LC	Indigenous
Apocynaceae	Gomphocarpus tomentosus subsp. tomentosus	Burch.	LC	Indigenous
Apocynaceae	Marsdenia dregea	(Harv.) Schltr.	LC	Indigenous
Apocynaceae	Microloma armatum var. armatum	(Thunb.) Schltr.	LC	Indigenous
Apocynaceae	Pachypodium succulentum	(L.f.) Sweet	LC	Indigenous; Endemic
Apocynaceae	Piaranthus cornutus	N.E.Br.		Indigenous
Apocynaceae	Stapelia grandiflora var. grandiflora	Masson	LC	Indigenous
Apocynaceae	Tridentea jucunda	(N.E.Br.) L.C.Leach	LC	Indigenous
Asparagaceae	Asparagus striatus	(L.f.) Thunb.	LC	Indigenous; Endemic
Asparagaceae	Asparagus suaveolens	Burch.	LC	Indigenous
Asphodelaceae	Haworthiopsis tessellata	(Haw.) G.D.Rowley	LC	Indigenous
Asphodelaceae	Haworthiopsis tessellata var. tessellata	(Haw.) G.D.Rowley	LC	Indigenous
Asphodelaceae	Kniphofia ensifolia subsp. ensifolia	Baker	LC	Indigenous
Asphodelaceae	Trachyandra acocksii	Oberm.	LC	Indigenous; Endemic
Asphodelaceae	Trachyandra laxa var. laxa	(N.E.Br.) Oberm.	LC	Indigenous
Asphodelaceae	Trachyandra saltii var. oatesii	(Baker) Oberm.	LC	Indigenous; Endemic
Aspleniaceae	Asplenium cordatum	(Thunb.) Sw.	LC	Indigenous
Asteraceae	Amphiglossa triflora	DC.	LC	Indigenous
Asteraceae	Arctotis leiocarpa	Harv.	LC	Indigenous
Asteraceae	Athanasia minuta subsp. minuta	(L.f.) Kallersjo	LC	Indigenous
Asteraceae	Berkheya eriobasis	(DC.) Roessler	LC	Indigenous; Endemic
Asteraceae	Berkheya pinnatifida subsp. pinnatifida	(Thunb.) Thell.	LC	Indigenous; Endemic
Asteraceae	Brachylaena glabra	(L.f.) Druce	LC	Indigenous; Endemic
Asteraceae	Chrysocoma ciliata	L.	LC	Indigenous
Asteraceae	Cirsium vulgare	(Savi) Ten.		Not indigenous; Naturalised; Invasive
Asteraceae	Crassothonna cacalioides	(L.f.) B.Nord.	LC	Indigenous; Endemic
Asteraceae	Dicoma capensis	Less.	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Asteraceae	Dimorphotheca cuneata	(Thunb.) Less.	LC	Indigenous
Asteraceae	Dimorphotheca pluvialis	(L.) Moench	LC	Indigenous
Asteraceae	Dimorphotheca sinuata	DC.	LC	Indigenous
Asteraceae	Dimorphotheca zeyheri	Sond.	LC	Indigenous
Asteraceae	Eriocephalus ericoides subsp. ericoides	(L.f.) Druce	LC	Indigenous
Asteraceae	Eriocephalus karooicus	M.A.N.Mull.	LC	Indigenous; Endemic
Asteraceae	Eriocephalus spinescens	Burch.	LC	Indigenous; Endemic
Asteraceae	Euryops subcarnosus subsp. vulgaris	DC.	LC	Indigenous
Asteraceae	Felicia burkei	(Harv.) L.Bolus	LC	Indigenous
Asteraceae	Felicia fascicularis	DC.	LC	Indigenous
Asteraceae	Felicia filifolia subsp. filifolia	(Vent.) Burtt Davy	LC	Indigenous
Asteraceae	Felicia hirsuta	DC.	LC	Indigenous
Asteraceae	Felicia muricata subsp. cinerascens	(Thunb.) Nees	LC	Indigenous
Asteraceae	Felicia muricata subsp. muricata	(Thunb.) Nees	LC	Indigenous
Asteraceae	Gazania jurineifolia subsp. jurineifolia	DC.	LC	Indigenous; Endemic
Asteraceae	Gazania krebsiana subsp. arctotoides	Less.	LC	Indigenous
Asteraceae	Geigeria filifolia	Mattf.	LC	Indigenous
Asteraceae	Geigeria ornativa subsp. ornativa	O.Hoffm.	LC	Indigenous
Asteraceae	Gnaphalium filagopsis	Hilliard & B.L.Burtt	LC	Indigenous
Asteraceae	Helichrysum asperum var. asperum	(Thunb.) Hilliard & B.L.Burtt	LC	Indigenous; Endemic
Asteraceae	Helichrysum dregeanum	Sond. & Harv.	LC	Indigenous
Asteraceae	Helichrysum lineare	DC.	LC	Indigenous
Asteraceae	Helichrysum lucilioides	Less.	LC	Indigenous
Asteraceae	Helichrysum micropoides	DC.	LC	Indigenous
Asteraceae	Helichrysum pentzioides	Less.	LC	Indigenous; Endemic
Asteraceae	Helichrysum pumilio subsp. pumilio	(O.Hoffm.) Hilliard & B.L.Burtt	LC	Indigenous; Endemic
Asteraceae	Helichrysum zeyheri	Less.	LC	Indigenous
Asteraceae	Hertia kraussii	(Sch.Bip.) Fourc.	LC	Indigenous; Endemic
Asteraceae	Hertia pallens	(DC.) Kuntze	LC	Indigenous
Asteraceae	Hirpicium echinus	Less.	LC	Indigenous
Asteraceae	Ifloga glomerata	(Harv.) Schltr.	LC	Indigenous
Asteraceae	Leysera tenella	DC.	LC	Indigenous
Asteraceae	Nidorella resedifolia subsp. resedifolia	DC.	LC	Indigenous
Asteraceae	Oedera humilis	(Less.) N.G.Bergh		Indigenous
Asteraceae	Oedera oppositifolia	(DC.) N.G.Bergh		Indigenous; Endemic
Asteraceae	Oncosiphon pilulifer	(L.f.) Kallersjo	LC	Indigenous
Asteraceae	Osteospermum calendulaceum	L.f.	LC	Indigenous; Endemic
Asteraceae	Osteospermum leptolobum	(Harv.) Norl.	LC	Indigenous; Endemic
Asteraceae	Osteospermum scariosum var. scariosum	DC.	NE	Indigenous
Asteraceae	Osteospermum sinuatum var. sinuatum	(DC.) Norl.	LC	Indigenous
Asteraceae	Osteospermum spinescens	Thunb.	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Asteraceae	Othonna pavonia	E.Mey.	LC	Indigenous; Endemic
Asteraceae	Pegolettia retrofracta	(Thunb.) Kies	LC	Indigenous
Asteraceae	Pentzia calcarea	Kies	LC	Indigenous
Asteraceae	Pentzia calva	S.Moore	LC	Indigenous
Asteraceae	Pentzia elegans	DC.	LC	Indigenous; Endemic
Asteraceae	Pentzia globosa	Less.	LC	Indigenous
Asteraceae	Pentzia incana	(Thunb.) Kuntze	LC	Indigenous
Asteraceae	Pentzia lanata	Hutch.	LC	Indigenous
Asteraceae	Pentzia quinquefida	(Thunb.) Less.	LC	Indigenous; Endemic
Asteraceae	Pentzia spinescens	Less.	LC	Indigenous
Asteraceae	Phymaspermum parvifolium	(DC.) Benth. & Hook. ex B.D.Jacks.	LC	Indigenous; Endemic
Asteraceae	Pseudognaphalium luteoalbum	(L.) Hilliard & B.L.Burtt	LC	Cryptogenic
Asteraceae	Pteronia erythrochaeta	DC.	LC	Indigenous; Endemic
Asteraceae	Pteronia glauca	Thunb.	LC	Indigenous
Asteraceae	Pteronia glaucescens	DC.	LC	Indigenous; Endemic
Asteraceae	Pteronia sordida	N.E.Br.	LC	Indigenous
Asteraceae	Rhaponticum repens	(L.) Hildago		Not indigenous; Naturalised
Asteraceae	Senecio consanguineus	DC.	LC	Indigenous
Asteraceae	Senecio niveus	(Thunb.) Willd.	LC	Indigenous
Asteraceae	Tarchonanthus camphoratus	L.	LC	Indigenous
Asteraceae	Ursinia nana subsp. leptophylla	DC.	LC	Indigenous
Asteraceae	Ursinia nana subsp. nana	DC.	LC	Indigenous
Aytoniaceae	Plagiochasma rupestre var. rupestre	(J.R.Forst. & G.Forst.) Steph.		Indigenous
Boraginaceae	Anchusa riparia	A.DC.	LC	Indigenous
Boraginaceae	Heliotropium ciliatum	Kaplan	LC	Indigenous
Boraginaceae	Heliotropium curassavicum	L.		Not indigenous; Naturalised
Boraginaceae	Heliotropium lineare	(A.DC.) Gurke	LC	Indigenous
Boraginaceae	Lithospermum papillosum	Thunb.	LC	Indigenous
Brassicaceae	Erucastrum strigosum	(Thunb.) O.E.Schulz	LC	Indigenous
Brassicaceae	Heliophila minima	(Stephens) Marais	LC	Indigenous
Brassicaceae	Lepidium africanum subsp. africanum	(Burm.f.) DC.	LC	Indigenous
Brassicaceae	Lepidium schinzii	Thell.	LC	Indigenous
Brassicaceae	Rorippa fluviatilis var. fluviatilis	(E.Mey. ex Sond.) R.A.Dyer	LC	Indigenous
Brassicaceae	Sisymbrium turczaninowii	Sond.	LC	Indigenous
Bryaceae	Bryum argenteum	Hedw.		Indigenous
Campanulaceae	Wahlenbergia nodosa	(H.Buek) Lammers	LC	Indigenous; Endemic
Caryophyllaceae	Dianthus micropetalus	Ser.	LC	Indigenous
Caryophyllaceae	Spergularia bocconei	(Scheele) Graebn.	LC	Not indigenous; Naturalised
Cleomaceae	Cleome gynandra	L.	LC	Indigenous
Cleomaceae	Cleome monophylla	L.	LC	Indigenous
Colchicaceae	Colchicum asteroides	(J.C.Manning & Goldblatt) J.C.Manning & Vinn.	LC	Indigenous; Endemic
Colchicaceae	Ornithoglossum vulgare	B.Nord.	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Commelinaceae	Commelina africana var. africana	L.	LC	Indigenous
Commelinaceae	Commelina africana var. barberae	L.	LC	Indigenous
Convolvulaceae	Convolvulus sagittatus	Thunb.	LC	Indigenous
Crassulaceae	Adromischus caryophyllaceus	(Burm.f.) Lem.	LC	Indigenous; Endemic
Crassulaceae	Adromischus trigynus	(Burch.) Poelln.	LC	Indigenous
Crassulaceae	Crassula corallina subsp. corallina	Thunb.	LC	Indigenous
Crassulaceae	Tylecodon ventricosus	(Burm.f.) Toelken	LC	Indigenous; Endemic
Cucurbitaceae	Cucumis africanus	L.f.	LC	Indigenous
Cucurbitaceae	Cucumis heptadactylus	Naudin	LC	Indigenous; Endemic
Cucurbitaceae	Cucumis myriocarpus subsp. leptodermis	Naudin	LC	Indigenous
Cucurbitaceae	Cucumis myriocarpus subsp. myriocarpus	Naudin	LC	Indigenous
Cucurbitaceae	Cucumis zeyheri	Sond.	LC	Indigenous
Cucurbitaceae	Kedrostis africana	(L.) Cogn.	LC	Indigenous
Cucurbitaceae	Momordica balsamina	L.	LC	Indigenous
Cyperaceae	Afroscirpoides dioeca	(Kunth) Garcia-Madr.		Indigenous
Cyperaceae	Bulbostylis humilis	(Kunth) C.B.Clarke	LC	Indigenous
Cyperaceae	Cyperus bellus	Kunth	LC	Indigenous
Cyperaceae	Cyperus capensis	(Steud.) Endl.	LC	Indigenous; Endemic
Cyperaceae	Cyperus congestus	Vahl	LC	Indigenous
Cyperaceae	Cyperus decurvatus	(C.B.Clarke) C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	Cyperus indecorus var. namaquensis	Kunth	NE	Indigenous
Cyperaceae	Cyperus laevigatus	L.	LC	Indigenous
Cyperaceae	Cyperus longus var. tenuiflorus	L.	NE	Indigenous
Cyperaceae	Cyperus marginatus	Thunb.	LC	Indigenous
Cyperaceae	Cyperus marlothii	Boeckeler	LC	Indigenous
Cyperaceae	Cyperus usitatus	Burch.	LC	Indigenous
Cyperaceae	Eleocharis dregeana	Steud.	LC	Indigenous
Cyperaceae	Schoenoplectus leucanthus	(Boeckeler) J.Raynal	LC	Indigenous
Cyperaceae	Schoenoplectus muricinux	(C.B.Clarke) J.Raynal	LC	Indigenous
Ebenaceae	Diospyros lycioides subsp. lycioides	Desf.	LC	Indigenous
Ebenaceae	Euclea crispa subsp. ovata	(Thunb.) Gurke	LC	Indigenous
Elatinaceae	Bergia anagalloides	(E.Mey. ex Fenzl) Walp.	LC	Indigenous
Euphorbiaceae	Euphorbia arida	N.E.Br.	LC	Indigenous; Endemic
Euphorbiaceae	Euphorbia crassipes	Marloth	LC	Indigenous
Euphorbiaceae	Euphorbia inaequilatera	Sond.	LC	Indigenous
Euphorbiaceae	Euphorbia juttae	Dinter	LC	Indigenous
Euphorbiaceae	Euphorbia mauritanica	L.	LC	Indigenous
Euphorbiaceae	Euphorbia rhombifolia	Boiss.	LC	Indigenous
Fabaceae	Amphithalea muraltioides	(Benth.) A.L.Schutte	LC	Indigenous; Endemic
Fabaceae	Argyrolobium transvaalense	Schinz	LC	Indigenous
Fabaceae	Calobota spinescens	(Harv.) Boatwr. & B.-E.van Wyk	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Fabaceae	Crotalaria sphaerocarpa subsp. sphaerocarpa	Perr. ex DC.	LC	Indigenous
Fabaceae	Cullen tomentosum	(Thunb.) J.W.Grimes	LC	Indigenous
Fabaceae	Indigastrum niveum	(Willd. ex Spreng.) Schrire & Callm.		Indigenous
Fabaceae	Indigofera alternans var. alternans	DC.	LC	Indigenous
Fabaceae	Indigofera hedyantha	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	Indigofera hololeuca	Benth. ex Harv.	LC	Indigenous
Fabaceae	Indigofera sessilifolia	DC.	LC	Indigenous
Fabaceae	Leobordea platycarpa	(Viv.) B.-E.van Wyk & Boatwr.	LC	Indigenous
Fabaceae	Lessertia annularis	Burch.	LC	Indigenous
Fabaceae	Lessertia inflata	Harv.	LC	Indigenous; Endemic
Fabaceae	Lotononis laxa	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	Lotononis pungens	Eckl. & Zeyh.	LC	Indigenous; Endemic
Fabaceae	Lotononis tenella	(E.Mey.) Eckl. & Zeyh.	LC	Indigenous; Endemic
Fabaceae	Medicago sativa	L.	NE	Not indigenous; Cultivated; Naturalised; Invasive
Fabaceae	Melilotus indicus	(L.) All.	NE	Not indigenous; Naturalised; Invasive
Fabaceae	Melolobium candicans	(E.Mey.) Eckl. & Zeyh.	LC	Indigenous
Fabaceae	Melolobium microphyllum	(L.f.) Eckl. & Zeyh.	LC	Indigenous
Fabaceae	Prosopis glandulosa var. torreyana	Torr.	NE	Not indigenous; Naturalised; Invasive
Fabaceae	Prosopis velutina	Wooton	NE	Not indigenous; Naturalised; Invasive
Fabaceae	Rhynchosia adenodes	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	Senegalia mellifera subsp. detinens	(Vahl) Seigler & Ebinger	LC	Indigenous
Fabaceae	Senna italica subsp. arachoides	Mill.	LC	Indigenous
Fabaceae	Trigonella anguina	Delile	LC	Indigenous
Funariaceae	Goniomitrium africanum	(Mull.Hal.) Broth.		Indigenous
Gentianaceae	Sebaea pentandra var. pentandra	E.Mey.	LC	Indigenous
Geraniaceae	Erodium cicutarium	(L.) L'Her.		Not indigenous; Naturalised; Invasive
Geraniaceae	Monsonia angustifolia	E.Mey. ex A.Rich.	LC	Indigenous
Geraniaceae	Monsonia salmoniflora	(Moffett) F.Albers	LC	Indigenous
Geraniaceae	Pelargonium tragacanthoides	Burch.	LC	Indigenous
Gisekiaceae	Gisekia pharnaceoides var. pharnaceoides	L.	LC	Indigenous
Grimmiaceae	Grimmia pulvinata	(Hedw.) Sm.		Indigenous
Hyacinthaceae	Albuca prasina	(Ker Gawl.) J.C.Manning & Goldblatt		Indigenous
Hyacinthaceae	Albuca virens subsp. arida	(Ker Gawl.) J.C.Manning & Goldblatt	LC	Indigenous
Hyacinthaceae	Daubenya comata	(Burch. ex Baker) J.C.Manning & A.M.van der Merwe	LC	Indigenous; Endemic
Hyacinthaceae	Dipcadi bakerianum	Bolus	LC	Indigenous
Hyacinthaceae	Dipcadi brevifolium	(Thunb.) Fourc.	LC	Indigenous
Hyacinthaceae	Dipcadi crispum	Baker	LC	Indigenous
Hyacinthaceae	Dipcadi gracillimum	Baker	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Hyacinthaceae	Dipcadi longifolium	(Ker Gawl.) Baker	LC	Indigenous
Hyacinthaceae	Dipcadi papillatum	Oberm.	LC	Indigenous
Hyacinthaceae	Dipcadi viride	(L.) Moench	LC	Indigenous
Hyacinthaceae	Lachenalia ensifolia	(Thunb.) J.C.Manning & Goldblatt	LC	Indigenous; Endemic
Hyacinthaceae	Ledebouria apertiflora	(Baker) Jessop	LC	Indigenous
Hyacinthaceae	Ledebouria revoluta	(L.f.) Jessop	LC	Indigenous
Hyacinthaceae	Ornithogalum nanodes	F.M.Leight.	LC	Indigenous
Hypoxidaceae	Hypoxis rigidula var. rigidula	Baker	LC	Indigenous
Iridaceae	Ferraria variabilis	Goldblatt & J.C.Manning	LC	Indigenous; Endemic
Iridaceae	Freesia andersoniae	L.Bolus	LC	Indigenous; Endemic
Iridaceae	Gladiolus permeabilis subsp. edulis	D.Delaroche	LC	Indigenous
Iridaceae	Moraea falcifolia	Klatt	LC	Indigenous
Iridaceae	Moraea miniata	Andrews	LC	Indigenous; Endemic
Iridaceae	Moraea pallida	(Baker) Goldblatt	LC	Indigenous
Iridaceae	Moraea polystachya	(Thunb.) Ker Gawl.	LC	Indigenous
Iridaceae	Syringodea concolor	(Baker) M.P.de Vos	LC	Indigenous; Endemic
Juncaceae	Juncus exsertus	Buchenau	LC	Indigenous
Kewaceae	Kewa salsoloides	(Burch.) Christenh.	LC	Indigenous
Lamiaceae	Leonotis ocymifolia	(Burm.f.) Iwarsson	LC	Indigenous
Lamiaceae	Salvia stenophylla	Burch. ex Benth.		Indigenous
Lamiaceae	Salvia verbenaca	L.	LC	Not indigenous; Naturalised; Invasive
Lamiaceae	Stachys cuneata	Banks ex Benth.	LC	Indigenous; Endemic
Lamiaceae	Stachys linearis	Burch. ex Benth.	LC	Indigenous
Leucobryaceae	Campylopus robillardei	Besch.		Indigenous
Limeaceae	Limeum aethiopicum	Burm.f.	LC	Indigenous
Limeaceae	Limeum aethiopicum var. aethiopicum	Burm.f.	NE	Indigenous; Endemic
Limeaceae	Limeum aethiopicum var. intermedium	Burm.f.	NE	Indigenous; Endemic
Limeaceae	Limeum aethiopicum var. lanceolatum	Burm.f.	NE	Indigenous
Limeaceae	Limeum argute-carinatum var. argute-carinatum	Wawra ex Wawra & Peyr.	LC	Indigenous
Limeaceae	Limeum argute-carinatum var. kwebense	Wawra ex Wawra & Peyr.		Indigenous
Limeaceae	Limeum myosotis var. myosotis	H.Walter	LC	Indigenous
Limeaceae	Limeum sulcatum var. sulcatum	(Klotzsch) Hutch.	LC	Indigenous
Lobeliaceae	Lobelia thermalis	Thunb.	LC	Indigenous
Malvaceae	Corchorus schimperi	Cufod.	LC	Indigenous
Malvaceae	Hermannia auricoma	(Szyszyl.) K.Schum.	LC	Indigenous
Malvaceae	Hermannia bicolor	Engl. & Dinter	LC	Indigenous
Malvaceae	Hermannia burkei	Burtt Davy	LC	Indigenous
Malvaceae	Hermannia comosa	Burch. ex DC.	LC	Indigenous
Malvaceae	Hermannia cuneifolia var. cuneifolia	Jacq.	LC	Indigenous
Malvaceae	Hermannia erodioides	(Burch. ex DC.) Kuntze	LC	Indigenous
Malvaceae	Hermannia linearifolia	Harv.	LC	Indigenous; Endemic

Family	Scientific name	Author	IUCN	Ecology
Malvaceae	Hermannia modesta	(Ehrenb.) Mast.	LC	Indigenous
Malvaceae	Hermannia pulchella	L.f.	LC	Indigenous
Malvaceae	Hermannia spinosa	E.Mey. ex Harv.	LC	Indigenous
Malvaceae	Hibiscus pusillus	Thunb.	LC	Indigenous
Malvaceae	Radyera urens	(L.f.) Bullock	LC	Indigenous
Melianthaceae	Melianthus comosus	Vahl	LC	Indigenous
Molluginaceae	Hypertelis cerviana	(L.) Thulin		Indigenous
Molluginaceae	Pharnaceum lineare	L.f.	LC	Indigenous; Endemic
Neuradaceae	Grielum humifusum var. humifusum	Thunb.	LC	Indigenous
Nyctaginaceae	Boerhavia cordobensis	Kuntze		Not indigenous; Naturalised
Onagraceae	Oenothera rosea	L'Her. ex Aiton		Not indigenous; Naturalised; Invasive
Ophioglossaceae	Ophioglossum polyphyllum var. polyphyllum	A.Braun	LC	Indigenous
Oxalidaceae	Oxalis depressa	Eckl. & Zeyh.	LC	Indigenous
Papaveraceae	Argemone ochroleuca subsp. ochroleuca	Sweet		Not indigenous; Naturalised; Invasive
Pedaliaceae	Pterodiscus luridus	Hook.f.	LC	Indigenous; Endemic
Pedaliaceae	Pterodiscus speciosus	Hook.	LC	Indigenous
Pedaliaceae	Sesamum capense	Burm.f.	LC	Indigenous
Peraceae	Clutia thunbergii	Sond.	LC	Indigenous
Phyllanthaceae	Flueggea virosa subsp. virosa	(Roxb. ex Willd.) Royle	LC	Indigenous
Phyllanthaceae	Phyllanthus maderaspatensis	L.	LC	Indigenous
Phyllanthaceae	Phyllanthus parvulus var. parvulus	Sond.	LC	Indigenous
Pittosporaceae	Pittosporum viridiflorum	Sims	LC	Indigenous
Plantaginaceae	Plantago major	L.		Not indigenous; Naturalised
Plumbaginaceae	Limonium dregeanum	(C.Presl) Kuntze	LC	Indigenous
Poaceae	Alloteropsis semialata subsp. eckloniana	(R.Br.) Hitchc.	LC	Indigenous
Poaceae	Aristida adscensionis	L.	LC	Indigenous
Poaceae	Aristida congesta subsp. barbicollis	Roem. & Schult.	LC	Indigenous
Poaceae	Aristida congesta subsp. congesta	Roem. & Schult.	LC	Indigenous
Poaceae	Aristida diffusa subsp. burkei	Trin.	LC	Indigenous
Poaceae	Aristida diffusa subsp. diffusa	Trin.	LC	Indigenous; Endemic
Poaceae	Aristida vestita	Thunb.	LC	Indigenous
Poaceae	Brachiaria eruciformis	(Sm.) Griseb.	LC	Indigenous
Poaceae	Bromus catharticus	Vahl	NE	Not indigenous; Naturalised; Invasive
Poaceae	Cenchrus ciliaris	L.	LC	Indigenous
Poaceae	Chloris truncata	R.Br.	NE	Not indigenous; Naturalised
Poaceae	Chloris virgata	Sw.	LC	Indigenous
Poaceae	Cymbopogon pospischilii	(K.Schum.) C.E.Hubb.	NE	Indigenous
Poaceae	Cynodon dactylon	(L.) Pers.	LC	Indigenous
Poaceae	Cynodon incompletus	Nees	LC	Indigenous; Endemic
Poaceae	Cynodon polevansii	Stent	LC	Indigenous; Endemic
Poaceae	Digitaria eriantha	Steud.	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Poaceae	Digitaria ternata	(A.Rich.) Stapf	LC	Indigenous
Poaceae	Echinochloa crus-galli	(L.) P.Beauv.	LC	Indigenous
Poaceae	Elionurus muticus	(Spreng.) Kunth	LC	Indigenous
Poaceae	Enneapogon cenchroides	(Licht. ex Roem. & Schult.) C.E.Hubb.	LC	Indigenous
Poaceae	Enneapogon desvauxii	P.Beauv.	LC	Indigenous
Poaceae	Enneapogon scaber	Lehm.	LC	Indigenous
Poaceae	Enneapogon scoparius	Stapf	LC	Indigenous
Poaceae	Eragrostis annulata	Rendle ex Scott-Elliot	LC	Indigenous
Poaceae	Eragrostis barrelieri	Daveau	NE	Not indigenous; Naturalised
Poaceae	Eragrostis bergiana	(Kunth) Trin.	LC	Indigenous
Poaceae	Eragrostis bicolor	Nees	LC	Indigenous
Poaceae	Eragrostis chloromelas	Steud.	LC	Indigenous
Poaceae	Eragrostis cilianensis	(All.) Vignolo ex Janch.	LC	Indigenous
Poaceae	Eragrostis curvula	(Schrad.) Nees	LC	Indigenous
Poaceae	Eragrostis cylindriflora	Hochst.	LC	Indigenous
Poaceae	Eragrostis echinochloidea	Stapf	LC	Indigenous
Poaceae	Eragrostis homomalla	Nees	LC	Indigenous
Poaceae	Eragrostis lehmanniana var. lehmanniana	Nees	LC	Indigenous
Poaceae	Eragrostis mexicana subsp. virescens	(Hornem.) Link	NE	Not indigenous; Naturalised
Poaceae	Eragrostis nindensis	Ficalho & Hiern	LC	Indigenous
Poaceae	Eragrostis obtusa	Munro ex Ficalho & Hiern	LC	Indigenous
Poaceae	Eragrostis pallens	Hack.	LC	Indigenous
Poaceae	Eragrostis pilosa	(L.) P.Beauv.	LC	Indigenous
Poaceae	Eragrostis porosa	Nees	LC	Indigenous
Poaceae	Eragrostis procumbens	Nees	LC	Indigenous
Poaceae	Eragrostis pseudobtusa	De Winter	NE	Indigenous; Endemic
Poaceae	Eragrostis rotifer	Rendle	LC	Indigenous
Poaceae	Eragrostis superba	Peyr.	LC	Indigenous
Poaceae	Eragrostis tef	(Zuccagni) Trotter	NE	Not indigenous; Naturalised
Poaceae	Eragrostis truncata	Hack.	LC	Indigenous
Poaceae	Eustachys paspaloides	(Vahl) Lanza & Mattei	LC	Indigenous
Poaceae	Festuca costata	Nees	LC	Indigenous
Poaceae	Fingerhuthia africana	Lehm.	LC	Indigenous
Poaceae	Heteropogon contortus	(L.) Roem. & Schult.	LC	Indigenous
Poaceae	Hordeum capense	Thunb.	LC	Indigenous
Poaceae	Hyparrhenia hirta	(L.) Stapf	LC	Indigenous
Poaceae	Leptochloa fusca	(L.) Kunth	LC	Indigenous
Poaceae	Melica decumbens	Thunb.	LC	Indigenous
Poaceae	Melinis repens subsp. grandiflora	(Willd.) Zizka	LC	Indigenous
Poaceae	Oropetium capense	Stapf	LC	Indigenous
Poaceae	Panicum coloratum	L.	LC	Indigenous
Poaceae	Panicum impeditum	Launert	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Poaceae	Panicum lanipes	Mez	LC	Indigenous
Poaceae	Panicum stapfianum	Fourc.	LC	Indigenous
Poaceae	Paspalum dilatatum	Poir.	NE	Not indigenous; Naturalised; Invasive
Poaceae	Pennisetum villosum	R.Br. ex Fresen.	NE	Not indigenous; Naturalised; Invasive
Poaceae	Pentameris airoides subsp. airoides	Nees	LC	Indigenous
Poaceae	Polypogon monspeliensis	(L.) Desf.	NE	Not indigenous; Naturalised
Poaceae	Puccinellia acroxantha	C.A.Sm. & C.E.Hubb.	LC	Indigenous
Poaceae	Puccinellia distans	(L.) Parl.	NE	Not indigenous; Naturalised; Invasive
Poaceae	Schmidtia kalahariensis	Stent	LC	Indigenous
Poaceae	Setaria lindenbergiana	(Nees) Stapf	LC	Indigenous
Poaceae	Setaria verticillata	(L.) P.Beauv.	LC	Indigenous
Poaceae	Sorghum halepense	(L.) Pers.	NE	Not indigenous; Naturalised; Invasive
Poaceae	Sporobolus albicans	(Nees ex Trin.) Nees	LC	Indigenous
Poaceae	Sporobolus coromandelianus	(Retz.) Kunth	LC	Indigenous
Poaceae	Sporobolus fimbriatus	(Trin.) Nees	LC	Indigenous
Poaceae	Sporobolus ioclados	(Trin.) Nees	LC	Indigenous
Poaceae	Sporobolus nervosus	Hochst.	LC	Indigenous
Poaceae	Sporobolus oxyphyllus	Fish	LC	Indigenous; Endemic
Poaceae	Sporobolus tenellus	(Spreng.) Kunth	LC	Indigenous
Poaceae	Stipagrostis anomala	De Winter	LC	Indigenous
Poaceae	Stipagrostis ciliata var. capensis	(Desf.) De Winter	LC	Indigenous
Poaceae	Stipagrostis namaquensis	(Nees) De Winter	LC	Indigenous
Poaceae	Stipagrostis obtusa	(Delile) Nees	LC	Indigenous
Poaceae	Stipagrostis uniplumis var. uniplumis	(Licht.) De Winter	LC	Indigenous
Poaceae	Themeda triandra	Forssk.	LC	Indigenous
Poaceae	Tragus berteronianus	Schult.	LC	Indigenous
Poaceae	Tragus koelerioides	Asch.	LC	Indigenous
Poaceae	Tragus racemosus	(L.) All.	LC	Indigenous
Poaceae	Urochloa panicoides	P.Beauv.	LC	Indigenous
Polygalaceae	Polygala ephedroides	Burch.	LC	Indigenous
Polygalaceae	Polygala hispida	Burch. ex DC.	LC	Indigenous
Polygalaceae	Polygala leptophylla var. leptophylla	Burch.	LC	Indigenous
Polygalaceae	Polygala seminuda	Harv.	LC	Indigenous
Polygonaceae	Rumex crispus	L.		Not indigenous; Naturalised; Invasive
Polygonaceae	Rumex lanceolatus	Thunb.	LC	Indigenous
Portulacaceae	Portulaca oleracea	L.		Not indigenous; Naturalised
Pottiaceae	Didymodon tophaceopsis	R.H.Zander		Indigenous
Pottiaceae	Didymodon tophaceus	(Brid.) Lisa		Indigenous
Pottiaceae	Didymodon umbrosus	(Mull.Hal.) R.H.Zander		Indigenous
Pottiaceae	Gymnostomum aeruginosum	Sm.		Indigenous
Pottiaceae	Hymenostylium recurvirostrum	(Hedw.) Dixon		Indigenous

Family	Scientific name	Author	IUCN	Ecology
Pottiaceae	Pseudocrossidium crinitum	(Schultz) R.H.Zander		Indigenous
Pottiaceae	Pterygoneurum macleanum	Warnst.		Indigenous
Pottiaceae	Tortula atrovirens	(Sm.) Lindb.		Indigenous
Pottiaceae	Trichostomum brachydontium	Bruch		Indigenous
Pteridaceae	Cheilanthes eckloniana	(Kunze) Mett.	LC	Indigenous
Pteridaceae	Cheilanthes hirta var. hirta	Sw.	LC	Indigenous
Pteridaceae	Pellaea calomelanos var. calomelanos	(Sw.) Link	LC	Indigenous
Ptychomitriaceae	Ptychomitrium cucullatifolium	(Mull.Hal.) A.Jaeger		Indigenous
Ranunculaceae	Anemone tenuifolia	(L.f.) DC.	LC	Indigenous; Endemic
Ranunculaceae	Ranunculus multifidus	Forssk.	LC	Indigenous
Ranunculaceae	Ranunculus trichophyllus	Chaix	LC	Indigenous
Resedaceae	Oligomeris dipetala var. dipetala	(Aiton) Turcz.	LC	Indigenous
Rhamnaceae	Rhamnus prinoides	L'Her.	LC	Indigenous
Rhamnaceae	Ziziphus mucronata subsp. mucronata	Willd.	LC	Indigenous
Ricciaceae	Riccia albolimbata	S.W.Arnell		Indigenous
Ricciaceae	Riccia albornata	O.H.Volk & Perold		Indigenous; Endemic
Ricciaceae	Riccia cavernosa	Hoffm.		Indigenous
Ricciaceae	Riccia nigrella	DC.		Indigenous
Ricciaceae	Riccia okahandjana	S.W.Arnell		Indigenous
Rubiaceae	Anthospermum rigidum subsp. rigidum	Eckl. & Zeyh.	LC	Indigenous
Rubiaceae	Kohautia caespitosa subsp. brachyloba	Schnizl.	LC	Indigenous
Rubiaceae	Kohautia cynanchica	DC.	LC	Indigenous
Rubiaceae	Nenax microphylla	(Sond.) T.M.Salter	LC	Indigenous
Ruscaceae	Sansevieria aethiopica	Thunb.	LC	Indigenous
Ruscaceae	Sansevieria hyacinthoides	(L.) Druce	LC	Indigenous
Santalaceae	Osyris lanceolata	Hochst. & Steud.	LC	Indigenous
Santalaceae	Thesium namaquense	Schltr.	LC	Indigenous; Endemic
Santalaceae	Viscum hoolei	(Wiens) Polhill & Wiens	LC	Indigenous
Santalaceae	Viscum rotundifolium	L.f.	LC	Indigenous
Scrophulariaceae	Aptosimum marlothii	(Engl.) Hiern	LC	Indigenous
Scrophulariaceae	Aptosimum procumbens	(Lehm.) Steud.	LC	Indigenous
Scrophulariaceae	Aptosimum spinescens	(Thunb.) Emil Weber	LC	Indigenous
Scrophulariaceae	Buddleja saligna	Willd.	LC	Indigenous
Scrophulariaceae	Chaenostoma halimifolium	Benth.	LC	Indigenous
Scrophulariaceae	Jamesbrittenia albiflora	(I.Verd.) Hilliard	LC	Indigenous; Endemic
Scrophulariaceae	Jamesbrittenia atropurpurea subsp. atropurpurea	(Benth.) Hilliard	LC	Indigenous
Scrophulariaceae	Jamesbrittenia aurantiaca	(Burch.) Hilliard	LC	Indigenous
Scrophulariaceae	Jamesbrittenia filicaulis	(Benth.) Hilliard	LC	Indigenous

Family	Scientific name	Author	IUCN	Ecology
Scrophulariaceae	Jamesbrittenia sp.			
Scrophulariaceae	Jamesbrittenia tysonii	(Hiern) Hilliard	LC	Indigenous; Endemic
Scrophulariaceae	Manulea fragrans	Schltr.	LC	Indigenous; Endemic
Scrophulariaceae	Nemesia linearis	Vent.	LC	Indigenous
Scrophulariaceae	Peliostomum leucorrhizum	E.Mey. ex Benth.	LC	Indigenous
Scrophulariaceae	Peliostomum origanoides	E.Mey. ex Benth.	LC	Indigenous; Endemic
Scrophulariaceae	Selago albida	Choisy	LC	Indigenous
Scrophulariaceae	Selago geniculata	L.f.	LC	Indigenous; Endemic
Scrophulariaceae	Selago paniculata	Thunb.	LC	Indigenous; Endemic
Scrophulariaceae	Selago saxatilis	E.Mey.	LC	Indigenous
Scrophulariaceae	Zaluzianskya karrooica	Hilliard	LC	Indigenous; Endemic
Solanaceae	Lycium bosciifolium	Schinz	LC	Indigenous
Solanaceae	Lycium cinereum	Thunb.	LC	Indigenous
Solanaceae	Lycium horridum	Thunb.	LC	Indigenous
Solanaceae	Lycium oxycarpum	Dunal	LC	Indigenous; Endemic
Solanaceae	Lycium pumilum	Dammer	LC	Indigenous
Solanaceae	Lycium schizocalyx	C.H.Wright	LC	Indigenous
Solanaceae	Nicotiana glauca	Graham		Not indigenous; Naturalised; Invasive
Solanaceae	Solanum capense	L.	LC	Indigenous
Solanaceae	Solanum humile	Lam.		Indigenous
Solanaceae	Solanum retroflexum	Dunal	LC	Indigenous
Talinaceae	Talinum caffrum	(Thunb.) Eckl. & Zeyh.	LC	Indigenous
Tamaricaceae	Tamarix ramosissima	Ledeb.		Not indigenous; Naturalised; Invasive
Targioniaceae	Targionia hypophylla	L.		Indigenous
Tecophilaeaceae	Cyanella lutea	L.f.		Indigenous
Thymelaeaceae	Lasiosiphon polycephalus	(E.Mey. ex Meisn.) H.Pearson	LC	Indigenous
Verbenaceae	Chascanum cuneifolium	(L.f.) E.Mey.	LC	Indigenous; Endemic
Verbenaceae	Chascanum pinnatifidum	(L.f.) E.Mey.		Indigenous
Verbenaceae	Chascanum pinnatifidum var. pinnatifidum	(L.f.) E.Mey.	LC	Indigenous
Zygophyllaceae	Roepera incrustata	(Sond.) Beier & Thulin		Indigenous
Zygophyllaceae	Roepera lichtensteiniana	(Cham.) Beier & Thulin		Indigenous
Zygophyllaceae	Tetraena microcarpa	(Licht. ex Cham.) Beier & Thulin		Indigenous
Zygophyllaceae	Tetraena simplex	(L.) Beier & Thulin		Indigenous
Zygophyllaceae	Tribulus terrestris	L.	LC	Indigenous
Zygophyllaceae	Zygophyllum dregeanum	Sond.	LC	Indigenous

9.3 Appendix C – Amphibian species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Amietia fuscigula	Cape River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Poyntonophrynus vertebralis	Southern Pygmy Toad	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	NT	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Vandijkophrynus gariepensis gariepensis	Karoo Toad	Not listed	Not listed
Xenopus laevis	Common Platanna	LC	LC

9.4 Appendix D – Reptile species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acontias gracilicauda	Thin-tailed Legless Skink	LC	LC
Acontias lineatus	Striped Dwarf Legless Skink	LC	LC
Afrotyphlops schlegelii	Schlegel's Beaked Blind Snake	LC	Unlisted
Agama aculeata aculeata	Western Ground Agama	LC	Unlisted
Agama atra	Southern Rock Agama	LC	LC
Aspidelaps lubricus lubricus	Coral Shield Snake	LC	LC
Bitis arietans arietans	Puff Adder	LC	Unlisted
Boaedon capensis	Brown House Snake	LC	LC
Chondrodactylus angulifer	Common Giant Gecko	LC	LC
Chondrodactylus bibronii	Bibron's Gecko	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Hemachatus haemachatus	Rinkhals	LC	LC
Homopus femoralis	Greater Dwarf Tortoise	LC	LC
Karusasaurus polyzonus	Southern Karusa Lizard	LC	LC
Lamprophis aurora	Aurora House Snake	LC	LC
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC	Unlisted
Lycophidion capense capense	Cape Wolf Snake	LC	Unlisted
Monopeltis capensis	Cape Worm Lizard	LC	LC
Naja nivea	Cape Cobra	LC	Unlisted
Pachydactylus capensis	Cape Gecko	LC	Unlisted
Pachydactylus mariquensis	Common Banded Gecko	LC	LC
Pedioplanis laticeps	Karoo Sand Lizard	LC	LC
Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	LC	Unlisted
Pedioplanis namaquensis	Namaqua Sand Lizard	LC	Unlisted
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	Unlisted
Psammobates tentorius	Tent Tortoise	LC	LC
Psammophis leightoni	Cape Sand Snake	VU	LC
Psammophis notostictus	Karoo Sand Snake	LC	Unlisted
Psammophylax rhombeatus	Spotted Grass Snake	LC	Unlisted
Pseudaspis cana	Mole Snake	LC	Unlisted
Ptenopus garrulus garrulus	Common Barking Gecko	LC	Unlisted
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis occidentalis	Western Three-striped Skink	LC	Unlisted
Trachylepis punctatissima	Speckled Rock Skink	LC	LC

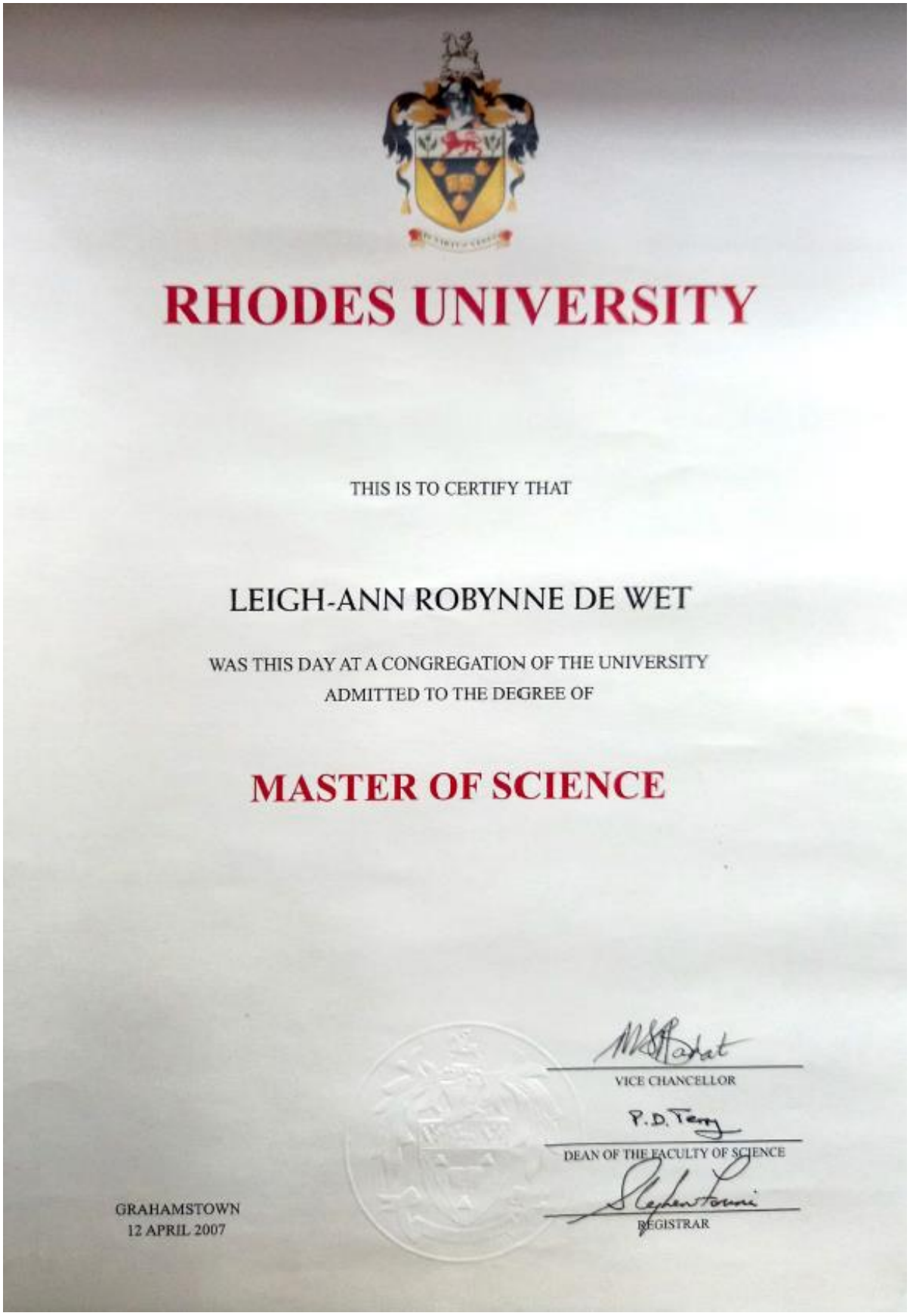
Trachylepis sulcata sulcata	Westren Rock Skink	LC	Unlisted
Trachylepis variegata	Variegated Skink	LC	Unlisted
Varanus albigularis albigularis	Southern Rock Monitor	LC	Unlisted
Varanus niloticus	Water Monitor	LC	Unlisted

9.5 Appendix E – Mammal species expected to occur within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Antidorcas marsupialis	Sclater's Shrew	LC	LC
Atilax paludinosus	Water Mongoose	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Desmodillus auricularis	Short-tailed Gerbil	LC	LC
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC
Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Gerbillurus paeba	Hairy-footed Gerbil	LC	LC
Herpestes pulverulentus	Cape Grey Mongoose	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus capensis	Cape Hare	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Macroscelides proboscideus	Round Eared Elephant Shrew	LC	LC
Malacothrix typica	Gerbil Mouse	LC	LC
Mastomys coucha	Multimammate Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC
Mus musculus	House Mouse	Unlisted	LC
Neoromicia capensis	Cape Serotine Bat	LC	LC
Neoromicia zuluensis	Aloe Bat	LC	LC
Orycteropus afer	Aardvark	LC	LC
Otocyon megalotis	Bat-eared Fox	LC	LC
Otomys unisulcatus	Karoo Bush Rat	LC	LC
Panthera pardus	Leopard	VU	VU

Papio ursinus	Chacma Baboon	LC	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Parotomys brantsii	Brants' Whistling Rat	LC	LC
Parotomys littledalei	Littledale's Whistling Rat	NT	LC
Pedetes capensis	Springhare	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Procavia capensis	Rock Hyrax	LC	LC
Pronolagus saundersiae	Hewitt's Red Rock Rabbit	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rattus rattus	House Rat	Exotic (Not listed)	LC
Redunca fulvorufula	Mountain Reedbuck	EN	EN
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus darlingi	Darling's Horseshoe Bat	LC	LC
Rousettus aegyptiacus	Egyptian Fruit Bat	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Suricata suricatta	Suricate	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC
Vulpes chama	Cape Fox	LC	LC
Xerus inauris	Cape Ground Squirrel	LC	LC

9.6 Appendix F – Specialists Qualifications



RHODES UNIVERSITY

THIS IS TO CERTIFY THAT

LEIGH-ANN ROBYNNE DE WET

WAS THIS DAY AT A CONGREGATION OF THE UNIVERSITY
ADMITTED TO THE DEGREE OF

MASTER OF SCIENCE

VICE CHANCELLOR

DEAN OF THE FACULTY OF SCIENCE

REGISTRAR

GRAHAMSTOWN
12 APRIL 2007

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Leigh-Ann Robynne de Wet

Registration Number: 400233/12

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)

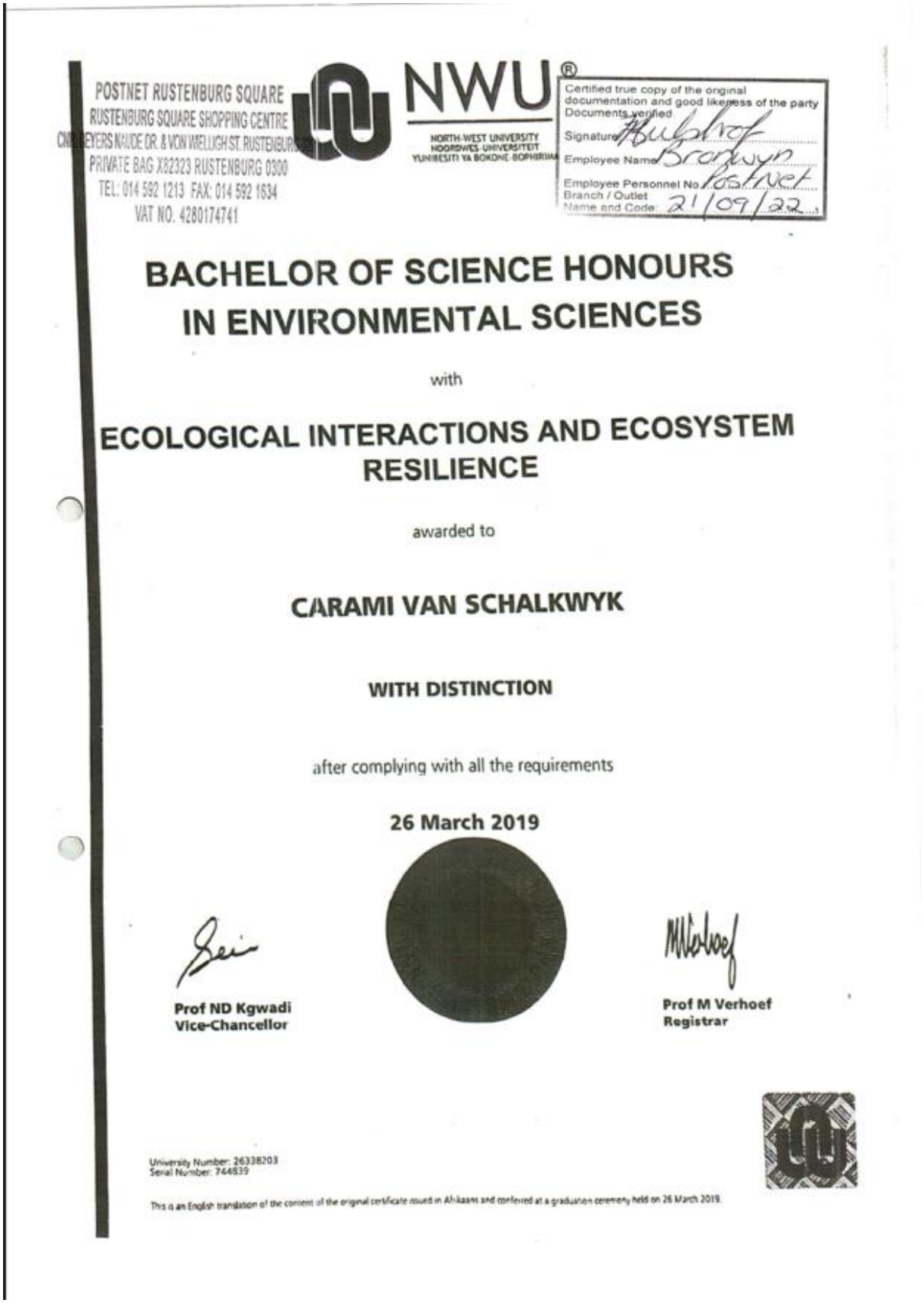
Ecological Science (Professional Natural Scientist)

Effective **19 September 2012** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code



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Documents verified
Signature
Employee Name
Employee Personnel No
Branch / Outlet
Name and Code: 21/09/22

BACHELOR OF SCIENCE HONOURS IN ENVIRONMENTAL SCIENCES

with

ECOLOGICAL INTERACTIONS AND ECOSYSTEM RESILIENCE

awarded to

CARAMI VAN SCHALKWYK

WITH DISTINCTION

after complying with all the requirements

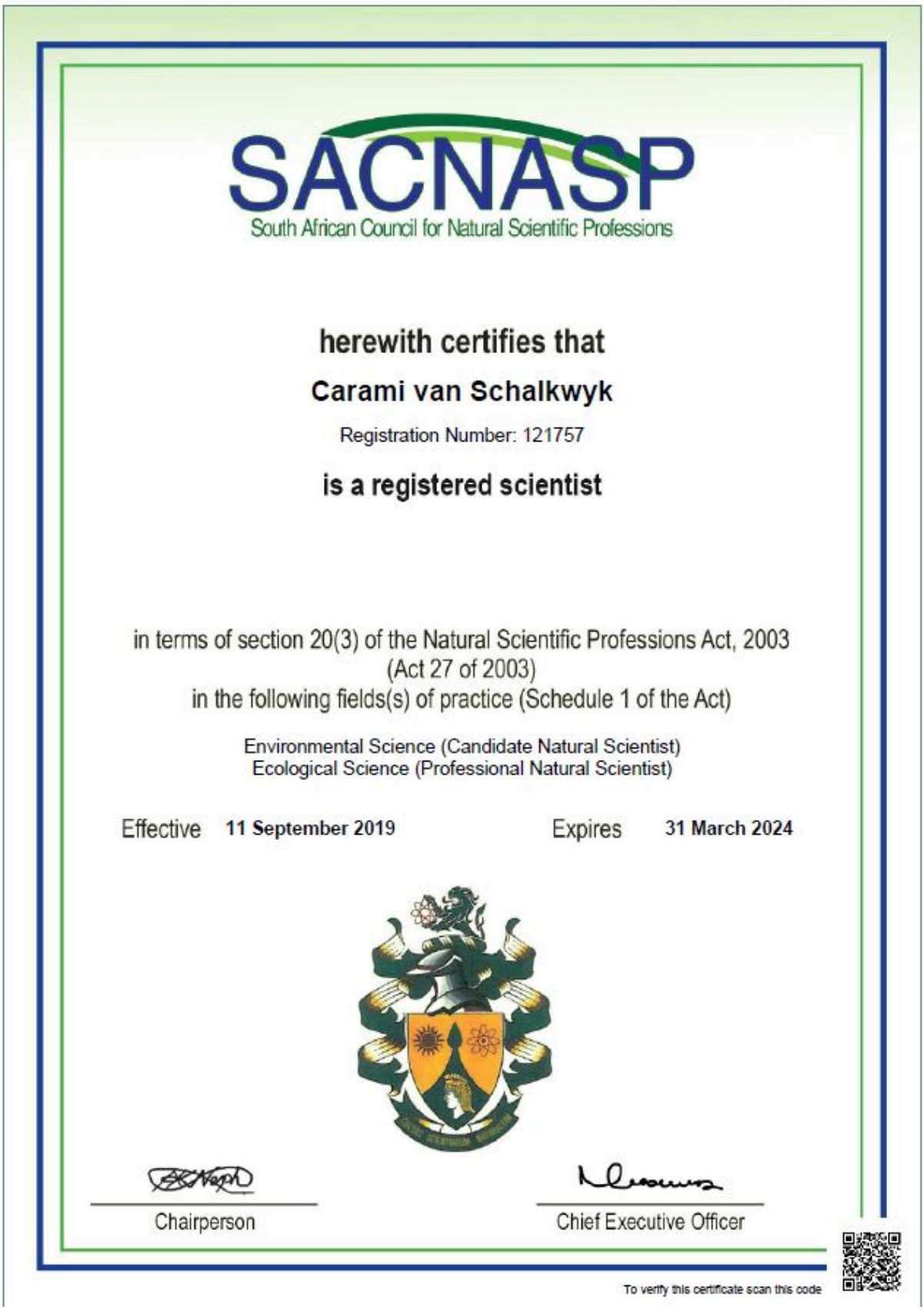
26 March 2019

Prof ND Kgwadi
Vice-Chancellor

Prof M Verhoef
Registrar

University Number: 26338203
Serial Number: 744839

This is an English translation of the content of the original certificate issued in Afrikaans and conferred at a graduation ceremony held on 26 March 2019.



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)
Ecological Science (Professional Natural Scientist)

Effective **11 September 2019** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

9.7 Appendix G – Specialists Declaration of Independence

I, Leigh-Ann de Wet, declare that:

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

Leigh-Ann de Wet

Biodiversity Specialist

The Biodiversity Company

May 2023

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

Biodiversity Specialist

The Biodiversity Company

July 2022