Renewstable Bokamoso Power Plant

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE RENEWSTABLE®BOKAMOSO ON THE FARM RIETFONTEIN 66HS WITHIN THE DR PIXLEY KA ISAKA SEME LOCAL MUNICIPALITY IN THE MPUMALANGA PROVINCE

Prepared for:

Nsovo Environmental Consulting

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Report Type:	**Terrestrial Biodiversity Assessment**
Project Name:	**Terrestrial Biodiversity Impact Assessment for the proposed development of the Renewstable®Bokamoso on the Farm Rietfontein 66HS within the Dr Pixley Ka Isaka Seme Local Municipality in the Mpumalanga Province**
Report Compiler:	**Rudolph Greffrath (Pr. Sci. Nat. 400018/17)**

DECLARATION

I, Rudolph Greffrath, in my capacity as a specialist consultant, hereby 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 favorable 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.

Rudolph Greffrath *Pr.Sci.Nat* (400018/17, Conservation Science)

September 2024

EXECUTIVE SUMMARY

AES Environmental Services was appointed by Nsovo Environmental Consulting (Nsovo) to undertake a terrestrial (fauna and flora) biodiversity assessment for the proposed Renewstable Bokamoso Energy Facility project near Amersfoort, Mpumalanga Province.

The assessment was completed per the Terrestrial Plant and Animal protocols which provided the criteria for this assessment and its reporting of impacts on terrestrial biodiversity for activities requiring environmental authorization.

The site falls within the regional vegetation type Amersfoort Highveld Clay Grassland, which is listed as a Least Concerned (LC) ecosystem by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 (NEMBA).

According to the Mpumalanga Biodiversity Sector Plan MBSP (2015), the Renewstable Bokamoso project area is classified as CBA optimal from a terrestrial perspective. All demarcations were considered during the fieldwork studies planning and execution, as the Sector Plan's delineations were confirmed where applicable.

The field investigation indicated that the undisturbed project area was dominated by undulating Moist grassland and Riparian areas, as opposed to transformed agricultural areas. A total of 149 plant species were recorded of the 385 recorded for the region.

No Species of Conservation Concern (SCC), according to the National Screening Report or NEWPOSA were encountered, however, 5 provincially protected species were recorded near the project site. A total of six mammal species were recorded on site, none of which are SCC. One amphibian was encountered during this field survey by means of active searching, none of these species are SCC. Suitable habitat in the form of the wetland area within the planted and natural pastures areas could yield additional species. No reptile species were recorded, however; the high probability of a Vulnerable reptile species being present must be taken cognisance of and further investigated.

The primary impact of the proposed development is a loss of flora and fauna habitat in the form of Natural Pastures and Riparian areas due to infrastructure development. No Red Data plant or animal species were present within the PAOI however it is expected that they may occur. Due to the majority extent and the moderate sensitivity assigned to these habitats after mitigation, the impacts identified were rated as Low, after mitigation. Alien plant invasion is expected due to surface disturbance due to infrastructure and this should be managed by implementing an alien plant management plan for quarterly monitoring that should take place for at least two years after construction and an additional two years after decommissioning.

The direct impacts on fauna are expected to be low. The impact of habitat destruction will not affect fauna SCC as these species were not recorded, and if possibly present, they will move away from the construction area and settle in other areas, probably within or adjacent to the project area.

The allocated sensitivities for each of the relevant themes are either disputed or validated for the overall PAOI. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the following section, and consideration is given to any observed or likely presence of SCC or protected species.

Screening Tool Comparison

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**High**	**Medium**	Disputed – Habitat is generally intact but fragmented, transformed areas are present and SCC possible. SCC may forage in specific areas
Plant Theme	**Medium**	**Medium**	Validated - The composition, moderate species diversity and number of plant species recorded, including the protected species recorded. Landscape is fragmented.
Terrestrial Theme	**Very High**	**High**	Disputed – Certain habitat sensitivities are regarded as high sensitivity due to the role of this intact habitat to biodiversity within an area. Medium and Low sensitive areas were also delineated. Very High sensitive CBA1 and NPAES areas are present.

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List of Abbreviations

ADU	Animal Demography Unit
CARA	Conservation of Agricultural Resources Act, 1993 (Act 43 of 1983)
CC	Closed Corporation
CBA	Critical Biodiversity Area
C-Plan	Conservation Plan
CR	Critically Endangered

DD	Data Deficient
DEA	Department of Environmental Affairs
DM	District Municipality
DMR	Department of Mineral Rights
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EBA	Endemic Bird Area
ESA	Ecological Support Areas
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
EN	Endangered
EW	Extinct in the Wild
EX	Extinct
Ha	Hectares
HL	Habitat linkage
HR	Habitat requirements
HS	Habitat status
IBA	Important Birding Area
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
IPP	Independent Power Plant
km	Kilometres
km^2	Square kilometres
LC	Least Concern
m	Meters
mm	Millimetres
MRA	Mining Right Application
NBSAP	National Biodiversity Strategy and Action Plan
MBSP	Mpumalanga Biodiversity Sector Plan
NE	Not Evaluated
NEMA	National Environmental Management Act,1998 (Act 107 of 1998)
NEMBA	National Environmental Biodiversity Act, 2004 (Act 10 of 2014)
NFEPA	National Freshwater Ecosystem Priority Areas
No	Number

NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
ONA	Other Natural Areas
PAOI	Project Area of Influence
PES	Present Ecological Status
PRECIS	Pretoria Computerised Information System
PS	Performance Standard
TMS	Timed Meander Searches
QDS	Quarter Degree Square
RE	Remainder Extend
SABAP	South African Bird Atlas Project
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
VU	Vulnerable

1 Introduction

1.1 Background

AES Environmental Services was appointed by Nsovo Environmental Consulting (Nsovo) to undertake a terrestrial (fauna and flora) biodiversity assessment for the proposed Renewstable® Bokamoso power plant near Amersfoort, Mpumalanga Province.

As part of the Eskom lander tender MWP1247GX, Hydrogene de France (HDF) has been awarded 1782 ha of Eskom's land to develop 8 Renewstable® power plants in the province of Mpumalanga, South Africa. Distributed over Five (5) plots within Tutuka and Majuba Coal Power Stations, HDF-Energy is part of a cluster of different project developers, also awarded land in the area to develop infrastructure related to renewable energy production. HDF-Energy, under its Special Purpose Company (SPC) "Renewstable Mpumalanga (Pty) Ltd", is undertaking the development and implementation of 4 projects referred to as Majuba Cluster that consists of the following:

- Renewstable® Qhakaza
- **Renewstable® Bokamoso**
- Renewstable® Sivutse
- Renewstable® Ntokozo.

This report deals specifically with the Renewstable® Bokamoso. The National Web-based Environmental Screening Tool has characterised the Terrestrial Biodiversity Combined 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).

1.1.1 Project components

The project involves developing the 74MW Renewstable® Bokamoso Power Plant, a high-capacity renewable power plant based on hydrogen BESS storage technology that harnesses renewable energy from a Photovoltaic (PV) Park and converts it into hydrogen using an electrolyser system. This hydrogen is stored in a compressed gas form; subsequently, when the photovoltaic park generates insufficient energy, the stored hydrogen is utilised to produce electricity for the grid through a fuel cell system. This innovative approach ensures a continuous and reliable power supply even when the PV park's energy production is inadequate. The system will only emit oxygen and water vapour as by-products.

The electricity produced by the plants will be purchased by a private(s) off-taker (s) at an agreed rate under the Power Purchase Agreement (PPA) for at least 25 years from the commissioning. The power plant is scheduled to be commissioned in 2027 and will contribute to the greening of the local power grid and enhance the territory's energy independence. The proposed development entails the following primary infrastructure:

Primary Infrastructure	**Power produced**
Baseload electricity	55MW day, and evening 12 MW night
Solar plant	210MWp
Electrolyser	60MW
Green H2 storage	250MWh
High-capacity fuel cells	12MW
Battery power	220MW
Battery storage	55MWh
Capacity production	87%
Land required	315 hectares
Electricity production	841.09 MWh daily 307 000 MWh yearly

Associated infrastructure includes the following:

- Hydrogen Power Centre
- Control Room
- Access/Service roads
- Buildings

- Fencing and Security
- Communications DC and AC cables installed underground and overhead
- High Voltage Collector station that will be shared with other IPPS

1.1.2 Proposed Activities

Proposed activities and infrastructure options associated with the construction and operation of the Solar PV facility is listed below.

Once site preparation is complete, physical construction and equipment installation of the main Project components will commence and will involve the following:

Construction of solar PV power plant, including:

- PV structure foundation construction
- PV structure assembly
- PV modules installation
- Power station installation
- Installation of cabling, boxes, and auxiliaries connecting the PV modules to the power station and connecting the individual components of the HyPCe area to their respective power supplies

Construction of HyPCe area facilities (i.e., BESS, HESS, and EMS), including:

- Foundation construction
- Electrical building construction
- Installation of integrated systems, containers, and associated power stations for the batteries, electrolysers, and fuel cells.

Erection of electrical and mechanical balance of plant components (e.g., cabling, piping, and auxiliaries).

Construction/installation of remaining supporting infrastructure, facilities, and utilities, including other Project buildings (e.g., guard building/security booth and office/equipment storage building), fencing, lighting, package water treatment plant, water storage tanks, and drainage works.

1.2 Project Location

The proposed project is located outside an urban area on Portions 4, 5, 10 and the Remaining Extent of the Farm Rietfontein 66HS, approximately 3 km northeast of Majuba Power Station and approximately 7 km southwest of Amersfoort. The site is within Ward 8 in the Dr Pixley Ka Isaka Seme Local Municipality jurisdiction in the Mpumalanga Province under the Gert Sibande District Municipality.

1.2.1 Surrounding Environment

Being Part of the "Majuba Cluster with the IPPs Red Rocket, Mainstream, Africa Clean Energy and SOLA; Renewstable® Bokamoso sits in the landscape of a future sustainable energy production hub in Mpumalanga (Figure 1-1).

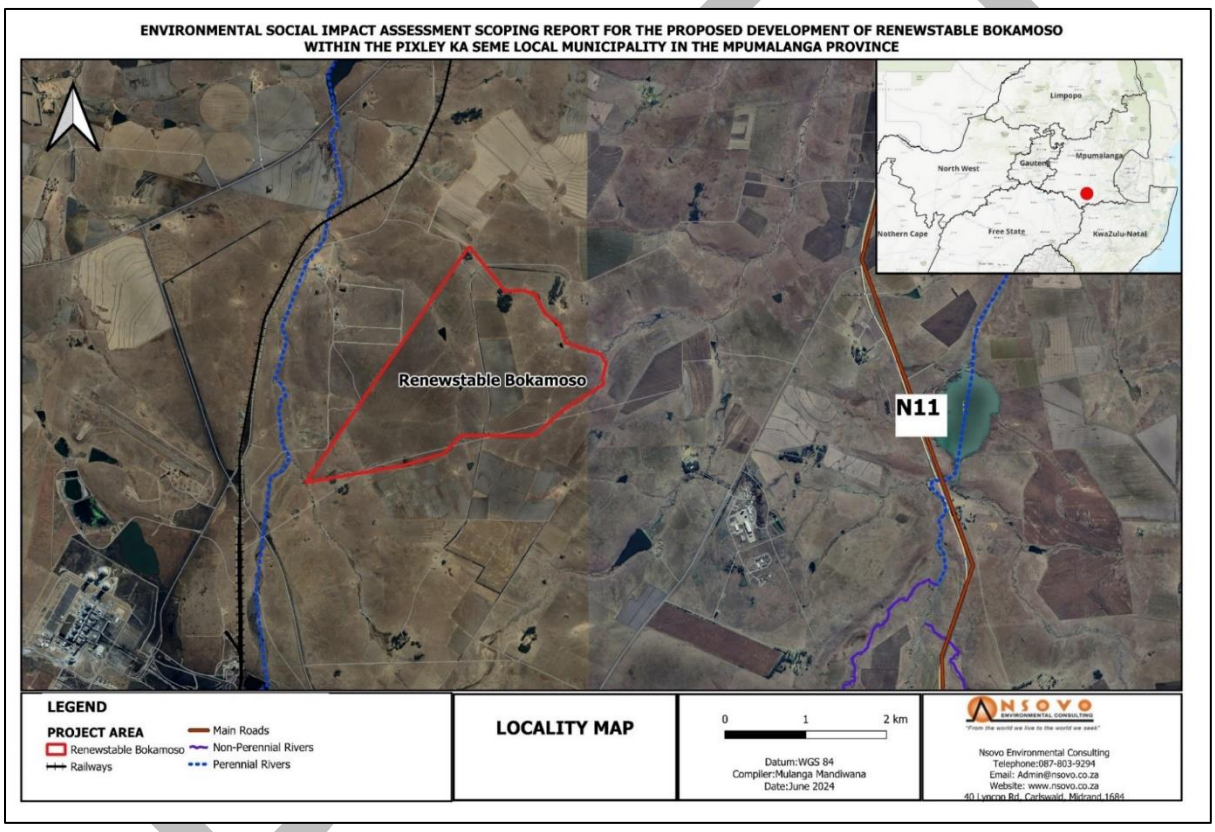


Figure 1-1: Locality Map of Renewstable Bokamoso

1.3 Project Area of Influence

The IFC PS section 8 states: Where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence. This area of influence encompasses, as appropriate:

The area likely to be affected by:

(i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;

(ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or

(iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

The PAOI consists of the Renewstable® Bokamoso PV Area, a terrestrial CBA optimal area is influenced. The proposed infrastructure layout can be viewed in Figure 1-2. Aquatic CBA areas are present in the form of streams within the project infrastructure. Specific management measures would be contained in the Wetland Specialist report.

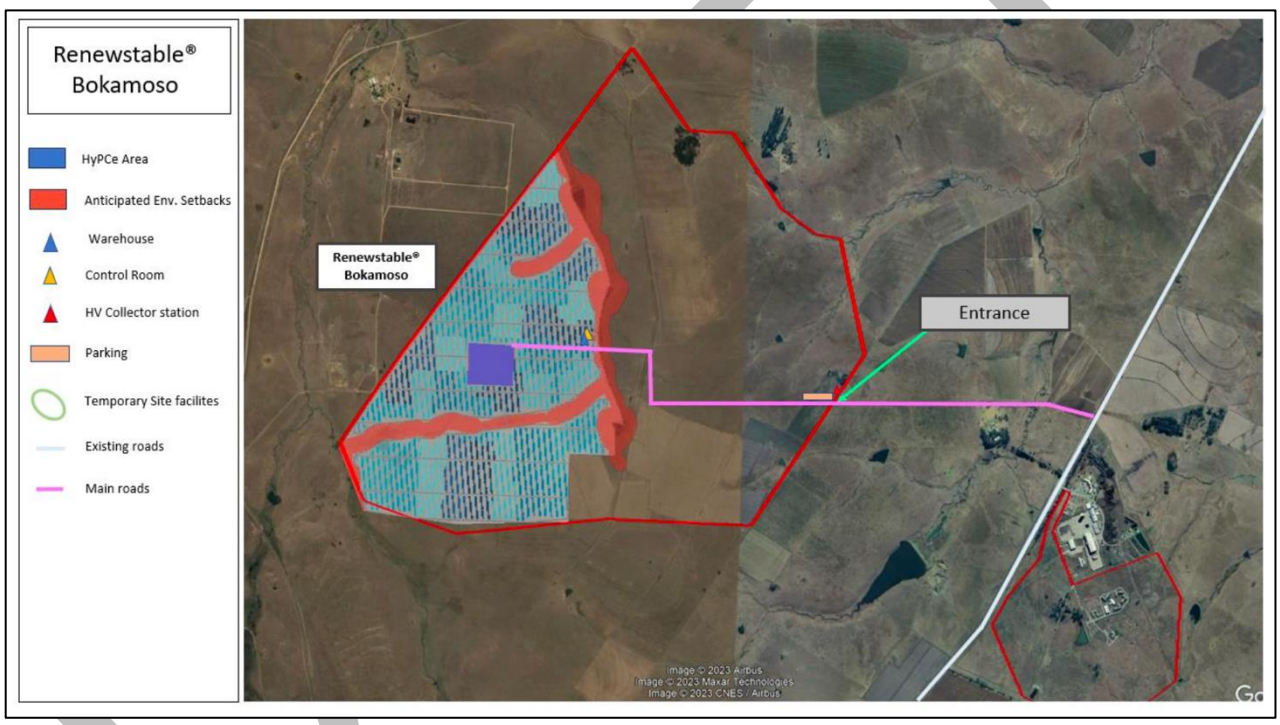


Figure 1-2: Proposed infrastructure layout

1.4 Terms of Reference

The terms of reference include the following deliverables for this Terrestrial Plants and Animals and Biodiversity Assessment include the following:

- Record representative samples of the plant species that occur within the study area based on seasonal field surveys;
- Record representative samples the animal species (mammals, and herpetofauna that occur within the study area based on field surveys;
- Identify which of these species are SCC based on the following lists:

- International Union for the Conservation of Nature (IUCN) red data list,
- The South African National Biodiversity Institute (SANBI) red data list,
- The South African Red Data lists for mammals, amphibians and reptiles,
- The National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), and
- The Convention on International Trade in Endangered Species of Flora and Fauna (CITES) list.

- Determine if any of the recorded species are alien invasive species or problem species in terms of NEMBA alien invasive species classification;
- Using data gathered from the field, determine the vegetation communities occurring within the study area and map these;
- Map important habitats for fauna within the study area;
- Determine the biodiversity value of the study area using information gathered on both flora and fauna and map this; and
- Assess the identified impact of the proposed project and recommend mitigation measures to avoid or mitigate negative impacts.

1.5 Assumptions and Limitations

Whilst every effort is made to cover as much of the site as possible, representative sampling was completed as per the nature of this type of investigation. It is therefore possible that some plant and animal species that are present on site were not recorded during the field investigations. An in-depth Avifauna investigation does not form part of this report.

Every effort is made to identify all plant species present on site during field investigations, this being the wet season, any winter flowering species would have been omitted from field data.

This report lists the findings of an on-site baseline evaluation within the area selected by HDF for the construction and operation activities of the PV facility and related activities. Where necessary, recommendations for the most appropriate mitigation measures have been included.

To obtain a comprehensive understanding of the dynamics of the biota on a site, including SCC, studies should include investigations through the different seasons of the year, over several years, and extensive sampling of the area. Due to the EIA process time constraints, such long-term research was not feasible, and information contained within this report is based on a late wet season field survey.

In terms of limitations relevant to this study, it must be noted that field investigations did not include a nocturnal survey for safety reasons, therefore nocturnal species were not recorded by this means. Furthermore, during the site investigation the prevailing temperature was low, with persistent rainfall and hail, this could have influenced the behaviour of reptile species and meant they might have not been as active.

1.6 Report Conditions

Findings, recommendations, and conclusions provided in this report are based on the authors' best scientific and professional knowledge as well as information available at the time of compilation. The author, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, and using the information contained in this document.

This report should be interpreted after taking into consideration the findings and recommendations provided by the specialist herein. Furthermore, this report 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.

No form of this report may be amended or extended *without the prior written consent of the author*. Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or refer to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included.

The author reserves the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field.

1.7 Regulatory and Institutional Framework

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

as 'Very High' sensitivity due to CBA 1, Protected areas, and Endangered ecosystem being present (National Environmental Screening Tool, 2022

This report is based on the Species Environmental Assessment Guideline: Guidelines for implementing the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. This guideline provides details for implementing relevant species protocols as they have been identified through the screening tool.

In terms of the NEMA and other applicable laws as listed below, it is required that the environmental and social impacts associated with mining activities be assessed to identify any potential negative and/or positive consequences as a result thereof. Following which, measures must be proposed to avoid or minimise these impacts.

The following legislative requirements were considered during this assessment:

- Section 24 of the Constitution – Environment, 1996 (Act No. 108 of 1996);
- The Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) and it's Regulations;
- National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2014) (NEM: BA);
- Section 5 of the National Environmental Management Act, 1998 (Act No. 7 of 1998) (NEMA);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) as amended;
- National Forest Act,1998, (Act No. 84 of 1998) (NFA) and
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA).

1.8 Details of Specialist

The Author is a terrestrial ecology specialist with 16 years of experience in biodiversity baseline assessments, biodiversity action planning design and development, biodiversity off-set design and implementation, biodiversity strategy design, conservation management planning and implementation, IFC performance standards best practice, ecological restoration, ecosystems services and environmental impact assessments, across Africa. He is *Pr. Sci Nat* registered (400018/17) in Conservation Science field of practice.

2 Methodology

2.1 Species Protocols and Associated Species Environmental Assessment Guidelines

The purpose of the Species Environmental Assessment Guideline is to provide background and context to the assessment and minimum reporting criteria contained within the Terrestrial Animal and Plant Species Protocols; as well as to provide guidance on sampling and data collection methodologies for the different taxonomic groups that are represented in the respective protocols. This guideline is intended for specialist studies undertaken for activities that have triggered a listed and specified activity in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as identified by the EIA Regulations, 2014 (as amended) and Listing Notices 1-3.6.

The screening tool report indicated the environmental sensitivities that intersect with the proposed development footprint as defined by the Eskom Majuba, as well as the relevant protocols that the applicant would need to adhere to (Terrestrial Plant and Animal and Biodiversity).

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the screening tool report indicated that the Renewstable® Bokamoso project area must incorporate the Terrestrial Plant and Animal Protocols as well as the Biodiversity Protocol for inclusion in this assessment report.

The screening tool report provided a list of all confirmed occurring and potentially occurring animals (medium sensitivity) and flora (low sensitivity) SCC within the proposed development footprint/PAOI.

2.2 Terrestrial 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 2-1 and Table 2-2, respectively.

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

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global 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 2-2: Summary of Functional Integrity (FI) criteria

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

BI can be derived from a simple matrix of CI and FI as provided in

Table 2-3.

Table 2-3: Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

The fulfilling criteria to evaluate Resource Resilience (RR) are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 2-4.

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

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality or species that have a very high likelihood of 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 cannot recover from major impacts, 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.

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

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

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

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-6.

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

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

2.3 Site Sensitivity Verification

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation the current use of the land and the environmental sensitivity of the site under consideration as identified by the national web-based environmental screening tool, must be confirmed by undertaking a site sensitivity verification.

The outcome of this site sensitivity verification is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

2.4 Literature Review and Desktop Study

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

2.4.1 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2012) and SANBI (2019) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the project area (

Figure 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.

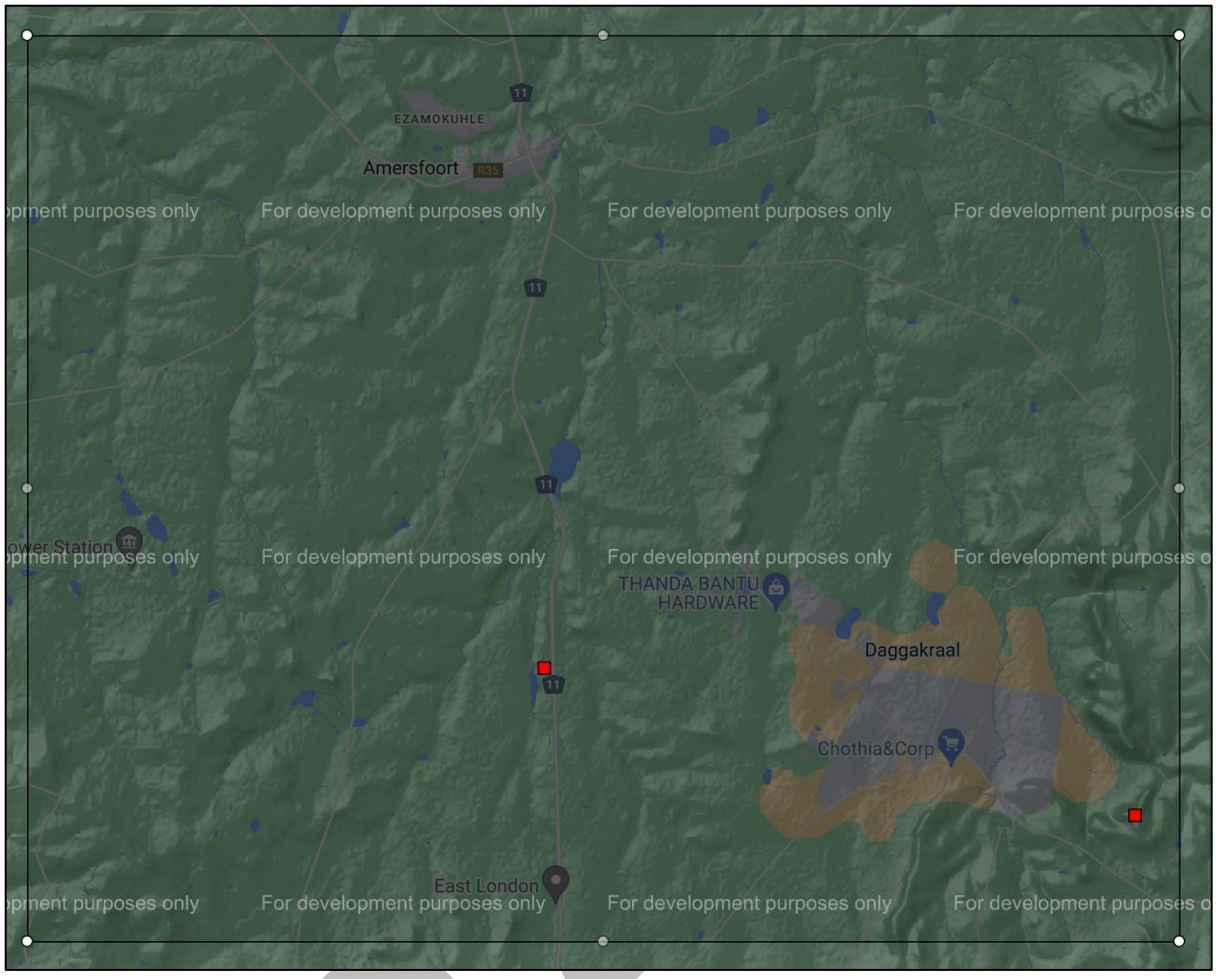


Figure 2-1: Map illustrating the extent of the area used to obtain the expected flora species list from the Plants of South Africa (POSA) database.

2.4.2 Desktop Faunal Assessment

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

- Amphibian list, generated from the IUCN spatial dataset (2017) and Reptile Map database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2729BB quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and Amphibian Map database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2729BB quarter degree square; and
- Mammal list from the IUCN spatial dataset (2017).

2.5 Field Investigation

The site visit and detailed infield flora and fauna assessments took place from the 30th of October to the 2nd of November 2023. Representations of the project area is indicated in Figure 2-2 representing the entire project area footprint and field tracks.

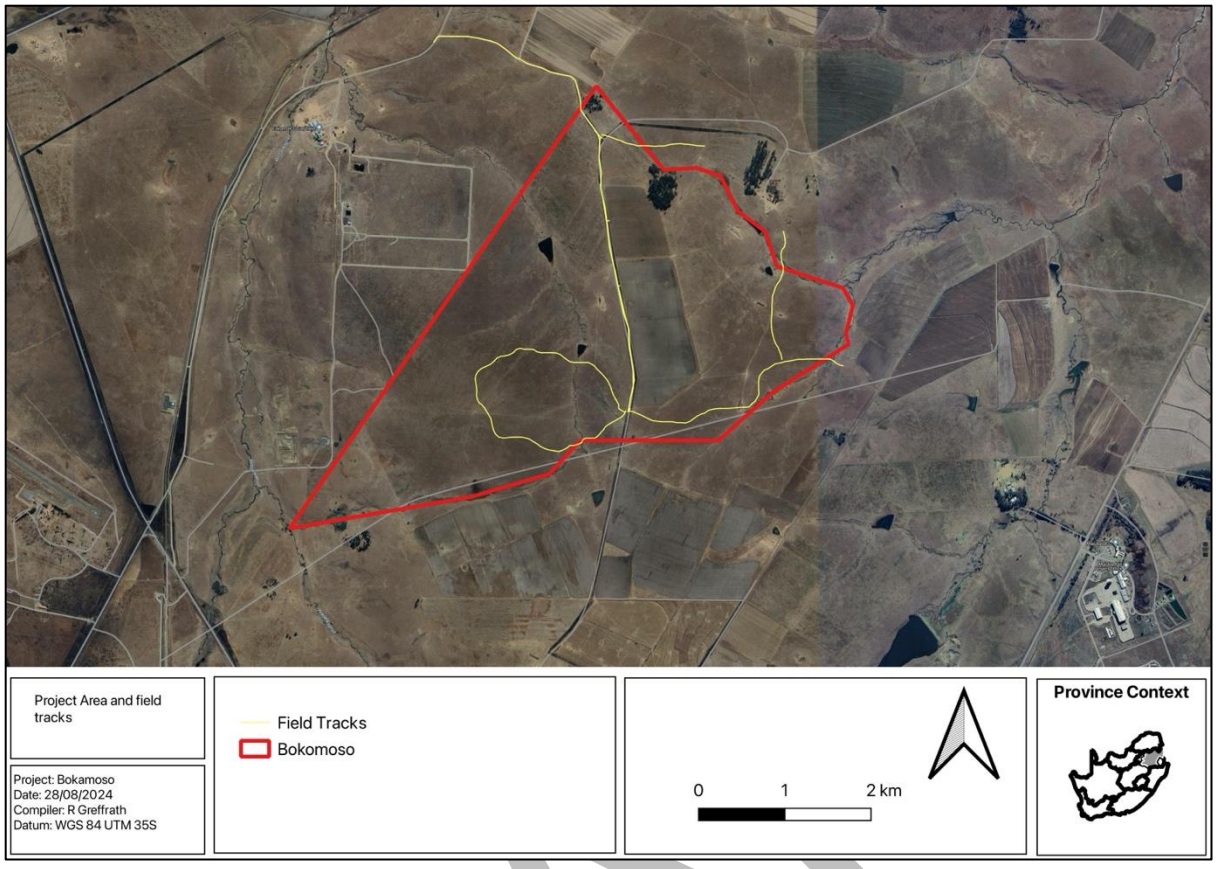


Figure 2-2: Project Area of Influence and field tracks

2.5.1 Flora Survey

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

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

The timed random meander method is highly efficient for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the

original technique described by Goff et al. (1982). Suitable habitat for SCC were identified according to Raimondo et al. (2009) and targeted as part of the timed meanders.

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

2.5.2 Fauna Survey

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

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed; and listening to species calls;
- Small Mammal Trapping – where Sherman traps were baited and placed infield for the duration of the study;
- Camera trapping – where stationary motion sensor cameras where left infield for the duration of the study;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.); and
- Utilization of local knowledge, informal but extensive interviews with land owners were completed.

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

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

2.6 Species of Conservation Concern (SCC)

From the overall species list compiled through field work, a list of SCC is compiled. The comprehensive SCC species list was compiled by taking the following Red Data Lists into consideration:

- International Union for the Conservation of Nature (IUCN) Red Data List (2019);
- The South African National Biodiversity Institute (SANBI) Red Data list version 2019.1;
- The South African Red Data lists for mammals (2004), birds (2016), and Herpetafauna;
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened or Protected Species Regulations, and
- The Convention on International Trade in Endangered Species of Flora and Fauna (CITES) list (2019).

The South African Red Data List uses the same criteria as that defined by the IUCN. According to the IUCN all species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation (IUCN, 2021). The categories are described in Table 2-7 below.

Table 2-7: Red Data Categories (taken from SANBI 2018)

CATEGORY		DESCRIPTION
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.
Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
Endangered	(EN)	High risk of extinction in the wild..
Vulnerable	(VU)	High risk of endangerment in the wild.
Near Threatened	(NT)	Likely to become endangered in the near future.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
Data Deficient	(DD)	Not enough data to make an assessment of its risk of extinction.
Not Evaluated	(NE)	Has not yet been evaluated against the criteria.

CATEGORY		DESCRIPTION
	Extinct	Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories CR, EN or VU is a threatened species. Species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories**, NT, LC** and **DD**
	Threatened	
	Other categories of conservation concern	
	Other categories	

2.7 Alien Invasive Species

Alien plant species in South Africa are categorised according to the Alien and Invasive Species Lists, 2014 (GN R864 in GG 40166 of 29 July 2016) of the NEMBA (Act 10 of 2004). The national list of invasive plant species listed in NEMBA represents the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and
- Category 3: Invasive species controlled by activity.

The species recorded on site are categorised according to NEMBA, and management measures designed according to requirements of the act.

3 Study Area

3.1 Locality

The study area is situated approximately 7km south of Amersfoort located within the in Municipal Ward number 7 of Dr Pixley ka Isaka Seme Local Municipality within the jurisdiction of the Gert Sibande District Municipality in the Mpumalanga Province.

3.2 Climate and Surface Hydrology

The study area is in the Highveld climatic region, which is a summer rainfall area. The temperature classifications for the region are hot in summer and mild to warm in winter, with significant diurnal fluctuations. The local climate can be described as semi-arid high-veld conditions with hot summers and moderate dry winters (en.climate-data.org; worldweatheronline.com, Mucina and Rutherford (2012).

Rainfall occurs mainly in early summer, from 620 mm in the west to 830 mm in the east (MAP 694 mm). MAT 14ºC, with temperatures higher in the west than in the east. Winters are cold and summers are mild. The incidence of frost is very high.

3.3 Geology and Soils

The study area is restricted to vertic clay soils derived from dolerite that is intrusive in the Karoo sediments of the Madzaringwe Formation north and the Volksrust Formation and the Adelaide Subgroup south. The dominant land type is Ca, while the Ea land type is of subordinate importance.

3.4 Regional Vegetation (Reference State)

3.4.1 Amersfoort Highveld Clay Grassland

In terms of recent vegetation classifications, the assessed area occurs within the Amersfoort Highveld Clay Grasslands vegetation type (Mucina & Rutherford, 2012).

Important Taxa

Graminoids: *Andropogon appendiculatus (d), Brachiaria serrata (d), Digitaria monodactyla (d), D. tricholaenoides (d), Elionurus muticus (d), Eragrostis capensis (d), E. chloromelas (d), E. plana (d), E. racemosa (d), Harpochloa falx (d), Heteropogon contortus (d), Microchloa caffra (d), Panicum natalense (d), Setaria nigrirostris (d), S. sphacelata (d), Themeda triandra (d), Trichoneura grandiglumis (d), Tristachya leucothrix (d), Abildgaardia ovata, Andropogon schirensis, Aristida bipartita, A. congesta, A. junciformis subsp. galpinii, A. stipitata subsp. graciliflora, Bulbostylis contexta, Chloris virgata, Cymbopogon caesius, C. pospischilii, Cynodon dactylon, Digitaria diagonalis, D. ternata, Diheteropogon amplectens, Eragrostis curvula, Koeleria capensis, Panicum coloratum, Setaria incrassata*.

Herbs: *Berkheya setifera (d), Vernonia natalensis, V. oligocephala (d), Acalypha peduncularis, A. wilmsii, Berkheya insignis, B. pinnatifida, Crabbea acaulis, Cynoglossum hispidum, Dicoma anomala, Haplocarpha scaposa, Helichrysum caespititium, H. rugulosum, Hermannia coccocarpa, H. depressa, H. transvaalensis, Ipomoea crassipes, I. oblongata, Jamesbrittenia silenoides, Pelargonium luridum, Pentanisia prunelloides subsp. latifolia, Peucedanum magalismontanum, Pseudognaphalium luteo-album, Rhynchosia effusa, Salvia repens, Schistostephium crataegifolium, Sonchus nanus, Wahlenbergia undulata*.

Herbaceous Climber: *Rhynchosia totta.*

Geophytic Herbs*: Boophone disticha, Eucomis autumnalis subsp. clavata, Hypoxis villosa var. obliqua, Zantedeschia albomaculata subsp. macrocarpa.*

Tall Shrubs*: Diospyros austro-africana, D. lycioides subsp. guerkei.*

Low Shrubs*: Anthospermum rigidum subsp. pumilum (d), Helichrysum melanacme (d), Chaetacanthus costatus, Euphorbia striata var. cuspidata, Gnidia burchellii, G. capitata, Polygala uncinata, Rhus discolor.*

Succulent Shrub*: Euphorbia clavarioides var. truncata*.

Conservation Vulnerable

The conservation target is 27%, but none is protected. Some 25% of the unit is transformed, predominantly by cultivation (22%). The area is not suited to afforestation. Silver and black wattle (Acacia species) and *Salix babylonica* invade drainage areas. Erosion potential is very low (57%) and low (40%).

4 Regional Sensitivity Analysis and No-go Areas

There are several assessments for South Africa as a whole and on provincial levels that allow for detailed conservation planning and meeting biodiversity targets for the country's variety of ecosystems. These guides are essential to consult for development projects and will form an important part of the sensitivity analysis.

Areas earmarked for future conservation or that are essential to meet biodiversity and conservation targets should not be developed and have a high sensitivity as they are necessary for overall ecological functioning. Further, details of the field investigation are used to inform and determine the site-specific sensitivity, as per Site Ecological Importance (SEI) criteria.

4.1 Mpumalanga Biodiversity Sector Plan (MBSP) (2013)

The main purpose of a biodiversity sector plan is to ensure that the most recent and best quality spatial biodiversity information can be accessed and used to inform land-use and development planning, environmental assessments and authorisations, and natural resource management. A biodiversity sector plan achieves this by providing a map (or maps) of terrestrial and freshwater areas that are important for conserving biodiversity patterns and ecological processes – these areas are called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The maps are provided together with contextual information on biodiversity and land-use guidelines that can be incorporated into the policies and decisions of a wide range of sectors.

The sector plan is a living document that is constantly reviewed and updated and documents the distribution of conservation important areas for biodiversity. According to the Mpumalanga Sector Plan, the Renewstable® Bokamoso project area contains terrestrial CBA Irreplaceable,

Ecological support, other natural and Heavily Modified Areas (Figure 4-1). All demarcations were considered during the fieldwork studies' planning and execution, as the Sector Plan's delineations were refined where applicable.

Irreplaceable CBAs are the most important biodiversity areas in the Province, outside of the protected area network. This sub-category comprises those CBAs considered essential for meeting biodiversity targets to ensure the persistence of species and the functioning of ecosystems. Such areas are often at risk of being lost due to their remaining extent already being near to or lower than the required biodiversity target. For example, the only known nesting sites for certain highly threatened bird species, or areas of high connectivity value which are at high risk of being disrupted (i.e. critical corridor linkages in the landscape). If Irreplaceable CBAs suffer any further loss of habitat or ecological function, it is likely that the biodiversity targets will not be met and species losses and breakdown of ecological functioning will take place (Lötter, M.C. 2015).

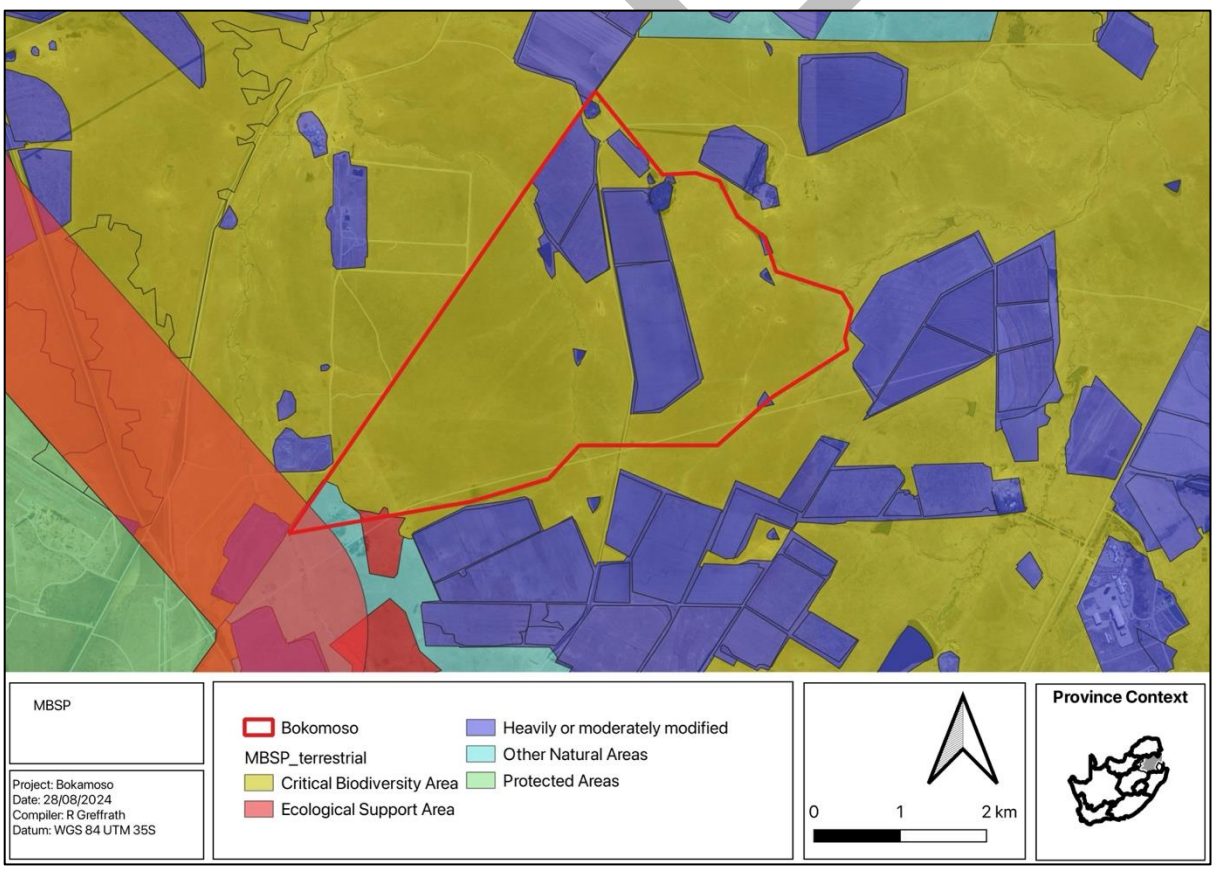


Figure 4-1: The MBSP in relation to the project site

4.1.1 The National Biodiversity Assessment

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

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

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

4.1.1.1 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. The revised list (known as the Red List of Ecosystems (RLE) 2022) is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types). The revised list was published in the Government Gazette (Gazette Number 47526, Notice Number 2747) and came into effect on 18 November 2022.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the Department of Water Affairs and Forestry (DWAF), now the Department of Water and Sanitation (DWS);
- Priority areas identified in a provincial systematic biodiversity plan; and
- High irreplaceability forest patches or clusters identified by DWAF (DWS).

The criteria for identifying threatened terrestrial ecosystems include six criteria overall, two of which are dormant due to lack of data (criteria B and E). The presented criteria indicate that the Amersfoort Highveld Clay Grassland is listed as an LC ecosystem. The cumulative loss of these areas should be avoided.

Table 4-1: Criteria for the Listing of National Threatened Ecosystems

Criterion	Details
A1	Irreversible loss of natural habitat
A2	Ecosystem degradation and loss of integrity

B	Rate of loss of natural habitat
C	Limited extent an imminent threat
D1	Threatened plant species associations
D2	Threatened animal species associations
E	Fragmentation
F	Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

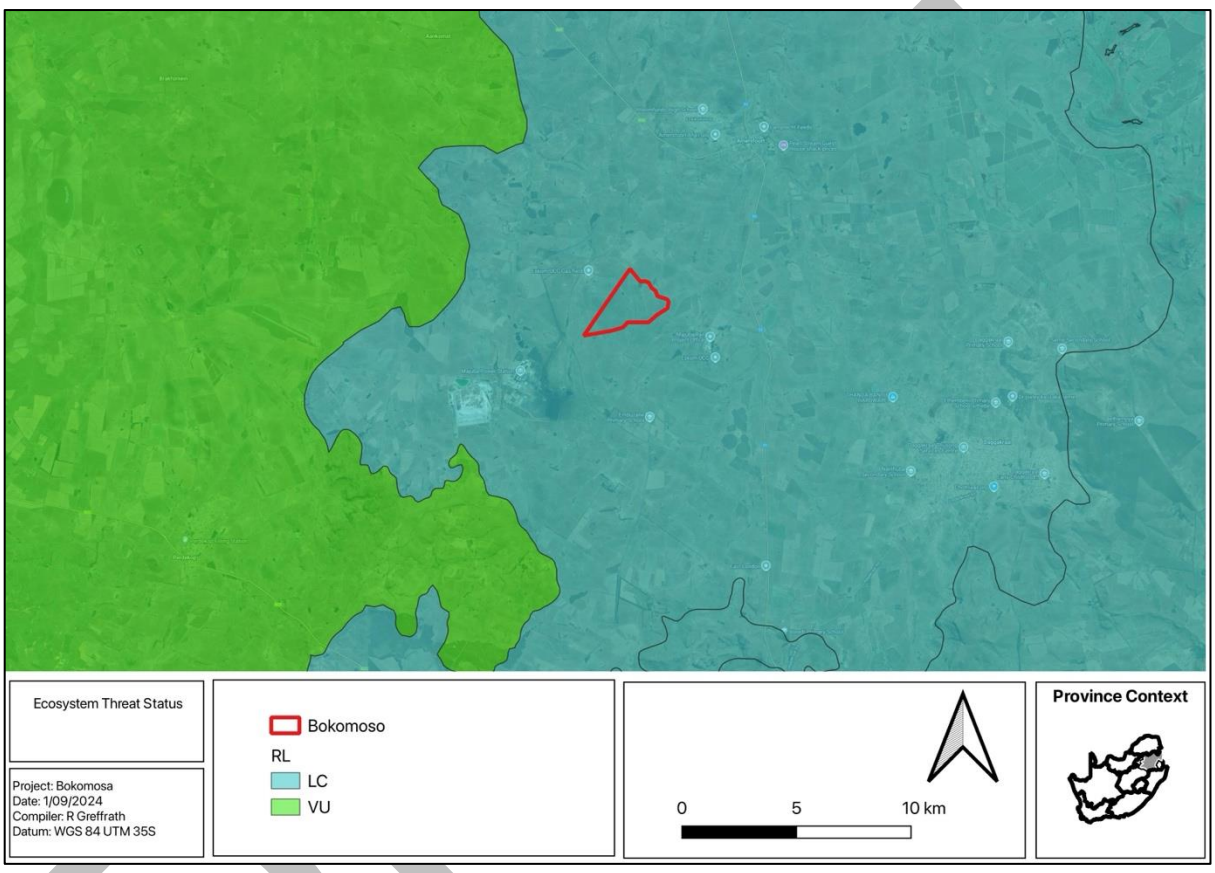


Figure 4-2: Ecosystem Threat Status

4.1.1.2 *Ecosystem Protection Level*

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

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development. Based on this, the terrestrial ecosystems associated with the project area is rated as Poorly Protected (PP).

This means that these ecosystems are considered not adequately protected in areas such as national parks or other formally protected areas.

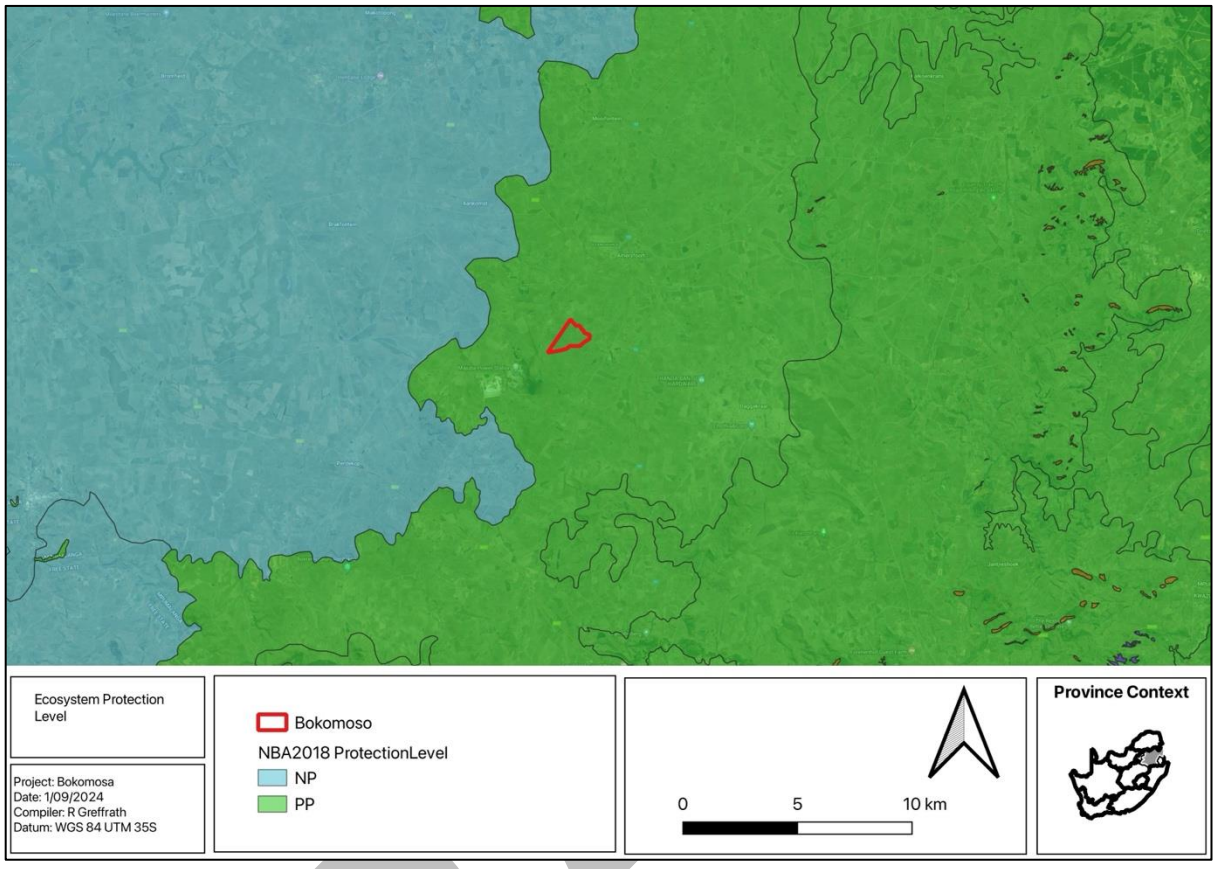


Figure 4-3: Ecosystem Protection Level

4.1.2 Protected Areas

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

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

- Special nature reserves:
- National parks:
- Nature reserves and

- Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003);
- World heritage sites declared in terms of the World Heritage Convention Act;
- Marine protected areas declared in terms of the Marine Living Resources Act;
- Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and
- Mountain catchment areas were declared in the Mountain Catchment Areas Act of 1970 (Act No. 63 of 1970).

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

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

Officially protected areas, either provincially or nationally, that occur near the project site could have consequences as far as impact on these areas are concerned. However, there are no protected areas in proximity for the project area. The closest protected area is the Majuba Nature Reserve, situated 1km to the west.

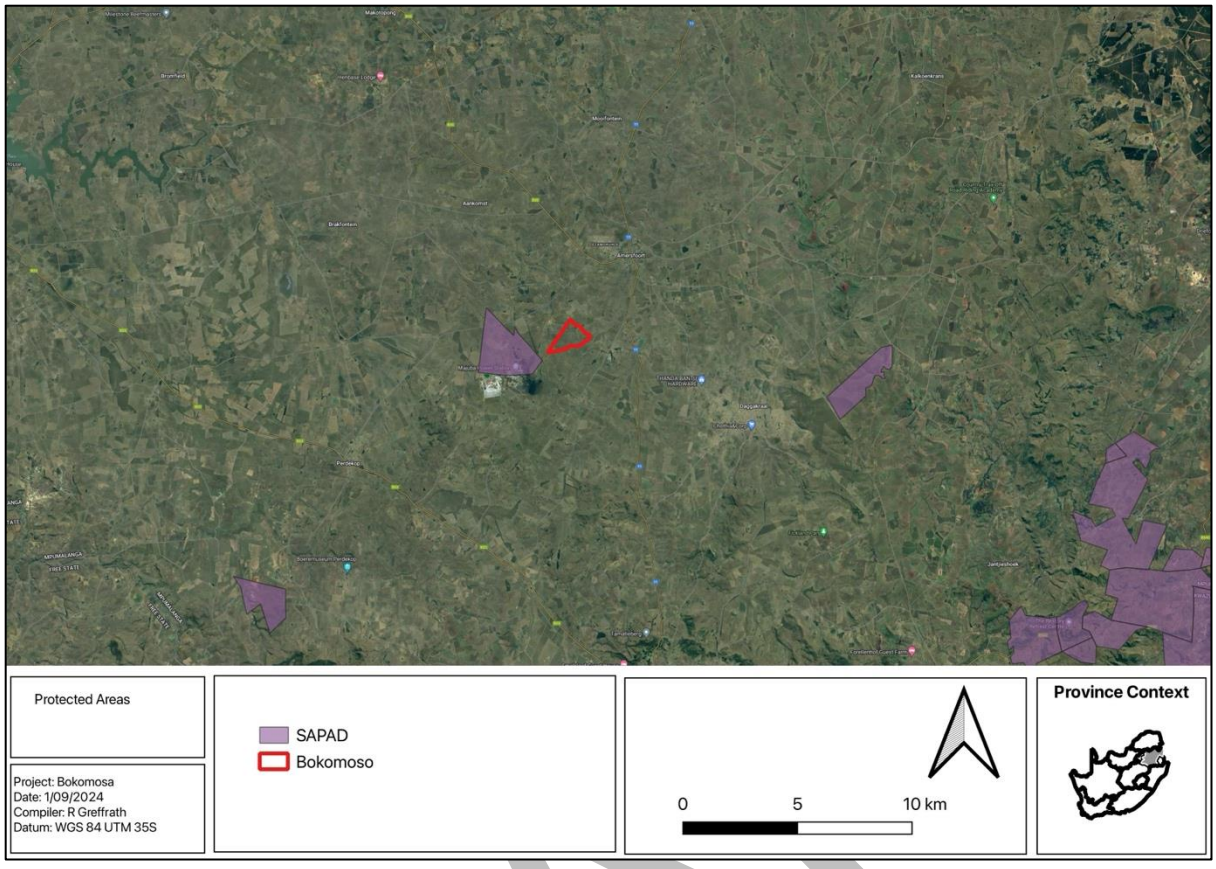


Figure 4-4: Protected Areas in relation to the project area

4.2 Important Bird Areas (Birdlife SA, 2013)

An Important Bird Area (IBA) is an area recognised as a globally important habitat for conserving bird populations. Currently, there are about 10,000 IBAs worldwide. Currently, South Africa has 124 IBAs, covering over 14 million hectares of habitat for threatened, endemic, and congregatory birds. Yet only one million hectares of the total land surface covered by our IBA's are legally protected. BirdLife South Africa continues an IBA program of stewardship which will ultimately achieve formal protection (BirdlifeSA, 2013).

The study area falls close to the Grasslands IBA and is close to the Amersfoort-Bethal-Carolina IBA.

This vast area (c. 1 050 000 ha) is centred on the towns of Volksrust and Wakkerstroom. The previously proposed, but not yet declared, Biosphere Reserve comprises some 800 private farms, several municipalities, conservancies, Biodiversity Stewardship Protected Environments, and a considerable amount of State-owned land. A series of farms and conservancies in the Harrismith, Vrede, and Memel districts of the Free State is included. The area comprises gentle rolling hills on the South African plateau (1 700 - 1 800 m a.s.l.) that are broken regularly by parts of the Mpumalanga Drakensberg escarpment, small ranges such

as the Gemsbokberg (2 095 m a.s.l.), Versamelberg (2 139 m a.s.l.) and Balelesberg (2 055 m a.s.l.), as well as the higher peaks around Wakkerstroom, such as Ntshele (2 291 m a.s.l.), Ossewakop (2 170 m a.s.l.), Kanonkop (2 112 m a.s.l.) and KwaMandlangampisi (2 266 m a.s.l.).

The proposed Grassland Biosphere Reserve is undoubtedly one of Africa's most important biodiversity areas. It consists primarily of private and state-owned land; a few small, protected areas are found within its boundaries, including Wakkerstroom and Seekoeivlei Nature Reserves. More than 20,000 ha of private land have been registered as Natural Heritage Sites. Despite the 'proposed Biosphere Reserve' status, this area is severely threatened, and it faces some monumental conservation problems. Foremost amongst these are grassland afforestation, wetland degradation, accidental and targeted poisoning of cranes, and increased acid rain from local power station sulphur emissions.

Commercial afforestation is the most looming threat. Although virtually none of this area is currently afforested, over 100,000 ha has been designated prime plantation area. Plantations consume vital grassland habitats supporting many globally and nationally threatened taxa. Furthermore, the impacts of grassland fragmentation and other landscape-level changes are unclear,but could be catastrophic. Afforestation is also known to affect wetlands; planting non-native trees with poor water-utilization efficiency results in reduced run-off around wetlands. Wetlands within the proposed Biosphere Reserve face several other threats. Dam construction floods these ecosystems, turning them into sterile stretches of open water, and ecosystem processes are also disrupted downstream. Drainage by canals detrimentally affects wetlands. Overgrazing and burning marshy areas in winter lead to temporary damage, with accelerated run-off, soil erosion, and the formation of dongas. Several threatened species are affected dramatically by this wetland degradation, including *Sarothrura ayresi*.

Figure 4-5: IBA

4.3 Nationally Protected Areas Expansion Strategy

The National Protected Areas Expansion Strategy (NPAES) shows areas designated for future incorporation into existing protected areas (national and informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets and suitable for protection. They may not necessarily be proclaimed as protected areas in the future, but they are a broad-scale planning tool allowing for better development and conservation planning. The CBA areas within the project area correspond with NPAES.

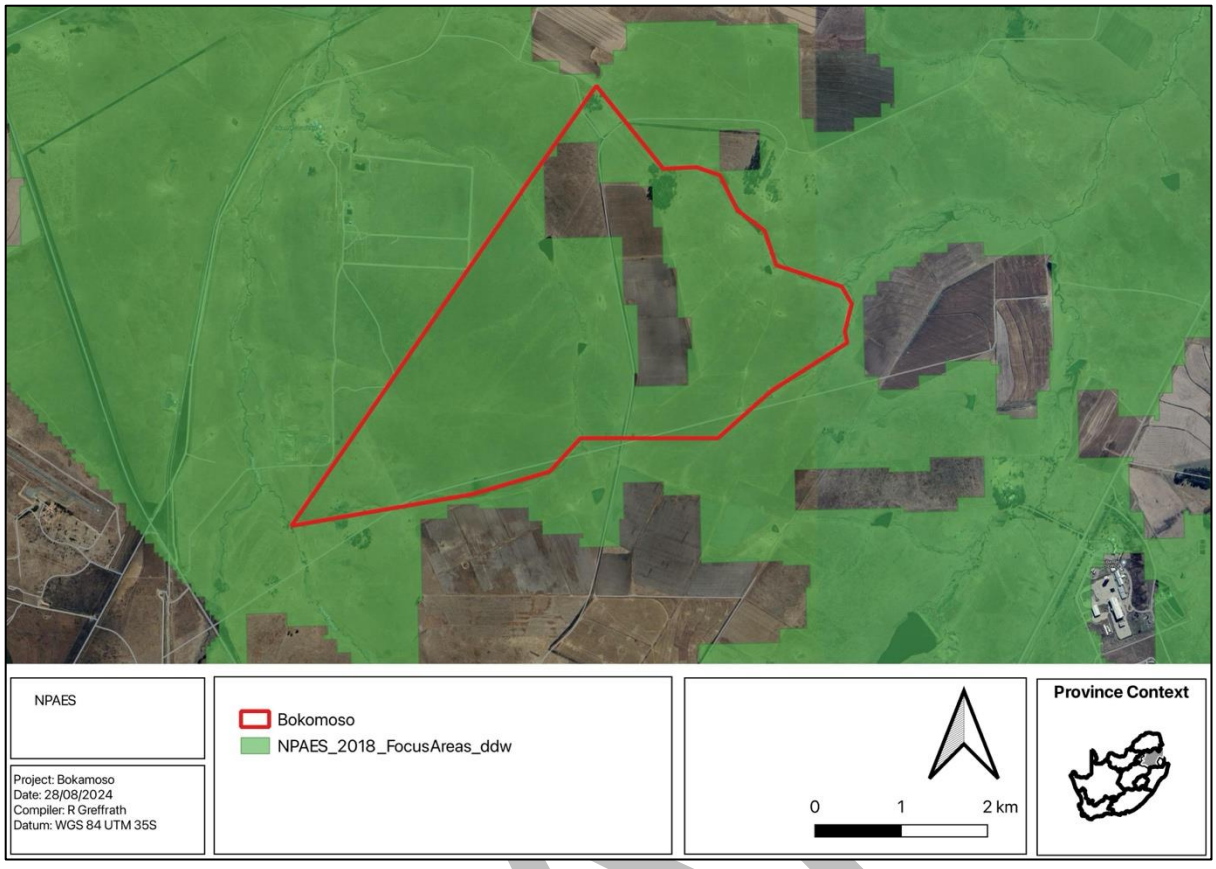


Figure 4-6: NPAES

4.4 Renewable Energy Development

4.4.1 Power Corridors

Power Corridors are geographical areas where wind and solar photovoltaic technologies can be incentivized, where grid expansion can be directed, and where regulatory processes will be streamlined.

The REDZs act as energy generation hubs and provide anchor points for grid expansion, thereby allowing for strategic and proactive grid expansion into these areas.

This will ensure that the grid expansion does not hamper the progress of the renewable energy power purchase agreement process. The Renewstable® Bokamoso project does not occur within 50km from a corridor.

4.4.2 Renewable Energy Development Zones

Renewable Energy Development Zones are geographical areas where wind and solar photovoltaic technologies can be incentivized, where grid expansion can be directed, and where regulatory processes will be streamlined.

The REDZs act as energy generation hubs and provide anchor points for grid expansion, thereby allowing for strategic and proactive expansion of the grid into these areas.

This will ensure that the grid expansion does not hamper the progress of the renewable energy power purchase agreement process. The closest REDz phase 2 area is the Emalahleni area, which is approximately 120km away.

5 Results

5.1 Flora Expected Species

The POSA database indicates that 91 species are expected to occur within the PAOI but not the surrounding landscape due to its transformed nature. However, based on the specialist's opinion, few of these species are expected due to the disturbed and transformed nature of the project area and surrounds. Appendix B provides the list of species and their respective conservation status.

5.2 Flora

The project area falls within the as described in Grassland Biome as described by Mucina and Rutherford (2012). The Grassland Biome covers roughly a third of the country. It occurs across six provinces and is the second largest of South Africa's nine biomes, covering an area of 339 237.68 km2 (SANBI, 2012).

The study site corresponds with Amersfoort Highveld Clay Grasslands to the Grassland Biome, more generally the Mesic Highveld Grassland defined by Mucina and Rutherford (2006). This unit is found in the eastern, precipitation-rich regions of the Highveld.

Grasslands of these parts are regarded ‘sour grasslands’. The study area is composed of an ecological type known as the Amersfoort Highveld Clay Grassland. This grassland comprises undulating plains with small, scattered patches of dolerite outcrops. The vegetation comprises short, closed grassland, largely dominated by a dense *Themeda triandra* sward, often severely grazed.

Thirty percent of the biome has been irreversibly transformed, and only 1,9% is formally conserved. As a result, the National Biodiversity Strategy and Action Plan has identified the grassland biome as one of the spatial priorities for conservation action (SANBI, 2012). The important biodiversity contained within the grasslands, which underpins life, is being eroded to such an extent that human wellbeing is threatened.

Most of the study area (162 ha) had transformed due to the cultivation of maize and soybeans. Livestock were also observed throughout most of the site, and evidence of grazing was recorded in grassland areas, showing a dominance of increased species and some erosion.

Despite these impacts, areas left intact showed a high diversity of grasses and forbs, particularly members of the Asteraceae family and the Helichrysum genus.

A total of 149 plant species were recorded during site visits (Appendix B), of 543 listed (recorded by SANBI in the relevant grid in the past in the regional list (Appendix A); more may occur that was not recorded and identified by SANBI and therefore not on the PRECIS List. The delineated vegetation types associated with the project area are discussed in more detail in the following sections and is depicted in Figure 5-1. Vegetation associated with the Renewstable Bokamoso project area comprises four habitat units: the Natural Pastures, Pastures, Agricultural and Alien vegetation areas and low-lying riparian areas or wetlands.

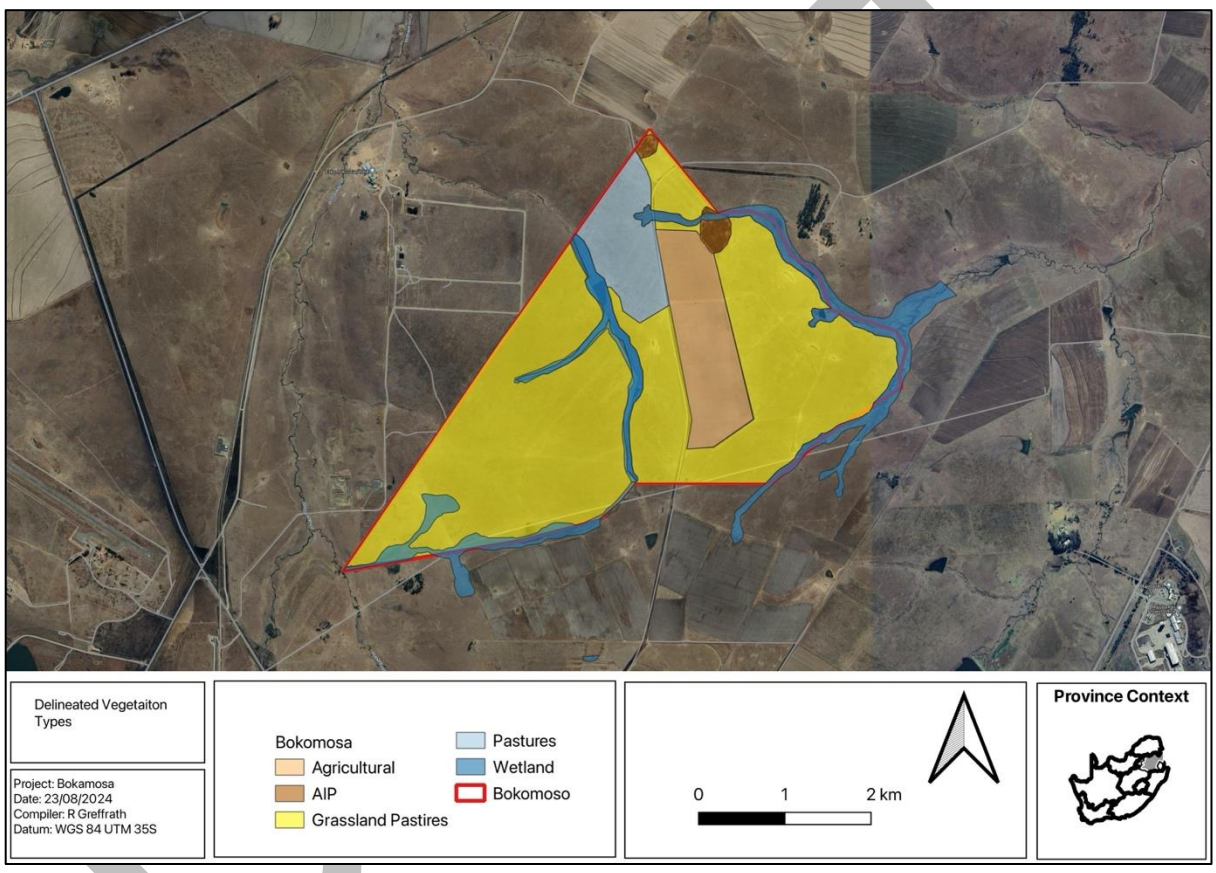


Figure 5-1: Delineated Vegetation types encountered within the Renewstable Bokamoso project area.

A total of 149 plant species were recorded during the various site investigations. Typical of the Grassland Biome, the physiognomic dominance of the herbaceous component in the form of forb species and grass species are evident. Trees are present as low shrubs or as stands of exotics. The species composition of untransformed grasslands represents the principal regional vegetation type.

The site investigations revealed the presence of the following vegetation habitat types:

- Riparian Habitat/Wetland

The floristic status of these areas is regarded as high and has few impacts, however, cattle grazing was recorded. An impact that does affect the status of these areas adversely is damming practices of upstream catchment areas, causing changes in the flow patterns and soil moisture content in downstream areas. Trampling of the topsoil by cattle, using and infestation of the streambed by terrestrial species, imported by droppings and physical transportation methods, result in species changes in some areas. This vegetation type was found to be recently burnt, which made the identification of certain plant species difficult.

Species recorded include the grasses *Arundinella nepalensis, Fingerhuthia africana, Eragrostis plana, Paspalum scrobiculatum, P. dilatatum, Leersia hexandra, Brachiaria eruciformis,* the hydrophilic species *Cyperus species, Typha capensis, Oxycarpus* species, Scirpus species and the forbs *Oenothera rosea, Crinum species, Falkia oblonga, Denekia capensis, S. inornatus, Polygonum lapathifolia, Senecio achilleifolius, Helichrysum aureonitens, Haplocarpha scyposa, Rumex species*, species and Eucomis species. Where standing water was present, Typha capensis (Common Bulrush), *Imperata cylindrica* (Cottonwool Grass), and *Arundinella nepalensis* (River Grass) had colonised. The tree *Salix babylonica* frequently infests the streambanks and was present in the project area.

Considering the Red Data species that occur in the region, these areas are highly suitable for the potential presence of these species. No Red Data species were, however recorded during the investigation period.

Figure 5-2: Riparian Habitat

- Natural Grassland Pastures

The Natural Pastures (Figure 5-3, Figure 5-4) areas have been impacted by historic and current grazing and to certain degree mismanagement, certain portions were ploughed and used to plant crops. This area is not entirely transformed but in a constant disturbed state, as the vegetation cannot recover to a more natural state due to ongoing disturbances and impacts received from grazing from cattle and edge effects from the adjacent land use. Although the habitat unit is not entirely transformed, ongoing and historic disturbances have resulted in the plant community no longer being fully representative of the reference vegetation.

The main ecological characteristics of these grasslands include (SANBI, 2013):

- Climate; with warm, wet summers and cold winters, that results in a longer growing season and higher grassland productivity, producing tall and heavy plants;
- Grasslands that are used to fire, and this is the most important ecosystem process that can be managed to maintain biodiversity and productivity in these ecosystems.
- Grazing, if moderately stocked, these grasslands are well adapted to manage the pressure;

- Life-history strategies; due to the environmental conditions, the plants persist mainly through being long-lived, sporadically replacing themselves through seeds or vegetative reproduction;
- Geology; The underlying geology correlates to high levels of plant species richness and endemism.

This habitat unit can thus be regarded as important, not only within the local landscape, but also regionally; it acts as a refuge, used for habitat, foraging area and movement corridors for fauna (including likely SCC). The habitat sensitivity of the natural pastures is regarded as high, due to faunal species recorded as well as the role of this intact habitat to biodiversity within a very fragmented local landscape.

The management and spatial guidelines for land use for these grasslands that are relevant to this project area include (SANBI,2013);

- Avoid any further loss of primary grassland, if present;
- Establish and respect buffers around protected areas, wetlands and rivers. Manage wetland systems, rivers, ridges and valleys for biodiversity objectives, particularly if they have been classified as CBA or ESA; and
- The establishment of buffers; buffers should be established around sensitive habitats and SCC.

Figure 5-3: Example of Natural pastures with cattle in the background

Figure 5-4: Example of Natural pastures with Alien tree stand in the background

- Pastures

The Pastures areas represented grassy plains in terrestrial areas with a species assemblage that was typical of impacted/modified vegetation specific ally maintained to create pasture for livestock. The most prominent disturbances observed during the field visit include selective grazing, overgrazing, with certain areas representative of fallow fields that have returned to a poor form of grassland. Fire will also play a role in the landscape, fire in grasslands is a natural phenomenon, being responsible for maintaining a grassland landscape, however frequent burning results in a variety of grassland species, (forbs, bulbs ad grasses) being excluded from the environment due to unsuitable conditions that have been created. When habitat is overutilized, certain species will increase in abundance, whilst others will decrease. The site experiences frequent overgrazing from cattle.

Plant diversity in this habitat was generally poor, primarily due to the current land use. Erosion susceptibility was high therefore, as well as the general dominance of invasive species such as *Themeda triandra* (Red Grass).

- Exotic Tree Stands/Agricultural Areas

Cultivation represents the major land transformation activity in the region within a natural grassland environment. These areas include lands that are either currently actively cultivated for crops or fallow fields where agricultural activities ceased some time ago, but the vegetation still reflects the impact of transformation. Exotic tree stands are less prominent in the landscape, however these areas are also regarded as of a transformed nature due to the absence of expected species within the regional vegetation tpe. No Red Data plant species were recorded within these parts. The likelihood of encountering Red Data plant species within these parts is low, mainly because of habitat transformation.

5.2.1 Plant Species of Conservation Concern

The study site lies within four QDS grids 2728BB. According to the POSA, 282 species are expected to occur for the QDS for this site. After uploading the project area onto the Screening Tool, a list of potential and confirmed SCC was produced. In addition, the NEWPOSA database was also consulted. The Screening tool results indicated one SCC could be present in the PAOI, Sensitive species 851.

A detailed list of plant species recorded by the SANBI POSA List for the grids mentioned above is included in Appendix B. These species are expected to be present within undisturbed areas with suitable habitats within the proposed development footprint area. The eight SCC identified

in the POSA List are also listed by the Mpumalanga Nature Conservation Act, 1998 (Act No 10 of 1998) as Schedule 11 (Protected) species, the South African Red Data List and the CITES list.

SANBI records for the region and survey results indicate the presence of eight flora species of conservation importance, none of which are threatened:

- *Acalypha caperonioides var. caperonioides (Data Deficient);*
- *Boophone disticha (Declining);*
- *Crinum bulbispermum (Declining);*
- *Eucomis autumnalis (Declining);*
- *Ilex mitis var. mitis (Declining);*
- *Khadia alticola (Rare);*
- *Lobelia erinus (Near Threatened); and*
- *Nerine platypetala* (Insufficiently known).

The following provincially protected species were recorded in the vicinity to the study area (Mpumalanga Nature Conservation Act, Act No. 10 of 1998):

- *Boophone disticha;*
- *Gladiolus sericeovillosus;*
- *Gladiolus crassifolius;*
- *Eucomis autumnalis (Declining); and*
- *Crinum bulbispermum* recorded.

Figure 5-5: Example of *Boophone disticha*

Figure 5-6: Example of *Crinum bulbispermum*

Figure 5-7: Example of *Eucomus autumnalis*

5.2.2 Alien Plant Species

Alien plant species have also been classified according to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), as published in August 2014 (GN R599 in *GG* 37886 of 1 August 2014) into the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management program.
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

A total of 18 alien plant species (AIP) were recorded on site (Table 5-1); three of these have been assigned alien plant categories according to CARA and NEMBA. These species have established due to disturbance of the soil primarily due to trampling by livestock.

Table 5-1: Alien Plant Species recorded on site.

Genus	Species	Threat Status
Amaranthaceae	*Guilleminea densa*	Alien
Fabaceae	*Acacia mearnsii*	Cat 2
Asteraceae	*Bidens pilosa*	Alien
Asteraceae	*Cirsium vulgare*	1 b
Asteraceae	*Conyza albida*	Alien
Asteraceae	*Cosmos bippinata*	Alien
Solanaceae	*Datura ferox*	1b
Myrtaceae	*Eucalyptus camuldulensis*	1b
Amaranthaceae	*Gomphrena celesioides*	Alien
Cactaceae	*Opuntia ficus-indica*	1b
Salicaceae	*Salix babylonica*	Alien
Solanaceae	*Solanum sp.*	Alien
Solanaceae	*Solanum sysimbriifolium*	1b
Asteraceae	*Tagetes minuta*	Alien
Asteraceae	*Taraxacum offininale*	Alien
Poaceae	*Trichoneura grandiglumis*	Alien
Verbenaceae	*Verbena brasiliensis*	1b
Asteraceae	*Xanthium strumarium*	1b

5.3 Fauna

5.3.1 Mammals

Actual sightings, spoor, calls, dung and nesting sites, as well as active sampling by means of motion detection cameras and Sherman traps, were used to establish the presence of mammals on the proposed project site. The evidence of dung and spoor suggests that animals were present in the area although relatively few were recorded during the surveys. Table 5-2 lists mammals that were recorded in the Renewstable Bokamoso project area. Expected species are listed in Table 5-3.

Table 5-2: Mammal Species Recorded

Scientific Name	English Name	IUCN	NEMBA TOPS List (2007)	Mpumalanga Protected (1998)
Galerella sanguinea	Slender Mongoose	Not Listed	Not Listed	Not Listed

Hystrix africaeaustralis	Porcupine	Least Concern	Not Listed	Not Listed
Lepus saxatilis	Scrub Hare	Least Concern	Not Listed	Not Listed
Cynictis penicillata	Yellow Mongoose	Least Concern	Not Listed	Not Listed
Mastomys coucha	Multimammate Mouse	Least Concern	Not Listed	Not Listed
Sylvicapra grimmia	Common Duiker	Least Concern	Not Listed	Not Listed

Table 5-3: Expected Mammal Species

Family	Scientific name	Common name	SA Red list category	PoO
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	LC	High
Bovidae	*Ourebia ourebi*	Oribi	EN	High
Canidae	*Canis mesomelas*	Black-backed Jackal	LC	High
Canidae	*Vulpes chama*	Cape Fox	LC	Moderate
Equidae	*Equus quagga*	Plains Zebra	NT	Low
Felidae	*Caracal caracal*	Caracal	LC	Low
Felidae	*Felis sp.*	Small Cats		
Felidae	*Leptailurus serval*	Serval	NT	High
Herpestidae	*Atilax paludinosus*	Marsh Mongoose	LC	High
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC	High
Herpestidae	*Herpestes sanguineus*	Slender Mongoose	LC	High
Herpestidae	*Ichneumia albicauda*	White-tailed Mongoose	LC	High
Herpestidae	*Suricata suricatta*	Meerkat	LC	High
Hyaenidae	*Proteles cristata*	Aardwolf	LC	High
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC	High
Leporidae	*Lepus sp.*	Hares		
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT	High

Family	Scientific name	Common name	SA Red list category	PoO
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC	High
Vespertilionidae	*Neoromicia somalicus*	Somali Serotine		

According to the Screening tool the following species have a medium sensitivity and could be expected to occur on site *Chrysospalax villosus, Hydrictis maculicollis* and *Ourebia ourebi ourebi*. None of these species were recorded during the site visit.

5.3.2 Herpetofauna

According to the Southern African Frog Atlas Project (SAFAP), eleven amphibian species have been confirmed to occur within QDGC 2728BB. One amphibian was encountered during this field survey by means of active searching. Suitable habitat in the form of the wetland area within the pasture and natural pasture grassland areas could yield additional species. The expected amphibian species for the area are included as (Annexure/Appendix. The species identified on site was Common River Frog (*Afrana angolensis*).

According to the Southern African Reptile Conservation Assessment (SARCA), 17 reptile species have been confirmed to occur within QDGC 2728BB (Table 5-4). This includes the Red Data species Sungazer lizard (*Cordylus giganteus*, VU) which was previously recorded during the site investigations and are also known to occur in several localities in the region. None of the expected species were recorded, primarily due to the prevailing climatic conditions during sampling, which was cold (3°C) and continual rain.

Table 5-4: Expected Herpetofauna Species

Family	Scientific name	Common name	Red list category	PoO
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC	Moderate
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	LC	High
Cordylidae	*Pseudocordylus melanotus melanotus*	Common Crag Lizard	LC	High
Cordylidae	***Smaug giganteus***	**Giant Girdled Lizard**	**VU**	**High**
Elapidae	*Hemachatus haemachatus*	Rinkhals	LC	High
Gekkonidae	*Pachydactylus vansoni*	Van Son's Gecko	LC	Moderate
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	LC	Moderate
Lacertidae	*Nucras lalandii*	Delalande's Sandveld Lizard	LC	Moderate
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	LC	Moderate
Lamprophiidae	*Lamprophis guttatus*	Spotted House Snake	LC	Moderate
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	LC	Moderate
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake	LC	High
Lamprophiidae	*Pseudaspis cana*	Mole Snake	LC	High
Leptotyphlopidae	*Leptotyphlops scutifrons conjunctus*	Eastern Thread Snake	LC	Moderate
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake	LC	High
Scincidae	*Trachylepis capensis*	Cape Skink	LC	High
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	LC	High

5.3.3 Avifauna

Please refer to the separate Avifauna specialist study, that has been completed for this project.

5.3.4 Animal Species of Conservation Concern according to the Screening Report

The animal species theme retrieved the sensitivity data for Mammals, Herpetofauna, therefore these themes were the focus from a terrestrial fauna perspective. The themes are discussed below according to the sensitivity rating assigned to them.

5.3.4.1 Medium Sensitivity

Mammalia-*Chrysospalax villosus,*

This species has a disjunct distribution in South Africa, being recorded historically only from scattered localities in Eastern Cape, KwaZulu-Natal, Gauteng and Mpumalanga; and recently in Gauteng. This species is extremely rare and secretive. Only three specimens have been collected since 1980 (Bronner 2013). They are difficult to detect owing to their preference for areas with sandy soils and dense vegetation cover.

Mammalia-*Hydrictis maculicollis*

Cape Clawless Otters occur in all major drainage systems in both summer and winter rainfall regions between the 50 mm and 1,250 mm isohyets (Nel & Somers 2007). Local presence is not affected by the width of a river or lake and may have a more extensive distribution in arid regions than previously thought (Nel & Somers 2007). Although no decline in extent of occurrence is expected, area of occupancy may decline as habitat deterioration proceeds. Cape Clawless Otters are predominantly aquatic and seldom found far from permanent water. Fresh water is an essential habitat requirement, not only for drinking but also for rinsing their fur. As otters do not have a subcutaneous layer of fat like most other aquatic mammals, they rely on their dense fur for thermoregulation. Thus, rinsing their fur in freshwater followed by rolling in sand, grass or reeds helps them cleanse their fur and restore the thermoregulatory properties.

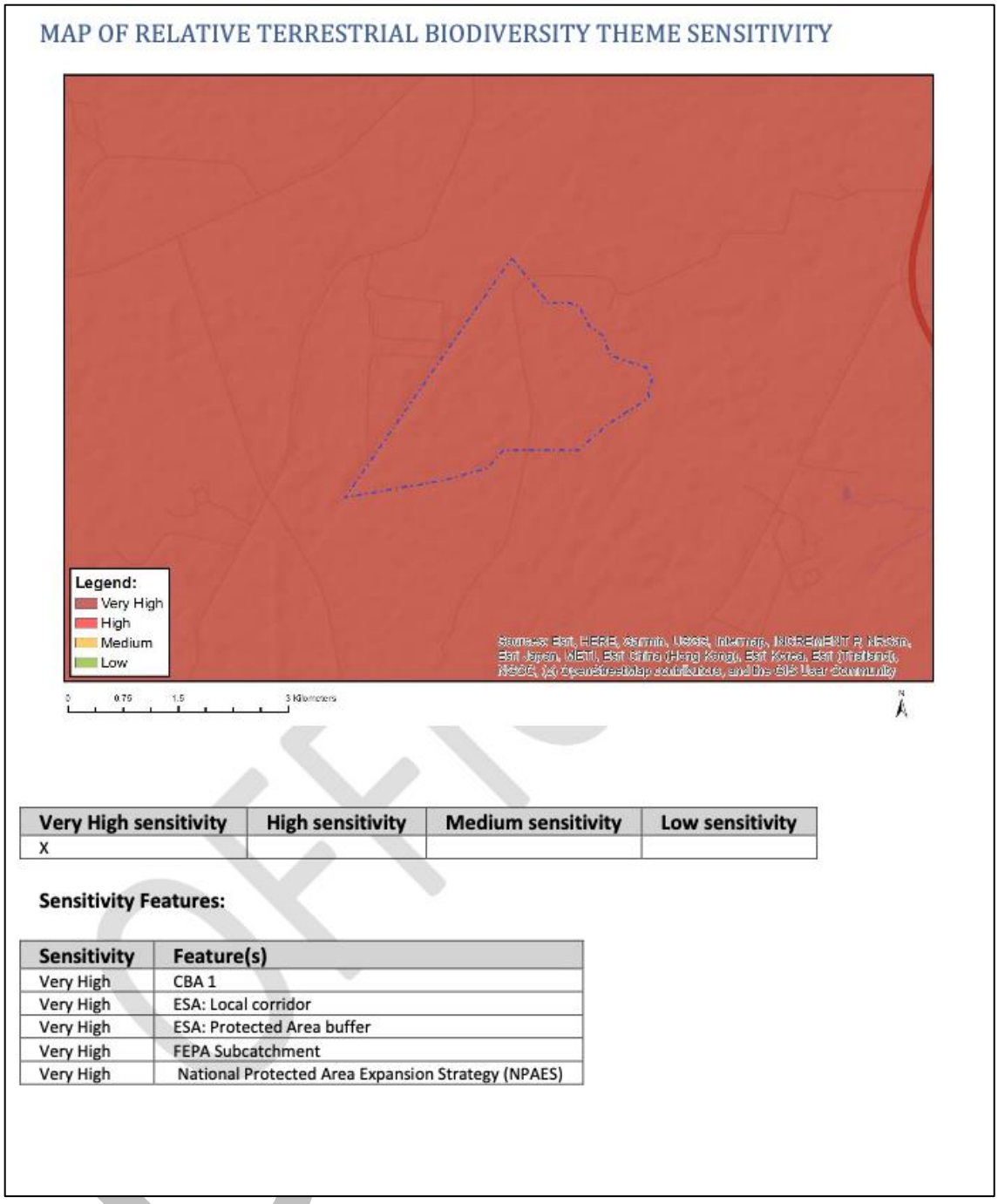
Mammalia *Ourebia ourebi ourebi*

Oribi inhabit savannah woodlands, floodplains and other open grasslands, from around sea level to about 2,200 m sl (Mpumalanga Province). They reach their highest density on floodplains and moist tropical grasslands, especially in association with large grazers. They prefer open grassland in good condition containing a mosaic of both short grass for feeding and long grass for feeding and shelter (Rowe-Rowe 1994; Perrin & Everett 1999, Stears 2015). However, within these grasslands they avoid feeding within and close to woodland patches even if these patches are small (for example, 2–6 m in diameter; Stears and Shrader 2015). Within grasslands, they are selective feeders that focus primarily on green leaves and thus maintain high quality intake year-round. For example, they have been found to select

patches of Themeda triandra grass (Shackleton & Walker 1985). Grass makes up most of their diet, with only a minor intake of forbs recorded during the wet season (Reilly et al. 1990, Stears 2015). Key grass species include, *Themeda triandra, Hyparrhenia hirta, Panicum natalense* and *Andropogon chinensis* (Viljoen 1982; Shackleton & Walker 1985; Everett et al. 1992, Stears 2015).

5.3.5 Terrestrial Biodiversity Theme

The combined terrestrial biodiversity theme sensitivity was derived to be High as indicated in the National Environmental Screening Tool (Figure 5-8), it can be downloaded at (https://screening.environment.gov.za/screeningtool/#/pages/welcome).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

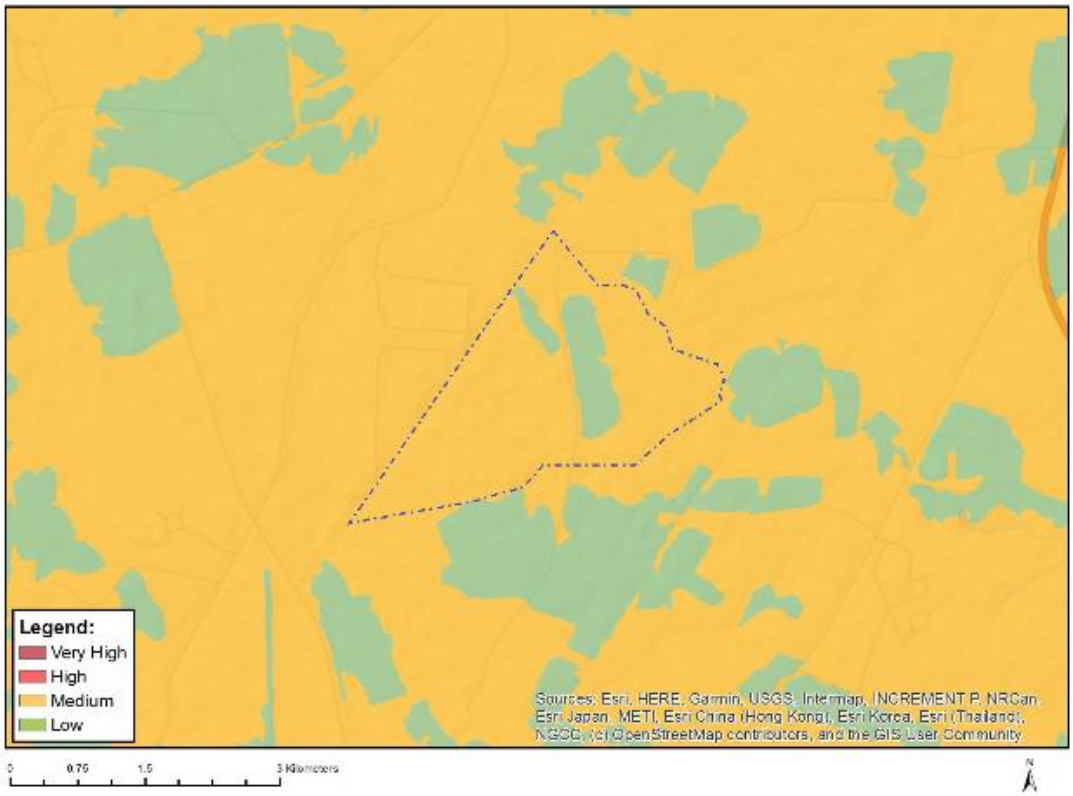
Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 1
Very High	ESA: Local corridor
Very High	ESA: Protected Area buffer
Very High	FEPA Subcatchment
Very High	National Protected Area Expansion Strategy (NPAES)

Figure 5-8: Relative Terrestrial Biodiversity Theme Sensitivity

From Figure 5-8, with the refinement of this infield assessment the sensitive features namely CBA Irreplaceable and NPAES features are confirmed.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

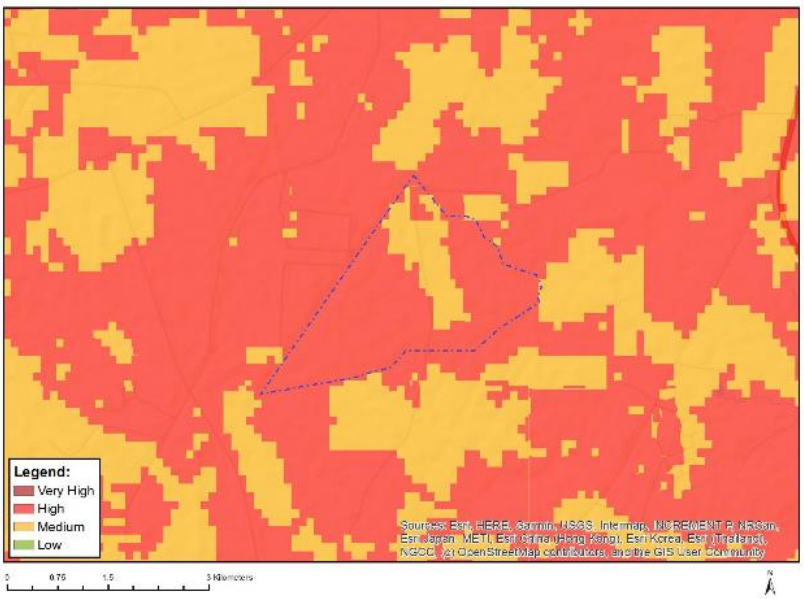
Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 851

Figure 5-9: Relative Plant species sensitivity

With the refinement of this infield assessment the sensitive features being mostly Medium/Low is confirmed.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



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

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
High	Aves-Spizocorys fringillaris
High	Aves-Sagittarius serpentarius
High	Aves-Geronticus calvus
Medium	Aves-Eupodotis senegalensis
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Tyto capensis
Medium	Aves-Circus ranivorus
Medium	Aves-Spizocorys fringillaris
Medium	Aves-Neotis denhami
Medium	Aves-Balearica regulorum
Medium	Aves-Geronticus calvus
Medium	Mammalia-Chrysospalax villosus

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Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Sensitive species 15

Figure 5-10: Relative Animal species sensitivity

With the refinement of this infield assessment the sensitive features being mostly of Avian nature can only be confirmed in the Avifauna specialist report. The four mammal species listed were not recorded during field work.

5.3.5.1 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the overall PAOI in Table 5-5 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the following section, and consideration is given to any observed or likely presence of SCC or protected species.

Table 5-5: Screening Tool Comparison

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**High**	**Medium**	Disputed – Habitat is generally intact but fragmented, transformed areas are present and SCC possible. SCC may forage in specific areas
Plant Theme	**Medium**	**Medium**	Validated - The composition, moderate species diversity and number of plant species recorded, including the protected species recorded. Landscape is fragmented.
Terrestrial Theme	**Very High**	**High**	Disputed – Certain habitat sensitivities are regarded as high sensitivity due to the role of this intact habitat to biodiversity within an area. Medium and Low sensitive areas were also delineated. Very High sensitive CBA1 and NPAES areas are present.

6 Site Ecological Importance

The ecological sensitivity map for the site is represented in Figure 6-1 for the entire project area. The moist bushveld and rocky bushveld vegetation units were allocated a medium sensitivity since these are regarded as an important habitat that should be conserved due to the likely presence of plant SCC and habitat diversity and functionality. Furthermore, the riparian delineations were assigned high ecological sensitivity due to the suitable habitat for SCC and species diversity. SCC are likely to occur in the natural areas of the project area, and provincially protected plant species were previously recorded in similar vegetation types within the greater area (Table 6-1).

Table 6-1: Evaluation of SEI of vegetation communities and habitats in the project footprint (PAOI).

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
Riparian	Valley Bottom wetlands and channel clay soils predominates, moist conditions create microclimate suitable to certain species. The current ecological condition of this habitat regarding the main driving forces, are intact, only being slightly disturbed by edge effect and infringement.	Provides unique habitat for numerous fauna and flora species. Provides greater heterogeneity in regional habitat and microclimate. and an important habitat for various fauna and flora, including the SCC.	**Medium**	**High** 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**	**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.	**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.
Natural Grassland Pastures	Impacted seasonally wet portions of land. Even though somewhat disturbed, the ecological integrity, importance and	Provides refuge and grazing areas. Aids in trapping sediment and nutrients derived from land runoff. Provides	**High** CR systems	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of	**Medium** Avoidance mitigation wherever possible.

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
	functioning of these areas play a crucial role as a water resource system locally and regionally and an important habitat for various fauna and flora, including possible SCC.	grazing and foraging resources for indigenous fauna and livestock. Important corridor for fauna dispersion within the landscape. The preservation of this system is the most important aspect to consider for the proposed project. This habitat needs to be protected and improved due to the role of this habitat as a water resource.		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.		the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.	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.
Agricultural Areas/Alien Tree Stands	Crops planted for harvesting, including Mielies and Soya beans	Provides forage areas for fauna that are tolerant of the modified landscape.	**Very Low** No natural habitat remaining.	**Very Low** Several major current negative ecological impacts.	**Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and	**Very Low** Minimisation mitigation – development activities of medium to high impact are acceptable, and restoration

Habitat Type	Description	Ecosystem Processes and Services	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
						functionality of the receptor.	activities may not be required.

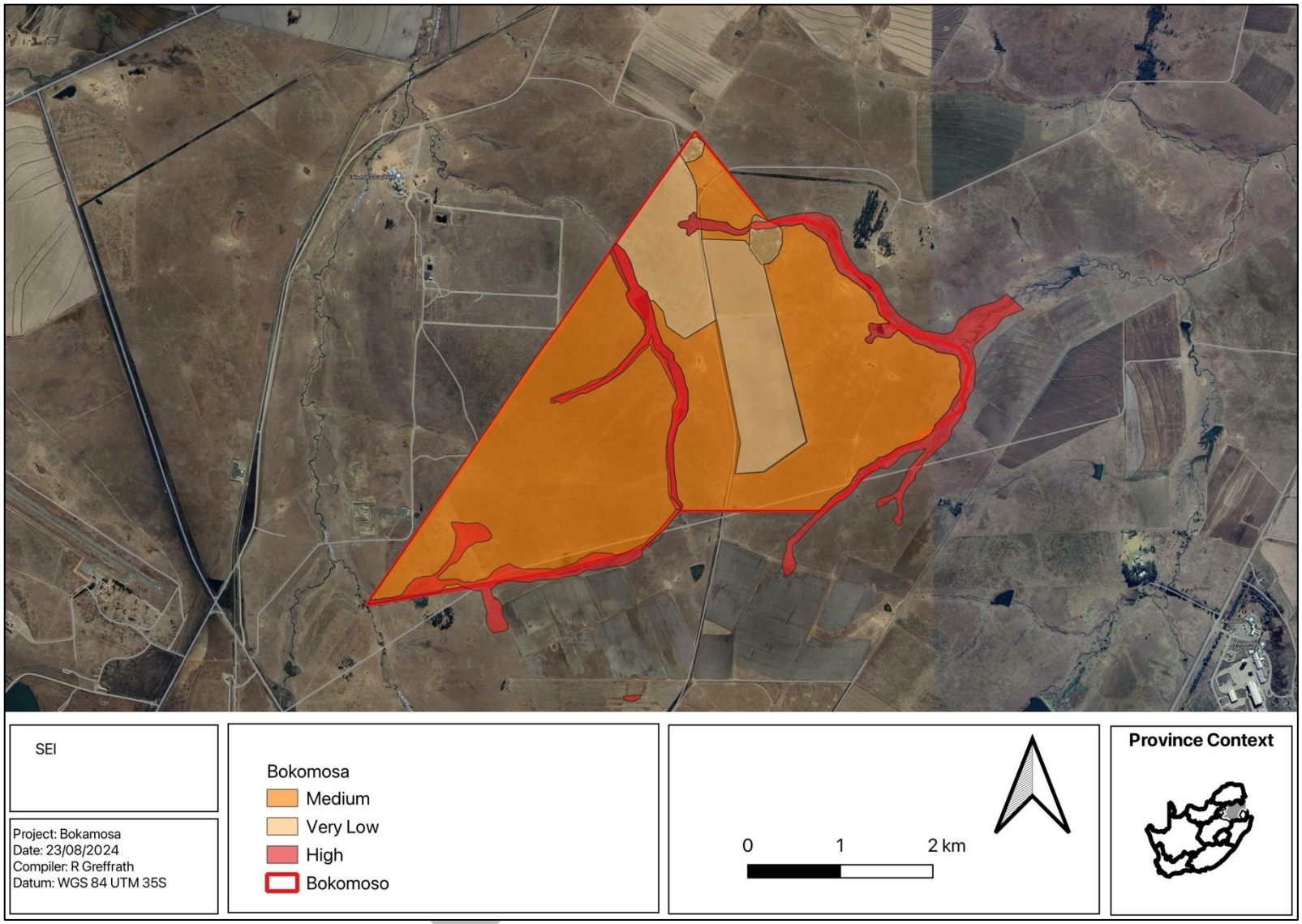

Figure 6-1: SEI for Bokamoso project area

7 Impact Assessment

The Methodology used in determining and ranking impacts and risks identified including the nature, significance, consequences, extent, duration, and probability of potential environmental impacts and risks

The assessment of impacts is largely based on the Department of Environmental Affairs and Tourism's (1998) Guideline Document: Environmental Impact Assessment Regulations. The assessment will consider the impacts arising from the proposed activities of the project both before and after the implementation of appropriate mitigation measures.

The impacts are assessed according to the criteria outlined in this section. The identified issues are ranked according to the extent, duration, magnitude (intensity), and probability. From these criteria, a significance rating is obtained, the method and formula are described below. Where possible, mitigation recommendations have been made and are presented in tabular form.

To spatially identify the different areas of importance for a species for the proposed development site and to facilitate transparent and comparable reporting of the potential impacts of development, a standardized metric for identifying site-based ecological importance for species, in relation to a proposed project with a specific footprint/PAOI and a suite of anticipated activities, is used in this section, as per guidelines. It allows for rapid spatial inspection and evaluation of the impacts of the project within the context of on-site habitats and SCC and facilitates integration of inputs from different specialist studies.

This Impact Assessment aims to identify and rate all potential direct (primary) influences and areas of potential indirect (secondary and tertiary) influences related to the PAOI.

7.1 Present Impacts to Biodiversity

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

- Historic and current land modification;
- Domestic animals;
- Farm roads and main roads (and associated traffic and wildlife road mortalities);
- Grazing and trampling of natural vegetation by livestock in certain areas;
- Alien and/or Invasive Plants (AIP);
- Unregulated Fire and Erosion; and
- Fences and associated maintenance.

7.2 Terrestrial Impact Assessment

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

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

7.2.1 Alternatives considered.

No alternatives were provided for the development.

7.2.2 Loss of Irreplaceable Resources

- Modified areas and CBA Areas will be lost, High SEI habitat will be lost,
- The likelihood of losing SCC and Protected species that exists.

7.2.3 Anticipated Impacts

The impacts anticipated for the proposed activities are considered to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (Table 7-1).

Table 7-1: Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project Activities	Secondary Impacts Anticipated
Loss of vegetation within development footprint	• Physical removal of vegetation for infrastructure construction	• Loss of flora (including possible SCC) • Increased potential for soil erosion • Habitat fragmentation • Increased potential for establishment of invasive alien vegetation
Degradation of surrounding habitats	• Dust precipitation • Spilling of hazardous waste • Water and wastewater leakages • Dumping of waste products	• Loss of flora including possible SCC • Increased potential for soil erosion • Habitat fragmentation

	• Random events such as fire (cooking fires or cigarettes)	• Increased potential for establishment of invasive alien vegetation
Direct mortality of avifauna	• Full discussion in separate report	• Loss of biodiversity including possible SCC • Loss of ecosystem services provide by avifauna species.
Spread and/or establishment of invasive alien species	• Vegetation removal • Vehicles potentially spreading seed • Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents • Vehicles potentially spreading seed • Unsanitary conditions surrounding infrastructure	• Habitat loss for native flora & fauna (including possible SCC) • Spreading of potentially dangerous diseases due to pest species • Alteration of fauna assemblages due to habitat modification
Displacement or Direct mortality of fauna	• Clearing of vegetation • Roadkill due to vehicle collision • Pollution of water resources due to dust effects, chemical spills, etc. • Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna)	• Loss of ecosystem services
Disruption/alteration of species activities (breeding, migration, feeding) due to noise and vibration	• Operation of machinery (Earth moving machinery	• Loss of recruitment • Loss of ecosystem services
Disruption/alteration of species activities (breeding, migration, feeding) due to dust	• Vehicles • Exposed stockpiles and/or dumps	• Loss of recruitment • Loss of ecosystem services

7.2.4 Unplanned Events

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

Table 7-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 7-2: Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be always available. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural Bushveld and ridge.	Appropriate/Adequate fire management plan need to be implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the road	Storm water management plan must be compiled and implemented.

7.3 Construction Phase

The construction phase activities that will have an impact on the fauna and flora are summarised below. The impacts are rated according to the effect they will have on the SEI ratings of the vegetation/habitat types. The SCC listed by the screening tool were not encountered on site and therefore a separate impact assessment is not completed for each of these taxa.

7.3.1 Impact Description

The proposed infrastructure plan for the preferred site coincides with moist grassland and Riparian areas. No animal or plant SCC were recorded within the construction footprint.

During this phase the infrastructure will be constructed, this includes roads, PV panel arrays and ancillary infrastructure, as well as fences. The main anticipated impact includes the clearing of vegetation, which will ultimately lead to habitat destruction and the proliferation of alien plant species along the roads and cleared areas as well as the severing of movement corridors for fauna, loss of fauna and flora SCCs (if present) and the fragmentation of habitat.

During the impact of site clearing, the habitats that have been rated as high and medium ecological importance will be impacted on, this activity will include the compete removal of vegetation where infrastructure will be located (see SEI).

Table 7-3 to Table 7-6 summarises the significance of potential impacts associated with the development on biodiversity before and after implementation of mitigation measures. The loss vegetation within the development footprint is rated as a ‘High’ significance and cannot be lowered significantly as the loss of vegetation is unavoidable, however can be lowered to a ‘Moderate’ risk after the implementation of mitigation measures. The degradation of surrounding habitats due to improper waste disposal, dust precipitation and spilling of

hazardous waste is a ‘High’ risk but can be lowered to a ‘Low’ risk after the implementation of mitigation measures. The destruction of threatened and protected plant species within the development footprint is rated as a ‘Moderate’ significance and can be lowered to a ‘Low’ risk after the implementation of mitigation measures.

The direct mortality of fauna due to construction phase activities is a ‘Medium’ risk but can be lowered to a ‘Low’ risk. The disruption/alteration of species activities such as reproduction, migration and feeding due to noise are vibration is a ‘Moderate’ risk can be lowered to a ‘Low’ significance. The spread and/or establishment of invasive alien species is rated as a ‘High’ risk but can be lowered to a ‘Low’ risk.

7.3.2 Impact Ratings

The impact of the loss of the vegetation, habitat and ecosystem areas on site is rated in Table 7-3 to Table 7-6.

Table 7-3: Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project Interaction 1: Loss of vegetation and habitat types

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	4 (High)	36 (Medium)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	4 (High)	36 (Medium)
Corrective Actions	• Refer to Table 9-1						

Table 7-4: Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project Interaction 2: Degradation of surrounding habitats due to improper waste disposal, dust precipitation and spilling of hazardous waste

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	6 (Moderate)	3 (Medium)	33 (Medium)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	6 (Moderate)	3 (Medium)	33 (Medium)

Corrective Actions	• Refer to Table 9-1

Table 7-5: Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project Interaction 3: Destruction of threatened and protected plant species and Direct mortality of fauna (including possible SSC).

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

Table 7-6: Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project Interaction 4: Spread and/or establishment of invasive alien species

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	4 (High)	36 (Medium)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	5 (Definite)	70 (High)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	27 (Low)
Corrective Actions	• Refer to Table 9-1						

7.4 Operations Phase

7.4.1 Project Activities Assessed

The operational phase of daily activities is anticipated to further spread the alien invasive plants, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld.

Table 7-7 summarises the significance of the operational phase impacts on biodiversity before and after implementation of mitigation measures.

The impact significance of continued fragmentation and degradation of habitats and ecosystems was rated as ‘Moderate’ but lowered to ‘Low’.

The impact significance of continued encroachment by alien invasive plant species into surrounding habitat that was disturbed, was rated as ‘Moderately’ prior to mitigation. Implementation of mitigation measures reduced the significance of the impact to an ‘Low’ level.

The direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration) was rated as a Moderate significance, which was lowered to Low, with mitigation measures.

Table 7-7: Assessment of significance of potential impacts on terrestrial biodiversity associated with the operational phase of the project Interaction 5: Continued fragmentation and degradation of habitats and ecosystems.

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

Table 7-8: Assessment of significance of potential impacts on terrestrial biodiversity associated with the operational phase of the project Interaction 6: Spread and/or further establishment of alien and/or invasive species

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

Table 7-9: Assessment of significance of potential impacts on terrestrial biodiversity associated with the operational phase of the project Interaction 7: Displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

7.5 Rehabilitation Phase

7.5.1 Project Activities Assessed

This phase is when the PV panels could be removed or replaced. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems;
- Erosion; and
- Spread of alien and/or invasive species.

Table 7-10: Assessment of significance of potential impacts on terrestrial biodiversity associated with the closure phase of the project Interaction 8: Continued fragmentation and degradation of habitats and ecosystems, and erosion

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

Table 7-11: Assessment of significance of potential impacts on terrestrial biodiversity associated with the closure phase of the project Interaction 9: Spread and/or establishment of alien and/or invasive species

Aspect	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Fauna	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Flora	No	Negative	2 (Local)	4 (Long-Term)	8 (High)	4 (High)	40 (Medium)
	Yes	Negative	1 (Site only)	4 (Long-Term)	4 (Low)	3 (Medium)	29 (Low)
Corrective Actions	• Refer to Table 9-1						

8 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 in an area or region, it is appropriate to consider the cumulative effects of development. This is like the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for terrestrial fauna and flora.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers. These include dust deposition, noise and vibration, disruption of wildlife corridors or habitat. The cumulative impact of the PV project can best be described by quantifying the current PV power plants in a 30km radius. This is completed by using the current number of active PV plants in the general project area. According to project information, three other companies have proposed projects close to or adjacent to the PAOI.

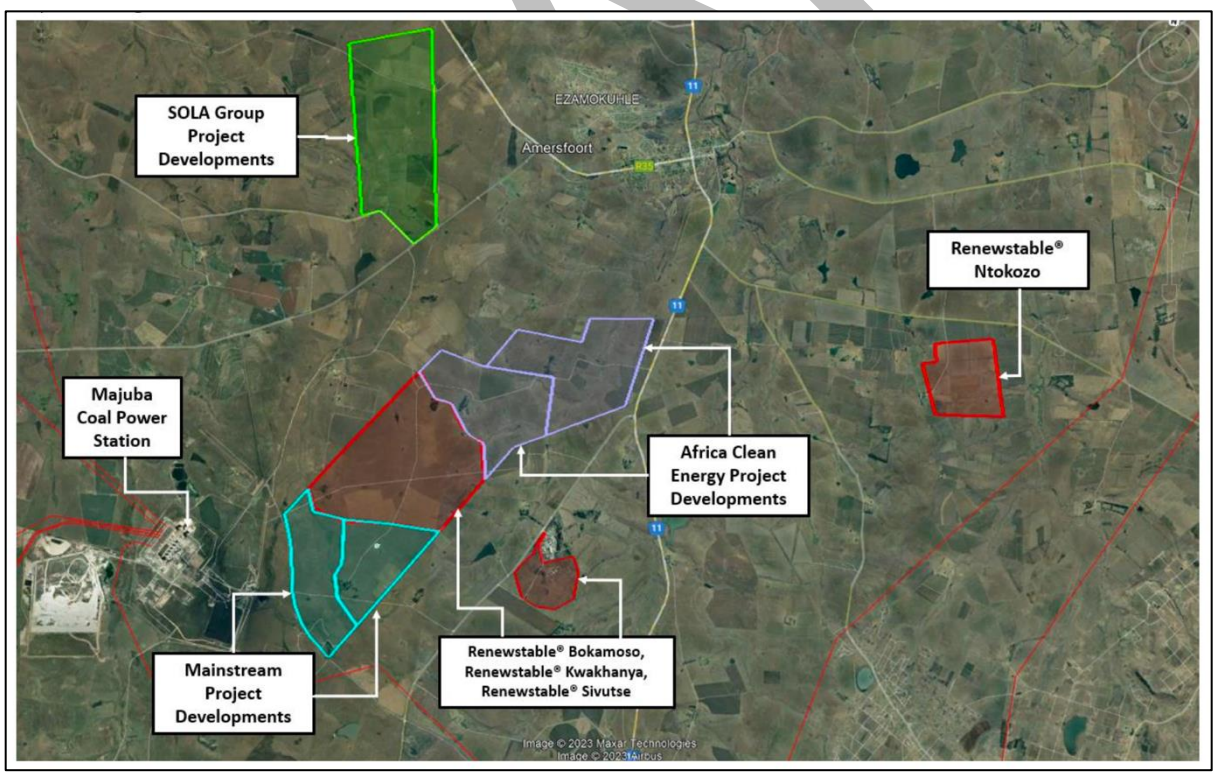

Figure 8-1: Cumulative Impact

9 Specialist Management Plan

The aim of the management outcomes is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines Table 9.1presents 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;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

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

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
All high sensitivity areas should be avoided as far as possible, and development must be prioritised in low or medium areas. Where medium areas are managed according to mitigation measures, and care is taken as SCC can be expected in these areas.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
Watercourses, drainage lines, streams and wetlands must be avoided, and a no-go buffer of 20m must be applied around them. Refer to aquatic report.	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should limited, and highly sensitive areas must be avoided, with areas not earmarked for clearance conserved. All activities must be restricted too within the low/medium sensitivity areas. No further loss of high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing

All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
All SCC as well as protected plants that are present needs a relocation or destruction permit for any individual that may be removed or destroyed due to the development. High visibility flags must be placed near any threatened/protected plants to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Development areas	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing

where protected plants cannot be avoided, must adhere to a SCC management plan, and these plants should be removed and relocated/ re-planted in similar habitats where they should be able to resprout and grow again. All protected and red-data plants should be relocated, and as many other species as possible.				
For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work other conservation projects.	Planning Phase, Pre-Construction	Project manager, Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season and any SSC should be noted, specifically in medium sensitive areas. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase

protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated				
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

Speed limits must still be enforced to ensure that road killings and erosion is limited.				
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight; • Should the holes remain overnight they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	

	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan for the project area	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority, and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes using dust suppressants. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				

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

signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.				
Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Where possible, existing access routes and walking paths must be used.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing

Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

10 Consultation Undertaken

No comments directly related to flora and fauna have been received.

11 Conclusions

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a high confidence in the information provided. The survey ensured that there was a suitable ground coverage of the PAOI and major habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed. The conservation status of the ecosystem is classified as Least Concern, and the protection level is regarded as 'Poorly Protected" Ecosystem. However, the proposed activity does overlap with terrestrial CBA Irreplaceable that coincides the Natural Pastures, planted pastures and Wetland/Riparian vegetation habitat types.

The current project area, fall within sensitive habitats and other areas of high biodiversity potential, the placement of infrastructure will have to be cognisant of the sensitivity rating assigned to each of these. The current project area would be considered to have a significant and high negative impact as it would directly affect sensitive landscapes as well as the habitat of threatened plant species and expected SCC that depend on these ecosystems.

Historically, overgrazing from cattle and mismanagement has led to the deterioration habits present. However, the high sensitivity areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging, water resource and movement corridors for fauna within the landscape.

The importance of these habitats is regarded as crucial, due to the species recorded as well as the role of this intact unique habitat to biodiversity within a very fragmented disturbed local landscape, not to mention the sensitivity according to various ecological datasets.

The high sensitivity terrestrial areas still:

- Occur within a CBA Irreplaceable;
- Overlaps an ESA protected area buffer;
- Possibly supports and protects threatened fauna and flora; and
- Support various organisms and may play a more important role in the ecosystem if left to recover from the superficial impacts.

The completion of the terrestrial biodiversity assessment confirmed the high sensitivity of certain parts of the project area and therefore corroborates the screening report with regards

to the riparian areas, further studies in the form of flood line delineation and wetland studies are expected to refine this.

The ecological integrity, importance and functioning of the high and medium sensitive areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of these habitats is the most important aspect to consider for the proposed project. These habitats need to be protected and improved due to the role of this crucial and limited habitat within this disturbed local area.

12 Impact Statement

The main expected impacts of the Renewstable Bokamoso renewable project and associated infrastructure will include the following:

- habitat loss and fragmentation, including the possible loss of floral Protected species;
- degradation of surrounding habitat;
- disturbance and displacement caused during the construction and operational phases.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a high possibility of the loss of plant and animal protected species and SCC, and these are impacts that cannot be reduced to a low risk. Considering that this area that has been identified as being of significance for biodiversity maintenance and ecological processes (CBA Irreplaceable), development may proceed but with caution. All mitigations measures prescribed herein must be considered by the issuing authority for authorisation. No fatal flaws are evident for the proposed project, especially if the high sensitivity areas and SCC are managed in terms of the objectives set forth on this report.

13 References

Branch, B. 2001. Snakes and Other Reptiles of Southern Africa. Struik Publishers, South Africa.

Bromilow, C (2010). Problem Plants and Alien Weeds of South Africa. Briza Publications. Pretoria, South Africa.

Carruthers, V. 2009. Frog and Frogging in Southern Africa. Struik Publishers (Pty) Ltd, Cape Town.

Department of Environmental Affairs and Tourism, 2005. South African Country Study, Situational Assessment undertaken to inform South Africa's National Biodiversity Strategy and Action Plan (NBSAP).

Hockey PAR, Dean WRJ and Ryan PG 2005. Roberts - Birds of southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town

Kingdon, J. 2007. The Kingdon field guide to African Mammals. A&C Black publishers, London.

Low, A.B. & Rebelo, A.G. (eds) 1996. Vegetation of South Africa, Lesotho and Swaziland.

Lötter, M., Burrows, J.E., Burgoyne, P.M. & von Staden, L. 2007. *Khadia carolinensis* (L.Bolus) L.Bolus. National Assessment: Red List of South African Plants version 2020.1.

Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Henning, G.A., Kruger, M., Pringle, E.L., Terblanche, R.F. & Williams, M.C. (eds). 2013. Conservation assessment of butterflies of South Africa, Lesothos and Swaziland: Red List and atlas. Saftronics (Pty) Ltd., Johannesburg & Animal Demography Unit, Cape Town.

Mucina, L. and Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Passmore N.I., & Carruthers, V.C. 1995. South African Frogs: A complete Guide. Southern Book Publishers, Witwatersrand University Press, South Africa.

Picker, M., C. Griffiths and Weaving. A. 2002. Field Guide to Insects. Random House Struik (Pty) Ltd

Pooley, E.S. 1998. A Field Guide to Wildflowers Kwazulu-Natal and the eastern region. Natal Flora Publishers Trust: Durban, South Africa.

Raimondo, D. 2013. Sensitive species 691 R.A. Dyer. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/11/02.

Schaminée, J. H. J. and Stortelder, A. H. F.1996. Recent developments in phytosociology. Acta Botanica Neerlandica.

South African National Biodiversity Institute. 2016. Botanical Database of Southern Africa (BODATSA) [dataset]. doi: to be assigned.

Smithers, R.H.N. 1986. South African Red Data Book – Terrestrial Mammals. South African National Scientific Programme Report no 125.

Sinclair, I., Hockey, P & Warwick, T. 1993. Sasol Voëlgids van Suider-Afrika. Struik Uitgewers, Kaapstad.

SoER: http://soer.deat.gov.za/dm_documents/TOR_Specialist_Studies_1qWDC.pdf

South African National Botanical Institute (2013). Grasslands Available Online at http://www.grasslands.org.za/.

Taylor PJ, Baxter R, Power RJ, Monadjem A, Child MF. 2016. A conservation assessment of Crocidura maquassiensis. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Victor, J.E. & Siebert, S.J. 2006. Zantedeschia pentlandii (R.Whyte ex W.Watson) Wittm. National Assessment: Red List of South African Plants version 2020.1.

von Staden, L., Lötter, M. & Winter, P.J.D. 2009. Sensitive species 691 Schinz ex Dummer. National Assessment: Red List of South African Plants version 2020.1.

von Staden, L. & Lötter, M. 2013. Sensitive species 41, Baker. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/11/02.

Waddle, J.H. 2006. Use of amphibians as ecosystem indicator species. Dissertation, University of Florida.

Williams, V.L., Raimondo, D., Crouch, N.R., Cunningham, A.B., Scott-Shaw, C.R., Lötter, M. & Ngwenya, A.M. 2008. Sensitive species 1252 Eckl. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2023/11/02.

Appendix A: CV

Mr. Rudolph Greffrath

Terrestrial Ecology Specialist

Amanzi Environmental Services

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Experience

Rudolph's current role is that of a senior terrestrial ecologist, with specific reference to fauna and flora biodiversity management. In this capacity he is responsible for the execution management of terrestrial ecological studies and the management of numerous specialists who perform this function under his leadership.

He has completed numerous standalone reports where the sole focus was terrestrial ecology as well as integrated projects such as EIA reports and ESIA reports. With regards to the latter he has extensive experience in the interrelationship of the various biotic and abiotic specialist components and the concepts that can have an impact and must be discussed across the board. These reports are used for environmental authorisations or are focused specialist studies which meet local and international standards.

He is well versed in the demands of inter disciplinary cooperation and has executed projects where a combination of qualified specialists have reported to him. He has experience in stakeholder engagement where the relationships with NGO's and other interested and affected parties must be established for the completion of projects to an acceptable international standard.

Rudolph has extensive experience in the application of the International Finance Corporation Performance standards, specifically performance standard 6. In this field he has worked within the extractive and energy sectors across Africa to ensure their compliance to IFC PS6. In applying international best practice, he has gained experience in applying the No Net Loss and Net Positive Impact approaches for Biodiversity in a business context. He has experience in applying leading practice according to the Equator Principles, Business and Biodiversity Offset Program, the Cross Sectoral Biodiversity Initiative, the Energy and Biodiversity Initiative, Fauna and Flora International, the International Petroleum Industry Environmental Conservation Association's guidance documents, the Economics of Ecosystems and Biodiversity and World Bank criteria, specifically Criteria 7.

Rudolph is responsible for off set design after a mitigation hierarchy is applied, in this regard he compiles Biodiversity Land Management Programs/Biodiversity Action Plans, where various specialist studies are collated into a working document for clients in order to aid in pre or post mining management and achieving the No Net Loss and Net Positive Impacts.

Further to this he is also involved in rehabilitation design studies which entail the planning, implementation and monitoring of vegetative rehabilitation. He is responsible for the planning of post mine land use and the various methods utilised to achieve this.

Rudolph also fulfils the role of project manager. Here he manages national and international projects across Africa, specifically west, central and southern Africa, managing a multi-disciplinary team of specialists.

Rudolph is also involved in the acquisition of regulatory permits for clients, this includes the planning of relocation strategies for protected and endangered plant species in areas where mines are to be established. This involves the planning and execution of data gathering surveys. Thereafter he manages the process involving relevant provincial and National authorities in order to obtain the specific permit that allows for a development to continue.

Information pertaining to the technical expertise of Rudolph includes knowledge and working experience in the following:

- Environmental Impact Assessments (EIAs), Basic Assessments and Environmental Management Plans (EMPs) for environmental authorisations in terms of the South African National Environmental Management Act (NEMA), 1998 (Act 107 of 1998);
- Implementation of Government Notice 320 (dated 20 March 2020) and Government Notice 1150 (dated 30 October 2020) in terms of NEMA: “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;
- Environmental pre-feasibility studies for gold tailings reclamation and iron ore and coal mining projects;
- Convention on Biological Diversity, Strategic Planning for Biodiversity, Mechanisms for implementation, Cooperation and Partnerships;
- Business and Biodiversity Off Sets program, standards on biodiversity off sets;
- International Finance Corporation (IFC) related projects across central and west Africa, applying performance standards and Equator Principles on the Environmental Health and Safety Guidelines set down by the IFC;
- International Council for Mining and Metals, Conservation of Biodiversity and Integrated approaches to land use planning;
- European Investment Bank; application of sustainability principles, such as those of the International Finance Corporation (part of the World Bank Group), in particular on biodiversity. Standard 3 on Biodiversity and Ecosystems, as part of the EIB Environmental and Social Standards;
- Environmental and Social Impact Assessments (ESIA) for Environmental Authorisation;
- Environmental off-Set studies, determining off-set liability, applying the Mitigation hierarchy and best practice in the form of IFC performance standard 6.
- Large Mammal Monitoring Projects;
- Biodiversity Assessments including Mammalia, Avifauna, Herpetofauna and Arthropoda;

- Environmental Impact Assessments (EIA) based Impacts to the terrestrial Ecological environment;
- Geographic Information Systems (GIS), frequent use of ArcGIS, QGIS.
- Biodiversity Action Plan, design and Implementation;
- Biodiversity and Land Management Programs;
- Protected plant species management strategies planning and implementation;
- Monitoring of rehabilitation success by means of vegetation establishment;
- Rehabilitation planning;
- Environmental auditing of rehabilitated areas;
- Project management of ecological specialist studies;
- Planning and design of Rehabilitation off-set strategies.

Tertiary Education

- 2005-2006: B-tech Degree in Nature Conservation, Nelson Mandela Metropolitan University (NMMU).
- 2001- 2004: National Diploma in Nature Conservation, Nelson Mandela Metropolitan University (NMMU).

Skills

- Project management and leadership skills;
- Sound organizational, good people skills;
- Good verbal presentation, written communication, language skills and excellent report writing skills;
- Researching, analysing and integrating data;
- Working experience in Environmental Impact Assessment processes and knowledge of the Environmental Impact Assessment Regulations 2010 & 2014;
- Understanding of the Municipal Land Use application processes;
- Knowledge and experience in the National Environmental Management Act, (No. 107 of 1998), as amended;
- Knowledge and working experience of the National Environmental Management: Biodiversity (Act no, 10 of 2004) and the National Management Protected Areas (Act no. 57 of 2003);
- Experience in working with multi-stakeholder groups, organizations;
- Working experience in Geographical Information Systems;
- Advanced computer skills (Microsoft (MS) word, MS excel, MS PowerPoint, Internet & Email, GIS and Remote Sensing), QGIS;
- Ecostatus classification, specifically Riparian Vegetation Response Index.

Training

- Measurements of Biodiversity at the University of the Free State, led by Prof. M. T. Seaman. September 2008.
- IFC performance standards implementation training, Lee-Ann Joubert, January 2013.
- Bird Identification course led by Ettiene Marais November 2009.
- Introduction to VEGRAI and Eco-classification led by Dr. James Mackenzie December 2009 and January 2018.
- Dangerous snake handling and snake bite treatment with Mike Perry 2011, 2015.
- Rehabilitation of Mine impacted areas, with Fritz van Oudshoorn, Dr Wayne Truter and Gustav le Roux 2011.
- First aid Level 2, School of Emergency and Critical Care, Netcare, 2013
- First aid Level 2, National First Aid Academy, 2017.

Projects

The following project list is indicative of Rudolph's experience, providing insight into the various projects, roles and locations he has worked in.

Project	Location	Client	Main project features	Positions held	Activities performed
Tongon Off-set project	Ivory Coast	Randgold Resources Limited	Applying IFC, BBOP and other best practice guidelines in designing an Off-set project for the residual Impact of the Tongon Gold Mine	Project Lead Technical Specialist	
Annual Large Mammal Monitoring in the Niokola Koba National Park.	Senegal	DPN Direction des Parcs Nationaux du Sénégal	Applying Aerial, Ground and vehicle, large mammal monitoring techniques in the National Park.	Aerial game counter, project specialist.	Training of field staff, recording of data in the vehicle and aerial surveys, Report reviews
Biodiversity Management for Massawa Gold Mine	Senegal	Barrick Gold	With the discovery of Western Chimpanzees in close proximity to the project area, detailed field work was conducted by world renowned experts. Leading to various mitigation measures.	Project Manager	Project design, Specialist Management. Producing Synthesis reports on results of specialists. Designing Monitoring Off sets and management plans
Mmamabula Energy Project (MEP).	Botswana	CIC energy	Construction of a railway, opencast mine, wellfield, conveyors, addits, housing.	Technical Specialist Ecologist	IFC level specialist studies, Fauna and Flora surveys for the project features, including impact assessments, management plans. Alien eradication plans.
Orlight Solar PV Power Project	South Africa	Orlight SA	Environmental Impact Assessment (EIA) process for five proposed Solar Photovoltaic (PV) Power Plants	Technical Specialist Ecologist	EIA Terrestrial Biodiversity studies, IFC level specialist studies

Twenty Nine Capitol	South Africa	CSIR	Photovoltaic Power stations	Technical Specialist Ecologist	EIA Terrestrial Biodiversity studies, in support of the EIA report, IFC level specialist studies
Tongan Biodiversity Land Management Plan	Ivory Coast	Randgold Resources Limited	Design, compilation and implementation of the BLMP	Technical Specialist Ecologist, Project Manager	Fauna and Flora surveys for the BLMP, compilation of BLMP. Alien eradication plans. IFC level specialist studies
Kibali Gold mine	DRC Congo	Randgold Resources Limited	Gold mine infrastructure	Technical Specialist Ecologist	Technical specialist, fauna and flora, for the Kibali ESIA. IFC level specialist studies
Kibali Gold mine	DRC Congo	Randgold Resources Limited	ESIA Update	Technical Specialist Ecologist	Technical specialist, fauna and flora, for the Kibali ESIA. IFC level specialist studies
Nzoro Hydroelectric station	DRC Congo	Randgold Resources Limited	Hydroelectric plant	Technical Specialist Ecologist	Technical specialist, fauna and flora, for the Nzoro ESIA. IFC level specialist studies.
Loulo Biodiversity Land Management Plan	Mali	Randgold Resources Limited	Design, compilation and implementation of the BLMP	Technical Specialist Ecologist, Project Manager	Fauna and Flora surveys for the project features, compilation of BLMP.
Koidu Diamond Mine	Sierra Leone	Koidu Resources	Construction of new open pit	Technical Specialist Ecologist	Technical specialist, fauna and flora, for the Koidu ESIA. IFC level specialist studies, terrestrial ecology management plans

Resource Generation	South Africa	Temo Coal	Coal mine/Railway Line	Technical Specialist Ecologist	Fauna and Flora surveys, Protected plant species management plans, Permitting and Rehabilitation design.
Impunzi Rehabilitation monitoring	South Africa	Glencore	Monitoring of rehabilitation success and suggested management measures	Technical Specialist Flora specialist, Project manager	Vegetation surveys, rehabilitation monitoring. Alien eradication plan.

Professional Registration

- South African Council for Natural Scientific Professions, *Professional Natural Scientist* in the field of practice *Conservation Science,* registration number, *400018/17*;
- IAIA, International Association for Impact assessments;
- Botanical Society of South Africa;
- The Land Rehabilitation Society of Southern Africa, LARSA (Membership No. 0085);
- Grassland Society of Southern Africa.

Employment

- 2021- current: Founder, Principal Biodiversity Specialist, RJG Consulting, Johannesburg.
- 2020-2021: Senior Biodiversity Specialist ERM, Johannesburg
- 2016-2019: Digby Wells Environmental, Johannesburg, International. Manager: Group Biodiversity.
- 2011-2016: Digby Wells Environmental, Johannesburg, International. Unit Manager: Fauna, Flora and Wetlands.
- 2009-2011: Digby Wells and Associates, Johannesburg, South Africa. Senior Consultant.
- 2006 – 2009: Digby Wells and Associates, Johannesburg, South Africa. Consultant.
- 2002 - 2003: Shamwari Game Reserve, Eastern Cape, South Africa.
- 2001: Kop-Kop Geotechnical instrumentation specialists, Johannesburg, South Africa.

Publications

- Biodiversity Action Plans for faunal habitat maintenance and expansion in mining. Poster presented at the 48th Annual Grassland Society of Southern Africa (GSSA) conference.

- Limpopo Province South Africa – the Biodiversity perspective Paper presentation, presented at the Limpopo Minerals Conference and Trade show, hosted by the fossil fuel foundation and LEDET, 2015/11/11.
- Sustainability and Biodiversity Strategic Planning, Randgold Resources, 2018.
- Niokola Koba National Park, Senegal. Annual Census of Large Mammals, contributing author, 2018

Appendix B: Expected Plant Species

Family	*Genus*	*Sp1*	IUCN	Ecology
Cyperaceae	*Abildgaardia*	*ovata*		Indigenous
Euphorbiaceae	*Acalypha*	*caperonioides*		Indigenous
Amaranthaceae	*Achyranthes*	*aspera*		Not indigenous; Naturalised
Asteraceae	*Afroaster*	*hispidus*		Indigenous
Rosaceae	*Agrimonia*	*procera*		Unconfirmed
Poaceae	*Agrostis*	*lachnantha*		Indigenous
Lamiaceae	*Ajuga*	*ophrydis*		Indigenous
Hyacinthaceae	*Albuca*	*virens*		Indigenous
Poaceae	*Alloteropsis*	*semialata*		Indigenous
Asphodelaceae	*Aloe*	*ecklonis*		Indigenous
Amaranthaceae	*Alternanthera*	*pungens*		Not indigenous; Naturalised
Amaranthaceae	*Amaranthus*	*hybridus*		Not indigenous; Naturalised
Amaranthaceae	*Amaranthus*	*capensis*		Indigenous; Endemic
Lythraceae	*Ammannia*	*sagittifolia*		Indigenous
Poaceae	*Andropogon*	*schirensis*		Indigenous
Apocynaceae	*Anisotoma*	*pedunculata*		Indigenous
Fabaceae	*Argyrolobium*	*nigrescens*		Indigenous
Poaceae	*Aristida*	*junciformis*		Indigenous
Poaceae	*Aristida*	*bipartita*		Indigenous
Poaceae	*Aristida*	*adscensionis*		Indigenous
Poaceae	*Aristida*	*congesta*		Indigenous
Asteraceae	*Arrowsmithia*	*tenuifolia*		Indigenous; Endemic
Poaceae	*Arundinella*	*nepalensis*		Indigenous
Asparagaceae	*Asparagus*	*asparagoides*		Indigenous
Asteraceae	*Athrixia*	*phylicoides*		Indigenous
Poaceae	*Avena*	*sativa*		Not indigenous; Naturalised; Invasive
Asteraceae	*Berkheya*	*radula*		Indigenous
Asteraceae	*Berkheya*	*echinacea*		Indigenous
Asteraceae	*Berkheya*	*pinnatifida*		Indigenous; Endemic
Asteraceae	*Berkheya*	*robusta*		Indigenous
Asteraceae	*Bidens*	*formosa*		Present
Poaceae	*Brachiaria*	*serrata*		Indigenous
Poaceae	*Brachiaria*	*eruciformis*		Indigenous
Poaceae	*Bromus*	*hordeaceus*		Not indigenous; Naturalised; Invasive
Bryaceae	*Bryum*	*argenteum*		Indigenous
Cyperaceae	*Bulbostylis*	*humilis*		Indigenous
Leucobryaceae	*Campylopus*	*introflexus*		Indigenous
Cannabaceae	*Cannabis*	*sativa*		Not indigenous; Naturalised
Poaceae	*Catalepis*	*gracilis*		Indigenous
Scrophulariaceae	*Chaenostoma*	*neglectum*		Indigenous
Scrophulariaceae	*Chaenostoma*	*floribundum*		Indigenous
Pteridaceae	*Cheilanthes*	*eckloniana*		Indigenous

Poaceae	*Chloris*	*virgata*		Indigenous
Agavaceae	*Chlorophytum*	*fasciculatum*		Indigenous
Agavaceae	*Chlorophytum*	*haygarthii*		Indigenous
Asteraceae	*Cineraria*	*aspera*		Indigenous
Peraceae	*Clutia*	*natalensis*		Indigenous
Colchicaceae	*Colchicum*	*striatum*		Indigenous
Commelinaceae	*Commelina*	*africana*		Indigenous
Convolvulaceae	*Convolvulus*	*sagittatus*		Indigenous
Asteraceae	*Conyza*	*podocephala*		Indigenous
Asteraceae	*Cotula*	*anthemoides*		Indigenous
Crassulaceae	*Crassula*	*dependens*		Indigenous
Crassulaceae	*Crassula*	*alba*		Indigenous
Crassulaceae	*Crassula*	*lanceolata*		Indigenous
Amaryllidaceae	*Crinum*	*bulbispermum*		Indigenous
Orobanchaceae	*Cycnium*	*tubulosum*		Indigenous
Poaceae	*Cynodon*	*transvaalensis*		Indigenous
Poaceae	*Cynodon*	*dactylon*		Indigenous
Poaceae	*Cynodon*	*hirsutus*		Indigenous
Boraginaceae	*Cynoglossum*	*austroafricanum*		Indigenous
Boraginaceae	*Cynoglossum*	*hispidum*		Indigenous
Cyperaceae	*Cyperus*	*rotundus*		Indigenous
Cyperaceae	*Cyperus*	*esculentus*		Indigenous
Cyperaceae	*Cyperus*	*congestus*		Indigenous
Cyperaceae	*Cyperus*	*difformis*		Indigenous
Cyperaceae	*Cyperus*	*rigidifolius*		Indigenous
Poaceae	*Dactylis*	*glomerata*		Not indigenous; Naturalised; Invasive
Asteraceae	*Denekia*	*capensis*		Indigenous
Caryophyllaceae	*Dianthus*	*basuticus*		Indigenous
Caryophyllaceae	*Dianthus*	*mooiensis*		Indigenous; Endemic
Scrophulariaceae	*Diclis*	*rotundifolia*		Indigenous
Iridaceae	*Dierama*	*insigne*		Indigenous
Poaceae	*Digitaria*	*eylesii*		Indigenous
Poaceae	*Digitaria*	*ternata*		Indigenous
Poaceae	*Digitaria*	*tricholaenoides*		Indigenous
Ebenaceae	*Diospyros*	*lycioides*		Indigenous
Ebenaceae	*Diospyros*	*austroafricana*		Indigenous
Hyacinthaceae	*Dipcadi*	*viride*		Indigenous
Orchidaceae	*Disa*	*cooperi*		Indigenous
Amaranthaceae	*Dysphania*	*schraderiana*		Indigenous
Poaceae	*Echinochloa*	*colona*		Indigenous
Boraginaceae	*Echium*	*vulgare*		Not indigenous; Naturalised; Invasive
Boraginaceae	*Echium*	*plantagineum*		Not indigenous; Naturalised; Invasive
Poaceae	*Eleusine*	*multiflora*		Not indigenous; Naturalised
Poaceae	*Eleusine*	*coracana*		Indigenous
Hypoxidaceae	*Empodium*	*elongatum*		Indigenous
Poaceae	*Eragrostis*	*racemosa*		Indigenous
Poaceae	*Eragrostis*	*plana*		Indigenous
Poaceae	*Eragrostis*	*patentissima*		Indigenous

Poaceae	*Eragrostis*	*cilianensis*		Indigenous
Poaceae	*Eragrostis*	*micrantha*		Indigenous
Poaceae	*Eragrostis*	*chloromelas*		Indigenous
Poaceae	*Eragrostis*	*curvula*		Indigenous
Poaceae	*Eragrostis*	*capensis*		Indigenous
Poaceae	*Eragrostis*	*planiculmis*		Indigenous
Poaceae	*Eragrostis*	*sclerantha*		Indigenous
Poaceae	*Eragrostis*	*tef*		Not indigenous; Naturalised
Fabaceae	*Eriosema*	*ellipticifolium*		Indigenous
Brassicaceae	*Erucastrum*	*austroafricanum*		Indigenous
Ebenaceae	*Euclea*	*crispa*		Indigenous
Euphorbiaceae	*Euphorbia*	*prostrata*		Not indigenous; Naturalised
Euphorbiaceae	*Euphorbia*	*striata*		Indigenous
Euphorbiaceae	*Euphorbia*	*clavarioides*		Indigenous
Euphorbiaceae	*Euphorbia*	*inaequilatera*		Indigenous
Convolvulaceae	*Falkia*	*oblonga*		Indigenous
Asteraceae	*Felicia*	*muricata*		Indigenous
Poaceae	*Fingerhuthia*	*sesleriiformis*		Indigenous
Rubiaceae	*Galium*	*capense*		Indigenous
Asteraceae	*Garuleum*	*woodii*		Indigenous
Asteraceae	*Gazania*	*krebsiana*		Indigenous
Asteraceae	*Geigeria*	*burkei*		Indigenous; Endemic
Geraniaceae	*Geranium*	*multisectum*		Indigenous
Geraniaceae	*Geranium*	*wakkerstroomianum*		Indigenous
Iridaceae	*Gladiolus*	*crassifolius*		Indigenous
Iridaceae	*Gladiolus*	*dalenii*		Indigenous
Thymelaeaceae	*Gnidia*	*nodiflora*		Indigenous; Endemic
Scrophulariaceae	*Gomphostigma*	*virgatum*		Indigenous
Celastraceae	*Gymnosporia*	*buxifolia*		Indigenous
Asteraceae	*Haplocarpha*	*nervosa*		Indigenous
Asteraceae	*Haplocarpha*	*scaposa*		Indigenous
Poaceae	*Harpochloa*	*falx*		Indigenous
Asteraceae	*Helichrysum*	*psilolepis*		Indigenous
Asteraceae	*Helichrysum*	*nudifolium*		Indigenous
Asteraceae	*Helichrysum*	*mixtum*		Indigenous
Asteraceae	*Helichrysum*	*miconiifolium*		Indigenous
Asteraceae	*Helichrysum*	*pilosellum*		Indigenous
Asteraceae	*Helichrysum*	*melanacme*		Indigenous
Asteraceae	*Helichrysum*	*ammitophilum*		Indigenous
Asteraceae	*Helichrysum*	*cooperi*		Indigenous
Asteraceae	*Helichrysum*	*monticola*		Indigenous
Asteraceae	*Helichrysum*	*rugulosum*		Indigenous
Asteraceae	*Helichrysum*	*cephaloideum*		Indigenous
Boraginaceae	*Heliotropium*	*ciliatum*		Indigenous
Malvaceae	*Hermannia*	*jacobeifolia*		Indigenous
Malvaceae	*Hermannia*	*grandistipula*		Indigenous
Malvaceae	*Hermannia*	*geniculata*		Indigenous
Malvaceae	*Hermannia*	*coccocarpa*		Indigenous

Malvaceae	*Hibiscus*	*microcarpus*		Indigenous
Asteraceae	*Hilliardiella*	*aristata*		Indigenous
Poaceae	*Hyparrhenia*	*anamesa*		Indigenous
Poaceae	*Hyparrhenia*	*hirta*		Indigenous
Hypericaceae	*Hypericum*	*lalandii*		Indigenous
Asteraceae	*Hypochaeris*	*radicata*		Not indigenous; Naturalised
Hypoxidaceae	*Hypoxis*	*iridifolia*		Indigenous
Poaceae	*Imperata*	*cylindrica*		Indigenous
Fabaceae	*Indigofera*	*hilaris*		Indigenous
Fabaceae	*Indigofera*	*evansiana*		Indigenous
Convolvulaceae	*Ipomoea*	*oblongata*		Indigenous
Convolvulaceae	*Ipomoea*	*crassipes*		Indigenous
Convolvulaceae	*Ipomoea*	*purpurea*		Not indigenous; Naturalised; Invasive
Scrophulariaceae	*Jamesbrittenia*	*silenoides*		Indigenous; Endemic
Scrophulariaceae	*Jamesbrittenia*	*aurantiaca*		Indigenous
Aizoaceae	*Khadia*	*alticola*		Indigenous; Endemic
Asphodelaceae	*Kniphofia*	*typhoides*		Indigenous; Endemic
Asphodelaceae	*Kniphofia*	*albescens*		Indigenous; Endemic
Poaceae	*Koeleria*	*capensis*		Indigenous
Rubiaceae	*Kohautia*	*caespitosa*		Indigenous
Rubiaceae	*Kohautia*	*amatymbica*		Indigenous
Cyperaceae	*Kyllinga*	*erecta*		Indigenous
Asteraceae	*Lactuca*	*inermis*		Indigenous
Thymelaeaceae	*Lasiosiphon*	*caffer*		Indigenous
Thymelaeaceae	*Lasiosiphon*	*burchellii*		Indigenous
Hyacinthaceae	*Ledebouria*	*ovatifolia*		Indigenous
Poaceae	*Leersia*	*hexandra*		Indigenous
Fabaceae	*Leobordea*	*eriantha*		Indigenous
Fabaceae	*Leobordea*	*divaricata*		Indigenous
Lamiaceae	*Leonotis*	*martinicensis*		Indigenous
Lamiaceae	*Leonotis*	*ocymifolia*		Indigenous
Limeaceae	*Limeum*	*viscosum*		Indigenous
Limeaceae	*Limeum*	*pauciflorum*		Indigenous; Endemic
Scrophulariaceae	*Limosella*	*longiflora*		Indigenous
Lobeliaceae	*Lobelia*	*erinus*		Indigenous
Poaceae	*Lolium*	*perenne*		Not indigenous; Naturalised; Invasive
Poaceae	*Lolium*	*multiflorum*		Not indigenous; Naturalised; Invasive
Fabaceae	*Medicago*	*laciniata*		Not indigenous; Naturalised
Fabaceae	*Melolobium*	*calycinum*		Indigenous
Poaceae	*Microchloa*	*caffra*		Indigenous
Phrymaceae	*Mimulus*	*gracilis*		Indigenous
Malvaceae	*Modiola*	*caroliniana*		Not indigenous; Naturalised
Poaceae	*Monocymbium*	*ceresiiforme*		Indigenous
Geraniaceae	*Monsonia*	*attenuata*		Indigenous
Iridaceae	*Moraea*	*stricta*		Indigenous
Iridaceae	*Moraea*	*pallida*		Indigenous
Scrophulariaceae	*Nemesia*	*umbonata*		Indigenous
Scrophulariaceae	*Nemesia*	*fruticans*		Indigenous

Asteraceae	*Nidorella*	*resedifolia*		Indigenous
Asteraceae	*Nidorella*	*anomala*		Indigenous
Onagraceae	*Oenothera*	*rosea*		Not indigenous; Naturalised; Invasive
Oxalidaceae	*Oxalis*	*corniculata*		Not indigenous; Naturalised; Invasive
Oxalidaceae	*Oxalis*	*depressa*		Indigenous
Apocynaceae	*Pachycarpus*	*grandiflorus*		Indigenous
Geraniaceae	*Pelargonium*	*luridum*		Indigenous
Geraniaceae	*Pelargonium*	*malacoides*		Indigenous
Pteridaceae	*Pellaea*	*calomelanos*		Indigenous
Ranunculaceae	*Peltocalathos*	*baurii*		Indigenous
Poaceae	*Pennisetum*	*sphacelatum*		Indigenous
Poaceae	*Pennisetum*	*villosum*		Not indigenous; Naturalised; Invasive
Rubiaceae	*Pentanisia*	*prunelloides*		Indigenous
Poaceae	*Phragmites*	*australis*		Indigenous
Solanaceae	*Physalis*	*angulata*		Not indigenous; Naturalised; Invasive
Plantaginaceae	*Plantago*	*lanceolata*		Indigenous
Plantaginaceae	*Plantago*	*virginica*		Not indigenous; Naturalised
Plantaginaceae	*Plantago*	*myosuros*		Not indigenous; Naturalised
Poaceae	*Poa*	*annua*		Not indigenous; Naturalised
Poaceae	*Pogonarthria*	*squarrosa*		Indigenous
Caryophyllaceae	*Pollichia*	*campestris*		Indigenous
Polygalaceae	*Polygala*	*gracilenta*		Indigenous
Polygalaceae	*Polygala*	*gerrardii*		Indigenous; Endemic
Polygalaceae	*Polygala*	*hottentotta*		Indigenous
Polygalaceae	*Polygala*	*amatymbica*		Indigenous
Polygalaceae	*Polygala*	*uncinata*		Indigenous
Polygonaceae	*Polygonum*	*aviculare*		Not indigenous; Naturalised
Portulacaceae	*Portulaca*	*oleracea*		Not indigenous; Naturalised
Asteraceae	*Pseudognaphalium*	*luteoalbum*		Cryptogenic
Lamiaceae	*Rabdosiella*	*calycina*		Indigenous
Ranunculaceae	*Ranunculus*	*multifidus*		Indigenous
Ranunculaceae	*Ranunculus*	*dregei*		Indigenous
Fabaceae	*Rhynchosia*	*totta*		Indigenous
Fabaceae	*Rhynchosia*	*adenodes*		Indigenous
Ricciaceae	*Riccia*	*atropurpurea*		Indigenous
Ricciaceae	*Riccia*	*okahandjana*		Indigenous
Ricciaceae	*Riccia*	*nigrella*		Indigenous
Brassicaceae	*Rorippa*	*nudiuscula*		Indigenous
Polygonaceae	*Rumex*	*acetosella*		Not indigenous; Naturalised
Polygonaceae	*Rumex*	*sagittatus*		Indigenous
Polygonaceae	*Rumex*	*steudelii*		Indigenous
Polygonaceae	*Rumex*	*crispus*		Not indigenous; Naturalised; Invasive
Lamiaceae	*Salvia*	*repens*		Indigenous
Dipsacaceae	*Scabiosa*	*columbaria*		Indigenous
Asteraceae	*Schistostephium*	*crataegifolium*		Indigenous
Asteraceae	*Schkuhria*	*pinnata*		Not indigenous; Naturalised
Cyperaceae	*Schoenoplectus*	*muriculatus*		Indigenous
Anacardiaceae	*Searsia*	*discolor*		Indigenous

Anacardiaceae	*Searsia*	*dentata*		Indigenous
Gentianaceae	*Sebaea*	*sedoides*		Indigenous
Scrophulariaceae	*Selago*	*procera*		Indigenous
Scrophulariaceae	*Selago*	*densiflora*		Indigenous
Asteraceae	*Senecio*	*inaequidens*		Indigenous
Asteraceae	*Senecio*	*harveianus*		Indigenous
Asteraceae	*Senecio*	*erubescens*		Indigenous
Asteraceae	*Senecio*	*laevigatus*		Indigenous; Endemic
Asteraceae	*Senecio*	*hieracioides*		Indigenous
Asteraceae	*Senecio*	*coronatus*		Indigenous
Asteraceae	*Senecio*	*crenatus*		Indigenous; Endemic
Asteraceae	*Senecio*	*paucicalyculatus*		Indigenous
Asteraceae	*Senecio*	*achilleifolius*		Indigenous
Poaceae	*Setaria*	*incrassata*		Indigenous
Poaceae	*Setaria*	*nigrirostris*		Indigenous
Caryophyllaceae	*Silene*	*burchellii*		Indigenous
Brassicaceae	*Sisymbrium*	*turczaninowii*		Indigenous
Solanaceae	*Solanum*	*retroflexum*		Indigenous
Solanaceae	*Solanum*	*panduriforme*		Indigenous
Asteraceae	*Sonchus*	*asper*		Not indigenous; Naturalised; Invasive
Poaceae	*Sporobolus*	*discosporus*		Indigenous
Asteraceae	*Stoebe*	*vulgaris*		Indigenous
Asteraceae	*Tagetes*	*minuta*		Not indigenous; Naturalised; Invasive
Asteraceae	*Taraxacum*	*hamatiforme*		Not indigenous; Naturalised
Fabaceae	*Tephrosia*	*semiglabra*		Indigenous
Poaceae	*Themeda*	*triandra*		Indigenous
Acanthaceae	*Thunbergia*	*atriplicifolia*		Indigenous
Asteraceae	*Tolpis*	*capensis*		Indigenous
Asphodelaceae	*Trachyandra*	*gerrardii*		Indigenous
Poaceae	*Tragus*	*racemosus*		Indigenous
Poaceae	*Trichoneura*	*grandiglumis*		Indigenous
Fabaceae	*Trifolium*	*africanum*		Indigenous
Poaceae	*Trisetopsis*	*imberbis*		Indigenous
Iridaceae	*Tritonia*	*gladiolaris*		Indigenous
Typhaceae	*Typha*	*capensis*		Indigenous
Poaceae	*Urochloa*	*panicoides*		Indigenous
Valerianaceae	*Valeriana*	*capensis*		Indigenous
Scrophulariaceae	*Verbascum*	*thapsus*		Not indigenous; Cultivated; Naturalised; Invasive
Verbenaceae	*Verbena*	*rigida*		Not indigenous; Naturalised; Invasive
Plantaginaceae	*Veronica*	*anagallis-aquatica*		Indigenous
Fabaceae	*Vigna*	*vexillata*		Indigenous
Campanulaceae	*Wahlenbergia*	*undulata*		Indigenous
Solanaceae	*Withania*	*somnifera*		Indigenous
Convolvulaceae	*Xenostegia*	*tridentata*		Indigenous
Apocynaceae	*Xysmalobium*	*undulatum*		Indigenous
Araceae	*Zantedeschia*	*albomaculata*		Indigenous
Asteraceae	*Zinnia*	*peruviana*		Not indigenous; Naturalised; Invasive

Appendix C: Plant Species Recorded

Genus	Species	Threat Status
Amaranthaceae	*Guilleminea densa*	Alien
Fabaceae	*Acacia mearnsii*	Alien
Euphorbiaceae	*Acalypha angustata*	LC
Lamiaceae	*Acrotome hispida*	LC
Poaceae	*Agrostis lachnantha*	LC
Orobanchaceae	*Alectra capensis*	LC
Asphodelaceae	*Aloe ecklonis*	LC
Amaranthaceae	*Alternanthera pungens*	LC
Amaranthaceae	*Amaranthus hybridus*	LC
Poaceae	*Andropogon appendiculatus*	LC
Poaceae	*Andropogon eucomus*	LC
Poaceae	*Andropogon huillensis*	LC
Poaceae	*Aristida junciformis*	KC
Poaceae	*Aristida congesta subsp. barbicollis*	LC
Poaceae	*Arundinella nepalensis*	LC
Asparagaceae	*Asparagus sp.*	
Asteraceae	*Berkheya carlinopsis*	LC
Asteraceae	*Berkheya setifera*	LC
Asteraceae	*Bidens pilosa*	Alien
Acanthaceae	*Blepharis acuminata*	LC
Poaceae	*Brachiaria eruciformis*	LC
Poaceae	*Bromus catharticus*	LC
Amaryllidaceae	***Boophone disticha***	LC
Apiaceae	*Centella asiatica*	No status
Scrophulariaceae	*Chaenostoma leve*	No status
Gentianaceae	*Chironia palustris*	LC
Asteraceae	*Cirsium vulgare*	Alien
Capparaceae	*Cleome maculata*	LC
Commelinaceae	*Commelina africana*	LC
Commelinaceae	*Commelina benghalensis*	LC

Commelinaceae	*Commelina subulata*	LC
Asteraceae	*Conyza albida*	Alien
Asteraceae	*Cosmos bippinatu*	Alien
Acanthaceae	*Crabbea acaulis*	LC
Crassulaceae	*Crassula alba*	LC
Crassulaceae	*Crassula pellucida*	LC
Asphodelaceae	***Crinum bulbispermum***	Declining
Asteraceae	*Crepis hypochoeridea*	LC
Poaceae	*Ctenium concinnum*	LC
Orobanchaceae	*Cynium tubulosum*	LC
Poaceae	*Cynodon dactylon*	LC
Cyperaceae	*Cyperus congestus*	LC
Cyperaceae	*Cyperus esculentus*	LC
Cyperaceae	*Cyperus semitrifidus*	LC
Solanaceae	*Datura ferox*	Alien
Asteraceae	*Denekia capensis*	LC
Mesembreanthemaceae	*Delosperma cooperi*	LC
Geraniaceae	*Dianthus mooiensis*	LC
Asteraceae	*Dicoma anomala*	LC
Ebenaceae	*Diospyros lycioides*	LC
Poaceae	*Eragrostis capensis*	LC
Poaceae	*Eragrostis chloromelas*	LC
Poaceae	*Eragrostis curvula*	LC
Poaceae	*Eragrostis gummiflua*	LC
Poaceae	*Eragrostis plana*	LC
Poaceae	*Eragrostis racemosa*	LC
Fabaceae	*Erythrina zeyheria*	LC
Myrtaceae	*Eucalyptus camuldulensis*	Alien
Hyacinthaceae	***Eucomus autumnalis***	Declining
Euphorbiaceae	*Euphorbia clavarioides*	LC
Euphorbiaceae	*Euphorbia strata*	LC
Convolvulaceae	*Falkia oblonga*	LC
Poaceae	*Fingerhuthia africana*	LC
Asteraceae	*Geigeria burkei*	LC
Asteraceae	*Gerbera galpinii*	LC
Thymeleaceae	*Gnidia kraussiana*	LC
Asclepiadaceae	*Gomphocarpus fruticosus*	LC
Iridaceae	***Gladiolus crassifolius***	LC
	Gladiolus sericeovillosus	
Amaranthaceae	*Gomphrena celesioides*	Alien
Amaryllidaceae	*Haemanthus humilis*	LC
Asteraceae	*Haplocarpha scaposa*	LC

Asteraceae	*Helichrysum aureonitens*	LC
Asteraceae	*Helictotrichon turgidulum*	LC
	Helichrysum krausii	
Asteraceae	*Helichrysum inornatum*	LC
Malvaceae	*Hermannia depressa*	LC
Malvaceae	*Hermannia transvaalensis*	LC
	Hibiscus aethiopicaus	
Malvaceae	*Hibiscus microcarpus*	LC
Malvaceae	*Hibiscus trionum*	
Asteraceae	*Hilliardiella oligocephala*	LC
Poaceae	*Hyperthelia dissolute*	LC
Poaceae	*Hyparrhenia hirta*	LC
Poaceae	*Hyparrhenia tamba*	LC
Asteraceae	*Hypochaeris radicata*	LC
Asteraceae	*Hypoxis rigidula*	LC
Asteraceae	***Hypoxis hemerocallidea***	LC
Asteraceae	*Hypoxis iridifolia*	LC
Poaceae	*Imperata cylindrica*	LC
Convolvulaceae	*Ipomoea crassipes*	LC
Convolvulaceae	*Ipomoea sp.*	
Juncaceae	*Juncus effusus*	LC
Juncaceae	*Juncus exsertus*	LC
Mesembreanthemaceae	*Khadia sp.*	
	Lobelia erinus	
Hyacinthaceae	*Ledebouria ovatifolia*	
Poaceae	*Leersia hexandra*	LC
Lamiaceae	*Leonotis leonurus*	LC
Poaceae	*Melinis nerviglumis*	LC
Poaceae	*Melinis repens*	LC
Lobeliaceae	*Monopsis decipiens*	LC
Geraniaceae	*Monsonia grandifolia*	LC
Scrophulariaceae	*Nemesia fruticans*	LC
Lythraceae	*Nesaea radicans*	LC
Onagraceae	*Oenothera rosea*	LC
Cactaceae	*Opuntia ficus-indica*	Alien
Oxalidaceae	*Oxalis corniculata*	LC
Oxalaceae	*Oxalis sp.*	
Poaceae	*Panicum coloratum*	LC
Chrysobalanaceae	*Parinari capensis*	LC
Poaceae	*Paspalum dilatatum*	LC
Poaceae	*Paspalum scrobiculatum*	LC
Geraniaceae	*Pelargonium luridum*	LC

Sinopteridaceae	*Pellaea calemelanos*	LC
Rubiaceae	*Pentanisia prunelloides*	LC
Polygonaceae	*Persicaria lapathifolia*	LC
Polygonaceae	*Persicaria senegalensis*	LC
Plantaginaceae	*Plantago minor*	LC
Polygonaceae	*Polygonum lapathifolium*	LC
Fabaceae	*Polygala hottentotta*	LC
Molluginaceae	*Psammotropha myriantha*	LC
Apocynaceae	*Raphionacme sp.*	
Salicaceae	*Salix babylonica*	Alien
Cyperaceae	*Schoenoplectus brachyceras*	LC
Cyperaceae	*Schoenoplectus corymbosus*	LC
Cyperaceae	*Schoenoplectus decipiens*	LC
Ebenaceae	*Searsia dentata*	LC
Gentianaceae	*Sebaea grandis*	LC
Sellaginellaceae	*Selaginella dregei*	LC
Scrophulariaceae	*Selago densiflora*	LC
Asteraceae	*Senecio inaequidens*	LC
Asteraceae	*Senecio achilleifolius*	LC
Asteraceae	*Senecio inornatus*	LC
Asteraceae	*Seriphium plumosum*	LC
Poaceae	*Setaria nigrirostris*	LC
Poaceae	*Setaria sphacelata*	LC
Caryophyllaceae	*Silene burchellii*	LC
Solanaceae	*Solanum sp.*	Alien
Solanaceae	*Solanum sysimbriifolium*	Alien
Poaceae	*Sporobolus africanus*	LC
Poaceae	*Sporobolus pyramidalis*	LC
Asteraceae	*Tagetes minuta*	Alien
Asteraceae	*Taraxacum offininale*	Alien
Poaceae	*Themeda triandra*	LC
Asphodelaceae	*Trachyandra cooperi*	LC
Poaceae	*Trichoneura grandiglumis*	Alien
Fabaceae	*Trifolium africanum*	LC
Poaceae	*Tristachya leucothrix*	LC
Alliaceae	*Tulbagia violacea*	LC
Typhaceae	*Typha capensis*	LC
Verbenaceae	*Verbena brasiliensis*	Alien
Asteraceae	*Vernonia centaureoides*	LC
Fabaceae	*Vigna vexillata*	LC
Campanulaceae	*Wahlenbergia sp.*	LC
Asteraceae	*Xanthium strumarium*	Alien