SAR Rooikop Powerline Deviation

Terrestrial Biodiversity Specialist Assessment

Prepared for:

Nsovo Environmental Consulting

April 2024

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Report Type:	**Terrestrial Biodiversity Specialist Assessment**
Project Name:	**SAR Rooikop Powerline Deviation Biodiversity Impact Assessment**
Report Compiler:	**Rudolph Greffrath (Pr. Sci. Nat. 400018/17)**

DECLARATION

I, Rudolph Greffrath, in my capacity as a specialist consultant, hereby declare that I –

- 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)

April 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 ±500metres 88KV SAR Rooikop Powerline Deviation located south of Johannesburg, in Gauteng Province.

The assessment was completed as 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 Carltonville Dolomite Grassland, of which is listed as a Least Concerned ecosystem (LC) by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 (NEMBA).

According to the Gauteng Conservation Plan (3.3) (2012), the SAR Rooikop project area contains terrestrial CBA Important area and Ecological support area. All demarcations were considered during the field work studies, planning and execution, as the Sector Plan's delineations were refined where applicable.

The field investigation indicated that most of the project area was dominated by Disturbed riparian grassland and Riparian areas. A total of 42 plant species were officially recorded on site of the 312 recorded for the region.

No Species of Conservation Concern (SCC) according to the National Screening report or NEWPOSA were encountered. A total of 4 mammal species were recorded on site, none of which are SCC.

The primary impact of the proposed development is a loss of flora and fauna habitat in the form of Open Bushveld and Riparian areas due to infrastructure development. No Red Data plant or animal species were present within the PAOI however. 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 area of construction and settle on other areas, probably within or adjacent to the project area.

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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 Acton Plan
NWBSP	Northwest 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 SAR Rooikop Powerline Deviation located south of Johannesburg, Gauteng Province.

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). See Appendix A for the protocol checklist and where they can be found within the report.

1.2 Project Location

The proposed powerline is in the City of Ekurhuleni Metropolitan Municipality within Ward 40, approximately 2 km from Vosloorus EXT 6 South of Germiston.

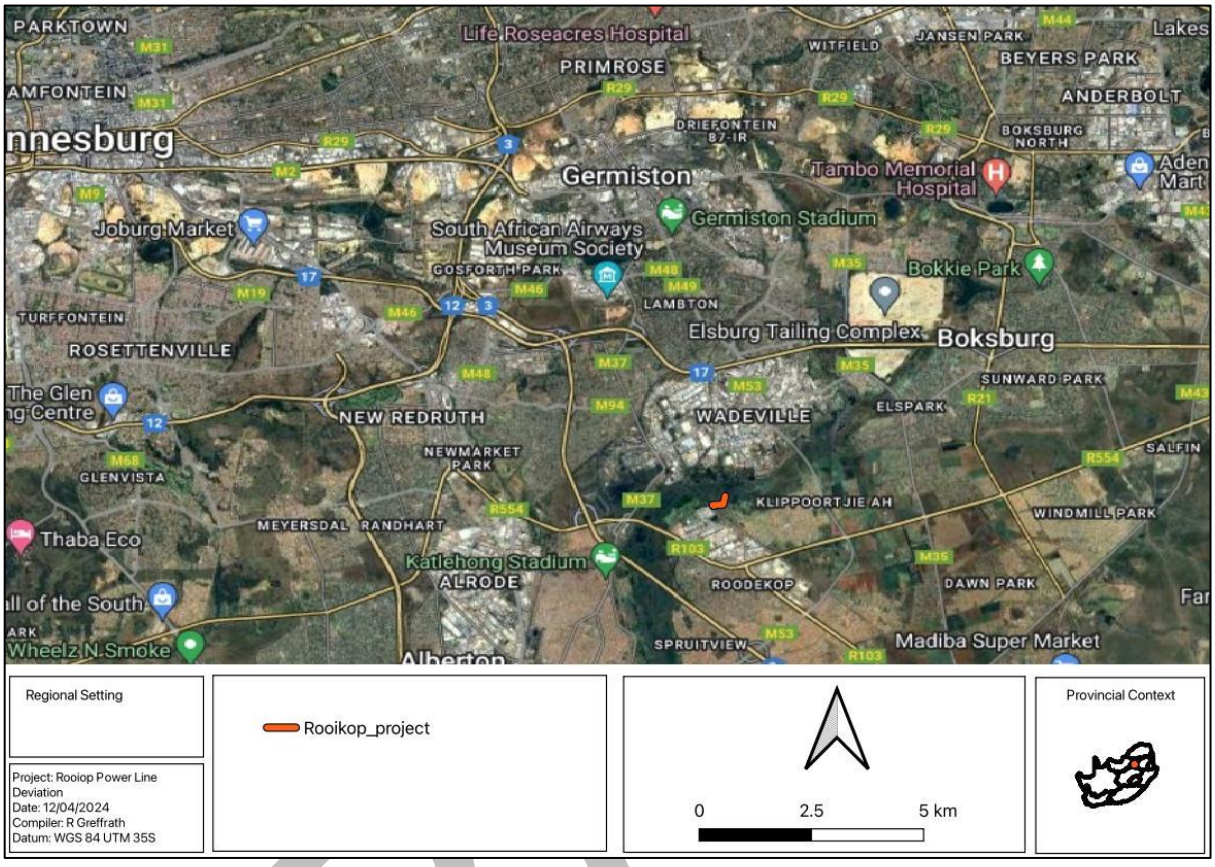


Figure 1-1: Locality

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 Rooikop powerline deviation, as well as a terrestrial CBA Important area and Ecological support area.

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 herpetafuana 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 Eskom for the construction and operation activities of the Rooikop powerline deviation 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.

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 in its entirety.

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

The Terrestrial plant and Animal studies were completed strictly according to the recently published 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".

This report is based on the Species Environmental Assessment Guideline: Guidelines for the implementation of 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 development 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, 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 Rooikop 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 (high/medium sensitivity) and flora (medium 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 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 is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

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 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.

2.3.1 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.

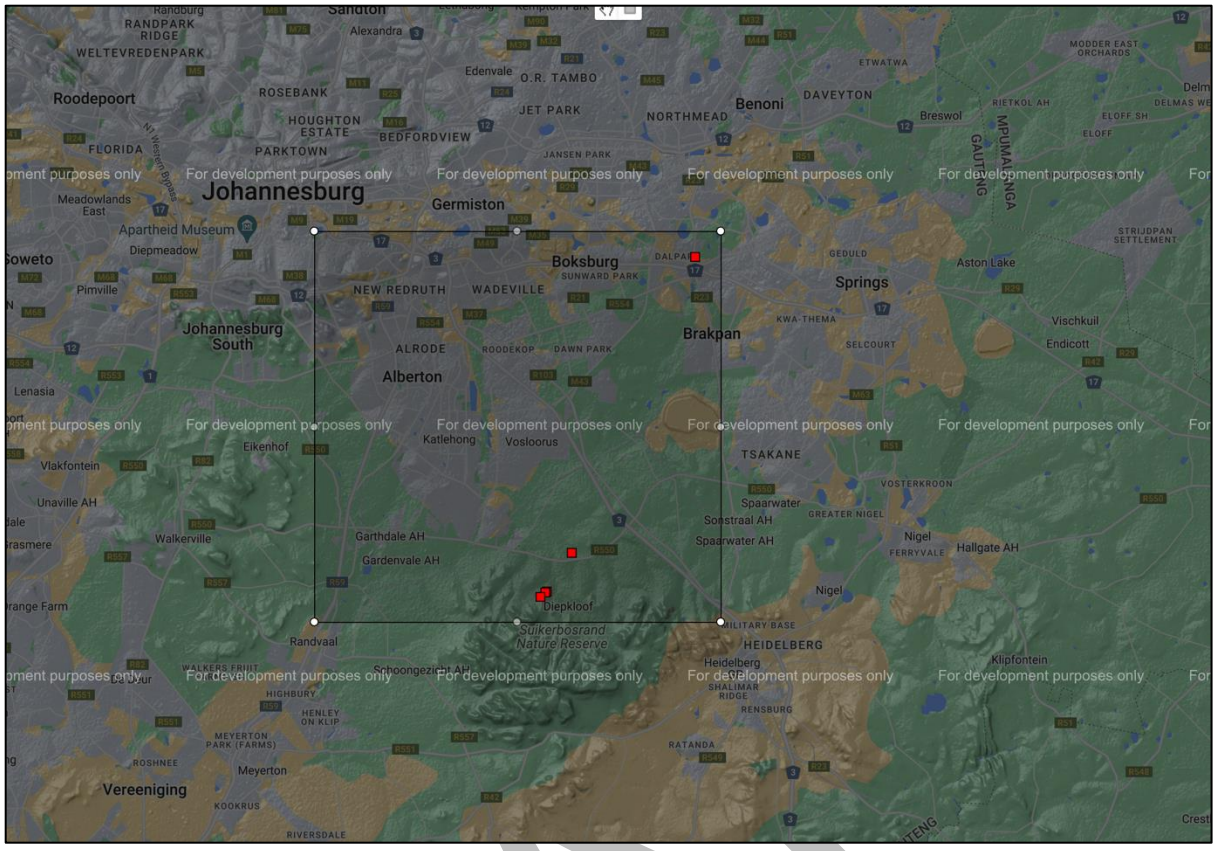


Figure 2-1: Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database.

2.3.2 Desktop Faunal Assessment

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

- Amphibian list, generated from the ReptileMap database (FitzPatrick Institute of African Ornithology, 2023a), using the 2628AC quarter degree square;
- Reptile list, generated from the AmphibianMap database (FitzPatrick Institute of African Ornithology, 2023b), using the 2628AC quarter degree square;
- Mammal list generated from the MammalMap database (FitzPatrick Institute of African Ornithology, 2023c), using the 2628AC quarter degree square, and
- Avifauna list, generated from the SABAP2 dataset by looking at pentads 2628AC.

2.4 Field Investigation

The site visit and detailed infield flora and fauna assessments was undertaken from the 12th of April 2024. Representations of the project area is indicated in Figure 2-2 representing the entire project area footprint.

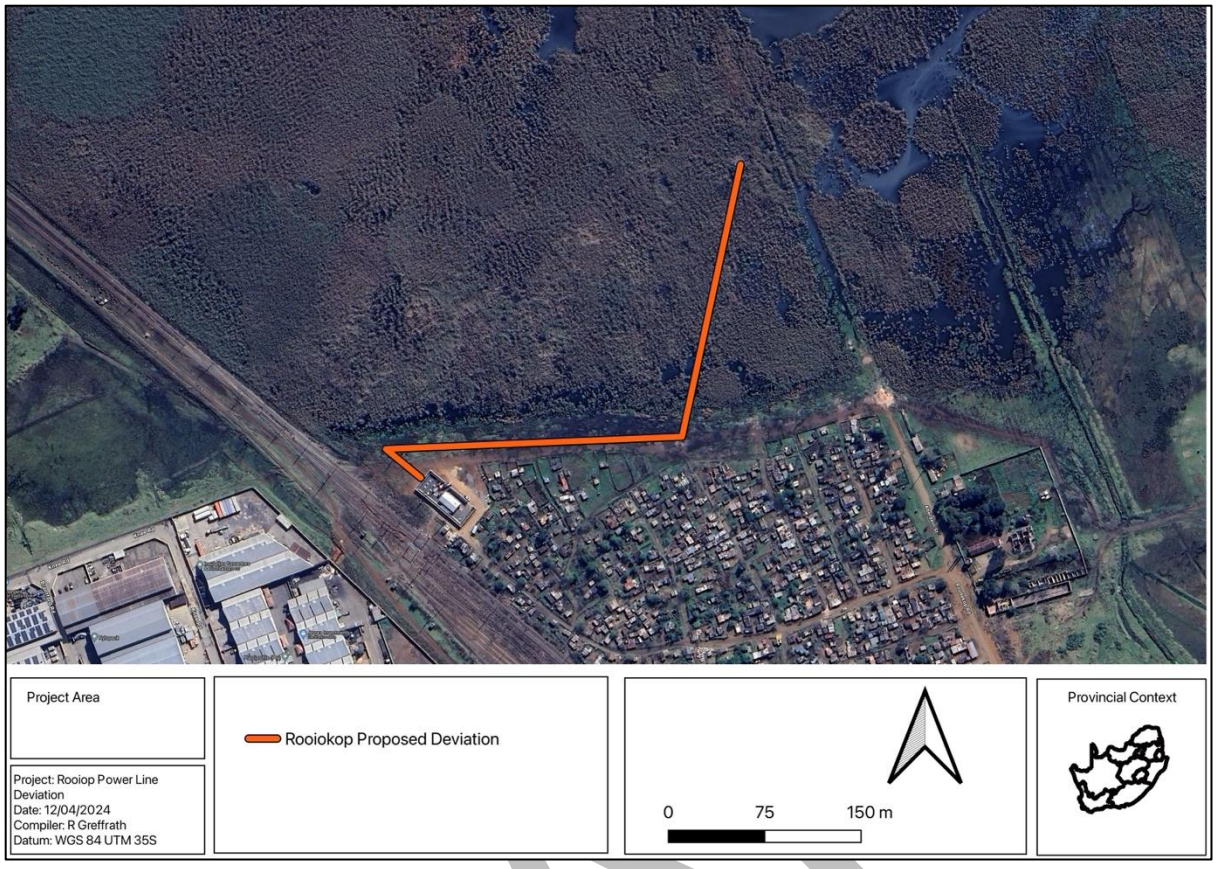


Figure 2-2: Project Area

2.4.1 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.

2.4.2 Fauna Survey

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

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

2.5 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 20191;
- 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.
	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	

2.6 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 Regional Vegetation (Reference State)

3.1.1 Carltonville Dolomite Grassland

Distribution: This vegetation type occurs North-West (mainly) and Gauteng and marginally into the Free State Province. In the region of Potchefstroom, Ventersdorp, and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province. Altitude 1 360–1 620 m, but largely 1 500–1 560 m.

Important Taxa

Graminoids: *Aristida congesta (d), Brachiaria serrata (d), Cynodon dactylon (d), Digitaria tricholaenoides (d), Diheteropogon amplectens (d), Eragrostis chloromelas (d), E. racemosa (d), Heteropogon contortus (d), Loudetia simplex (d), Schizachyrium sanguineum (d), Setaria sphacelata (d), Themeda triandra (d), Alloteropsis semialata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia biflora, Bulbostylis burchellii, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis curvula, E. gummiflua, E. plana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii*.

Herbs: *Acalypha angustata, Barleria macrostegia, Chamaecrista mimosoides, Chamaesyce inaequilatera, Crabbea angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommaneyi, Justicia anagalloides, Kohautia amatymbica, Kyphocarpa angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Vernonia oligocephala*.

Geophytic Herbs: *Boophone disticha, Habenaria mossii*.

Low Shrubs: *Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaeothamnus zeyheri var. rogersii, Searsia magalismontana, Tylosema esculentum, Ziziphus zeyheriana. Geoxylic Suffrutices: Elephantorrhiza elephantina, Parinari capensis subsp. capensis*.

Endemic Taxon Succulent Shrub: *Delosperma davyi*.

4 Regional Sensitivity Analysis and No-go Areas

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as 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 conservation in the future, 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 to this, details of the field investigation

are used to inform and determine the site-specific sensitivity, as per Site Ecological Importance (SEI) criteria.

4.1 Gauteng Conservation Plan (3.3) (2011)

The main purpose of a conservation 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 pattern 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 conservation plan is a living document that is constantly reviewed and updated and documents the distribution of conservation important areas for biodiversity. According to the Conservation Plan, the Rooikop project area contains terrestrial CBA Important area and Ecological support area (Figure 4-1). All demarcations were considered during the field work studies planning and execution, as the Sector Plan's delineations were refined where applicable.

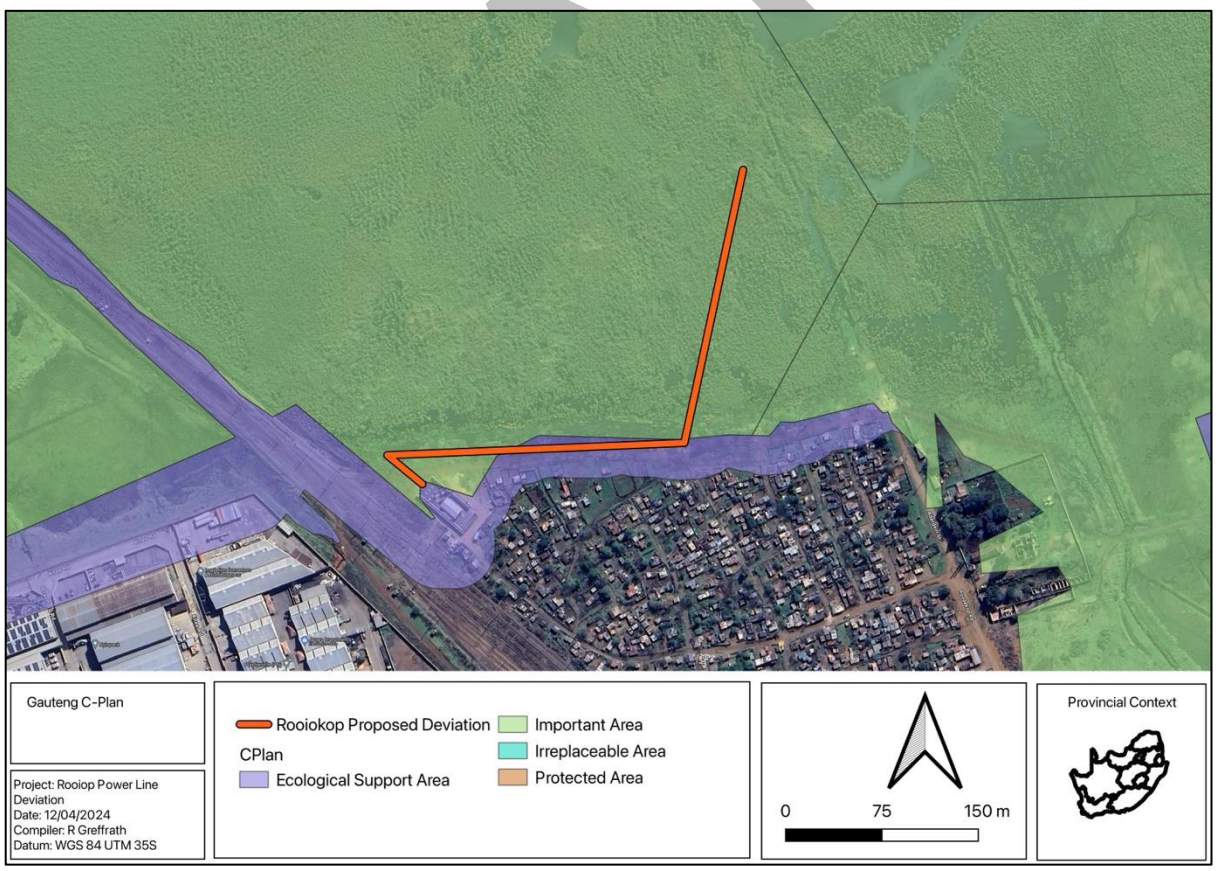


Figure 4-1: The NWBSP in relation to the project site

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 a three-year period (Skowno et al., 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (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

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

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

The list of nationally threatened ecosystems has been gazetted (NEM:BA, Act 10 of 2004: National list of ecosystems that are threatened and in need of protection) and results in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems.

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 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 criteria are presented indicates that the Carltonville Dolomite Grassland is listed as a Least Concerned ecosystem. 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 and 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

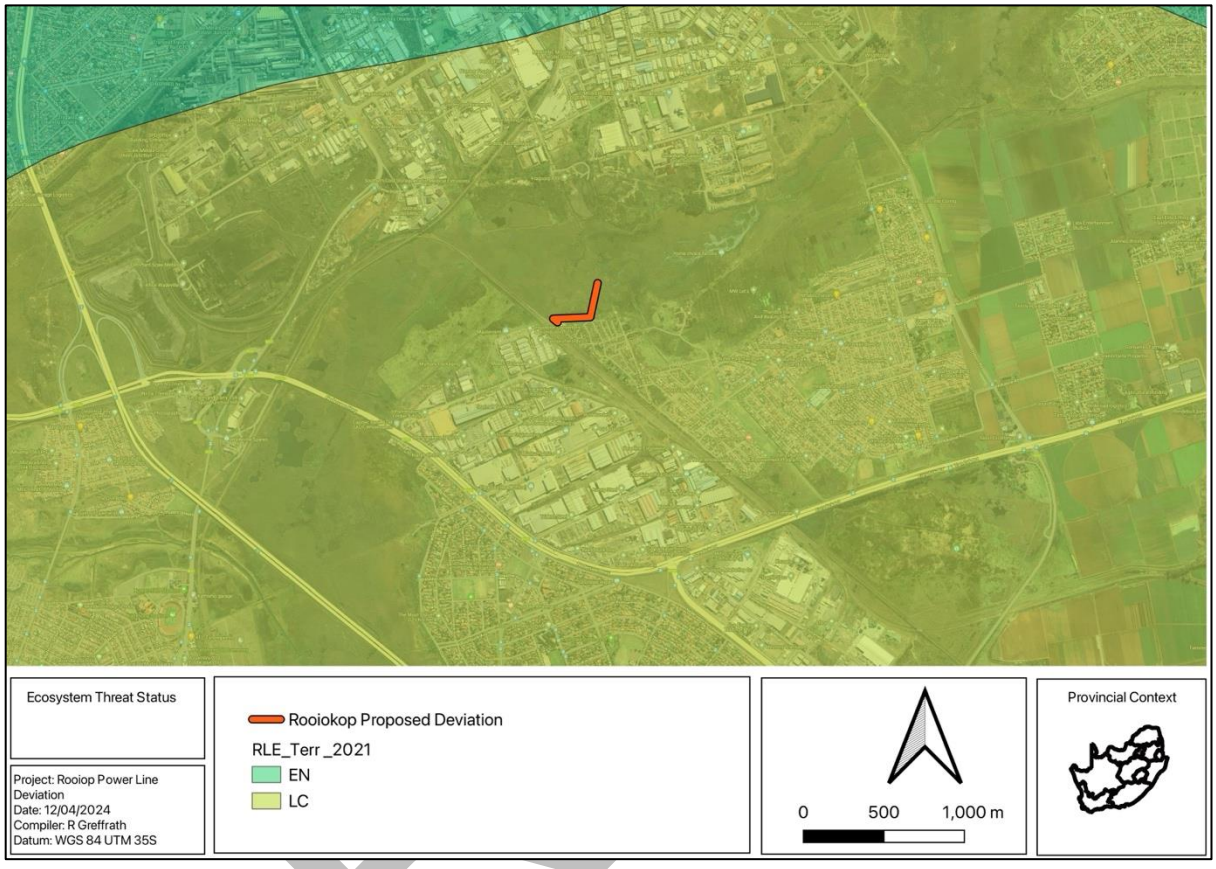


Figure 4-2: Ecosystem Threat Status

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, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno et al., 2019).

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

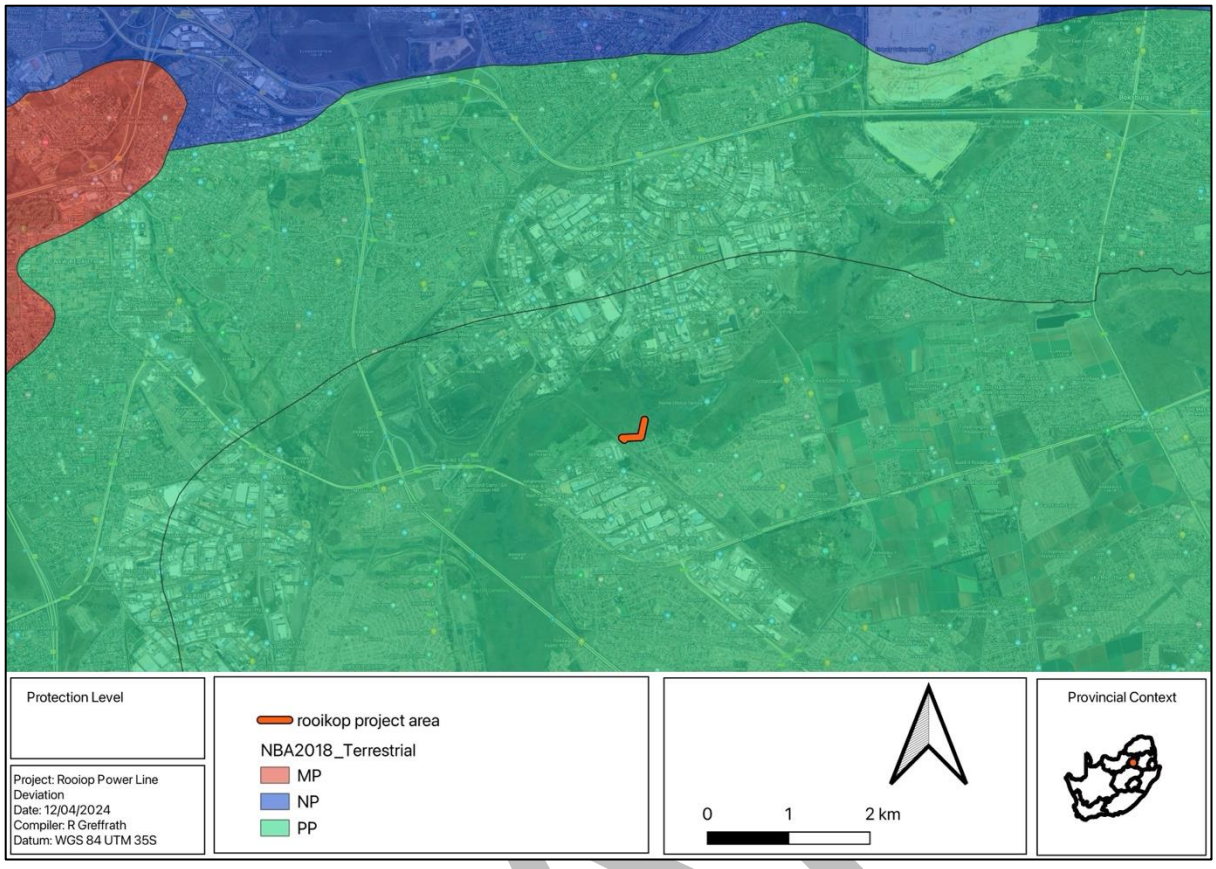


Figure 4-3: Ecosystem Protection Status

4.1.2 Protected Areas

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

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

- Special nature reserves:
- National parks:
- Nature reserves 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 declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

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

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

Officially protected areas, either provincially or nationally, that occur within proximity to the project site could have consequences as far as impact on these areas are concerned. For the project area the Suikerbosrand Nature Reserve is situated 15km south, and the Blesbokspruit is situated 15 km east.

4.2 Important Bird Areas (Birdlife SA, 2013)

An Important Bird Area (IBA) is an area recognised as being a globally important habitat for the conservation of bird populations. Currently there are about 10,000 IBAs worldwide. At present, South Africa has 124 IBA's, 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 programme of stewardship which will ultimately achieve formal protection (BirdlifeSA, 2013). The IBA Suikerbosrand Nature Reserve is situated 15km south, and the IBA Blesbokspruit is situated 15 km east of the project area.

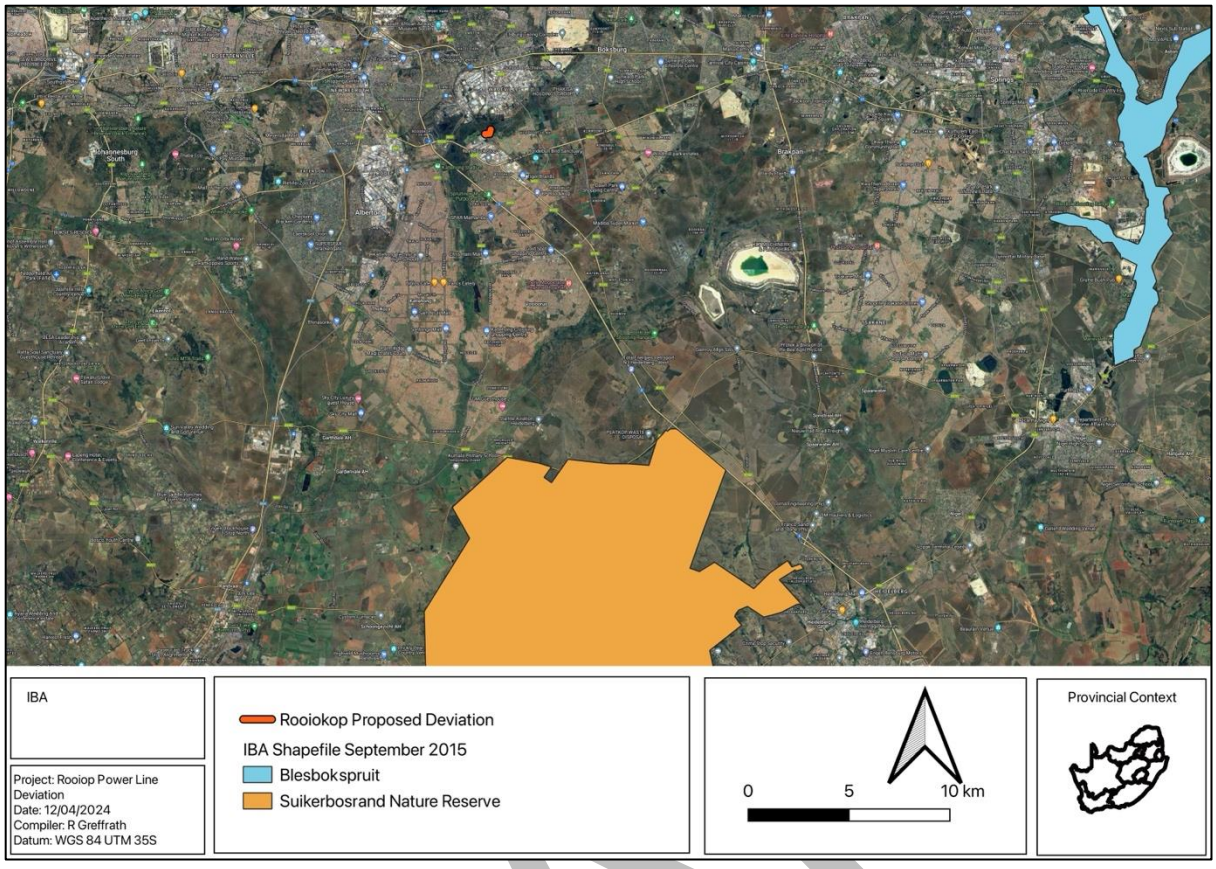


Figure 4-4: IBA

4.3 Nationally Protected Areas Expansion Strategy

The National Protected Areas Expansion Strategy (NPAES) shows areas designated for future incorporation into existing protected areas (both 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 and are a broad scale planning tool allowing for better development and conservation planning. Rooikop partially overlaps with a priority area.

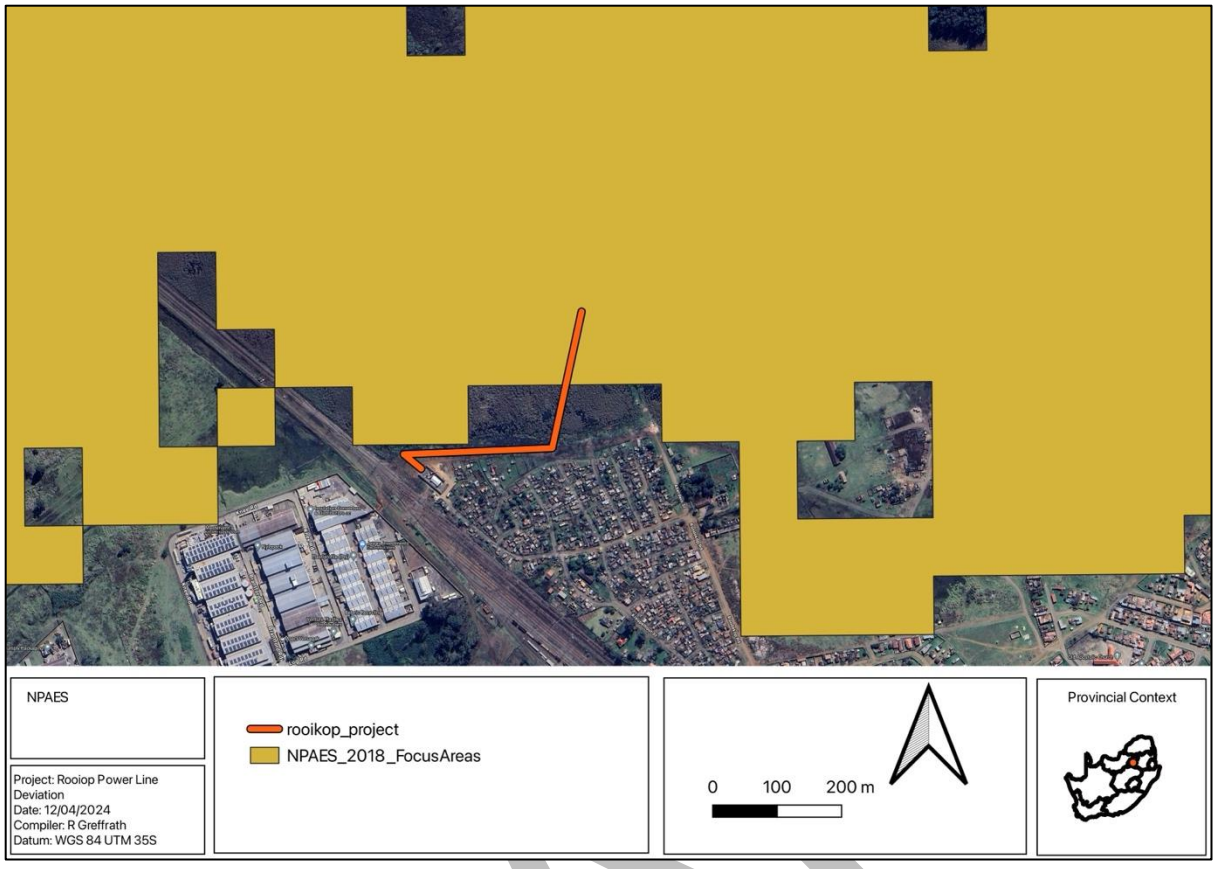


Figure 4-5: NPAES

5 Results

5.1 Flora Expected Species

The POSA database indicates that 312 species are expected to occur regionally and within the PAOI. Appendix C provides the list of species and their respective conservation status.

5.2 Flora

The project area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).
- The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.
- Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs)

are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

On a fine-scale vegetation type, the project areas overlap with one vegetation type: the Carltonville Dolomite Grassland The study site can be divided into two main sections being wetland and disturbed riparian areas.

A total of 42 plant species were recorded on site and immediate surrounds (Appendix B), of 312 listed wererecorded by SANBI in the relevant grid in the past in the regional list (Appendix B), however 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 the below section and depicted in Figure 5-1. The primary land use and vegetation habitats identified as well as their respective sizes within the project area are listed in **Error! Reference source not found.**. Vegetation associated with the Rooikop project area comprises two broad habitat units, namely the Disturbed Riparian Grassland and low-lying Riparian areas.

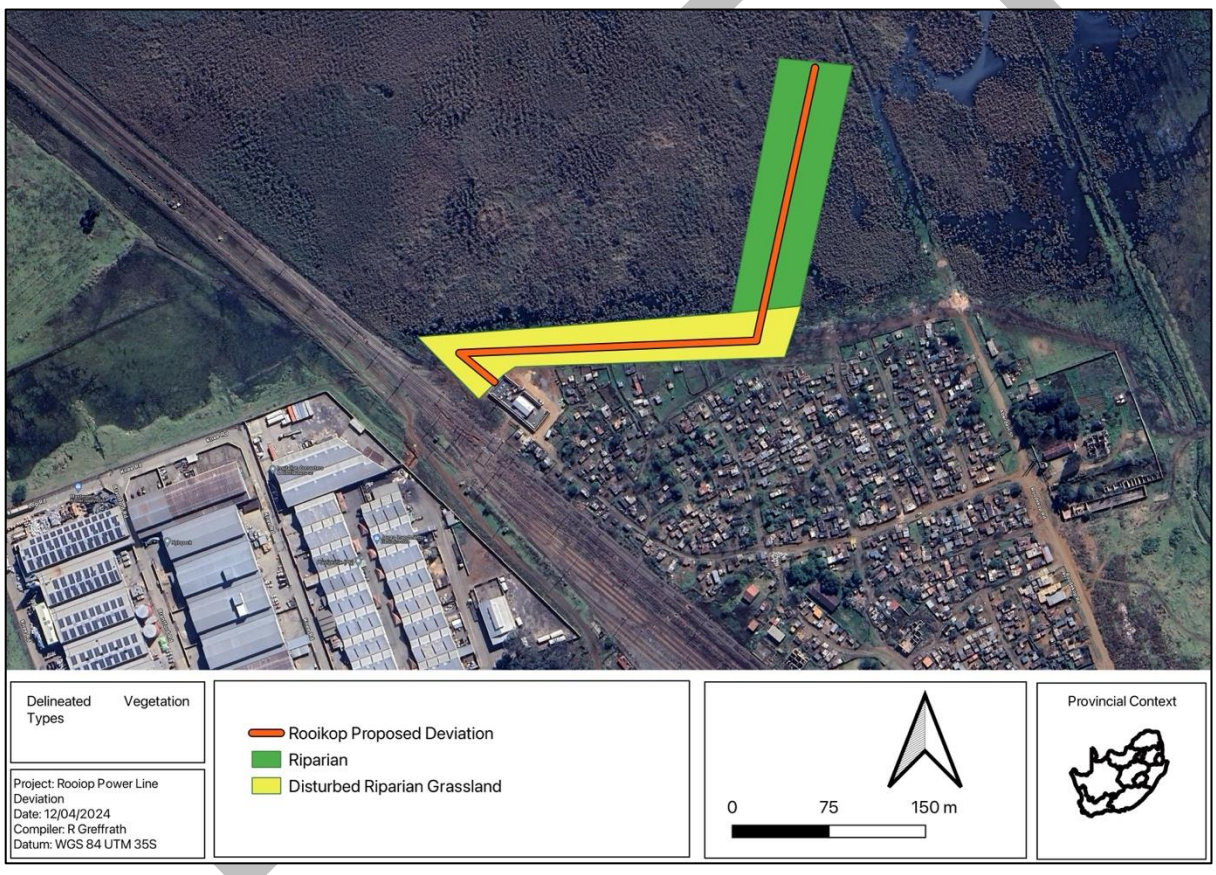


Figure 5-1: Delineated Vegetation types encountered within the Rooikop project area.

5.2.1 Disturbed Riparian Grassland

The Disturbed Riparian Grassland areas represented grassy plains in riparian areas with a species assemblage that was typical of disturbed habitat. The most prominent disturbances observed during the field visit include overgrazing and unplanned burning. 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 and grasses) being

excluded from the environment due to unsuitable conditions created. The grazing status of grassland can be determined based on the presence of certain groups of grass species (van Oudtshoorn, 2007). When habitat is overutilized, certain species will increase in abundance, whilst others will decrease. The site experiences frequent overgrazing from cattle herded by the local community.

Plant diversity in this habitat was generally poor, primarily due to the current land use and burning. Common grass species included *Aristida congesta subsp congesta, Melinis repens, Themeda triandra, Urochloa mosambicensis and Aristida stipitata. Observed common indigenous herbaceous species included Alternanthera pungens, Amaranthus deflexus, Asparagus laricinus, Chamaecrista mimosoides and Cucumis hirsutus. Alien invasive species observed in these areas included Bidens pilosa, Conyza canadensis, Cosmos bipinnata, Gleditsia triacanthos and Verbena bonariensis.*

Examples of the Disturbed Riparian Grassland are represented below showing relatively good vegetation cover with sparse ground cover in smaller areas, in response to overgrazing and fire.

Figure 5-2: Disturbed Riparian Grassland within the Rooikop project area.

Figure 5-3: Disturbed Riparian Grassland bordering on the wetland

5.2.2 Riparian Vegetation

A central drainage line runs from east to west through the project area, in and around which vegetation typical for at least seasonally inundated soils could be found. The larger portion of riparian vegetation was mapped as CBA ecological support areas according to the Gauteng C-Plan. It had uniquely adapted plant species, but also was suitable habitat for several faunal species, mostly small mammal and amphibians. This habitat had a high density of geophytes on its banks, and more unique species could emerge in less disturbed areas.

Riparian vegetation around streambanks was found have a high presence of alien invasive species.

Figure 5-4: Typical view of Riparian Vegetation.

5.2.3 Plant Species of Conservation Concern

The project area is within QDS 2628AC. 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.

According to the NEWPOSA, two SCC are expected to occur for the QDS's for the project area. The Screening tool results indicated four SCC could be present in the PAOI, Sensitive species 1248, *Brachycorythis conica subsp. transvaalensis*, *Sensitive species 1147* and *Khadia beswickii*.

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

5.2.4 Alien Plant Species

Alien plant species have also been classified according to 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 programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

A total of 9 alien plant species (AIP) were recorded on site (Table 5-1); five 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.

Scientific Name	Common Name	Invasive Category
Asparagus laricinus	Cluster leaved asparagus	Weed
Bidens pilosa	Common Black-jack	Weed
Datura stramonium	Common Thorn Apple	Cat 1B
Eucalyptus camaldulensis	Red River Gum	Cat 1B
Gleditsia triacanthos	Honey Locust	Cat 1B
Pennisetum clandestinum	Kikuyu Grass	Cat 1B
Plantago major		Weed
Tagetes minuta	Tall Khaki Weed	Alien Invasive
Verbena bonariensis	Tall Verbena	Cat 1B

5.3 Fauna

5.3.1 Mammals

Actual sightings, spoor, calls, dung and nesting sites, were used to establish the presence of mammals on the proposed 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 studyarea. Expected species are listed in Table 5-3.

Table 5-2: Mammal Species Recorded

Scientific Name	English Name	IUCN (2021.1)	NEMBA TOPS List (2007)
Cynictis penicillata	Yellow Mongoose	LC	Not Listed
Rhabdomys pumilio	Striped Mouse	LC	Not Listed

Table 5-3: Expected Mammal Species

Scientific name	Common name	Red list Category		PoO
		SA	IUCN	
ORDER Rodentia	Unidentified Rodentia			Low
Aepyceros melampus	Impala	LC	LC	Low
Alcelaphus buselaphus	Hartebeest			Low
Alcelaphus buselaphus caama	Red Hartebeest	LC	LC	Low
Antidorcas marsupialis	Springbok	LC	LC	Low
Connochaetes gnou	Black Wildebeest	LC	LC	Low
Connochaetes taurinus	Blue Wildebeest	LC	LC	Low
Damaliscus pygargus phillipsi	Blesbok	LC	LC	Low
Kobus ellipsiprymnus	Waterbuck	LC	LC	Low
Pelea capreolus	Vaal Rhebok	NT	NT	Low
Raphicerus campestris	Steenbok	LC	LC	Low
Redunca arundinum	Southern Reedbuck	LC	LC	Low
Redunca fulvorufula	Mountain Reedbuck	LC	LC	Low
Sylvicapra grimmia	Bush Duiker	LC	LC	Low
Taurotragus oryx	Common Eland	LC	LC	Low
Tragelaphus strepsiceros	Greater Kudu	LC	LC	Low
Canis mesomelas	Black-backed Jackal	LC	LC	Low
Papio ursinus	Chacma Baboon	LC	LC	Low
Taphozous mauritianus	Mauritian Tomb Bat	LC	LC	Low
Equus quagga	Plains Zebra	NT	NT	Low
Atelerix frontalis	Southern African Hedgehog	NT	NT	Low
Felis catus	Domestic Cat	Introduced		Low
Leptailurus serval	Serval	NT	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Giraffa giraffa giraffa	South African Giraffe	LC	LC	Low
Atilax paludinosus	Marsh Mongoose	LC	LC	Moderate
Cynictis penicillata	Yellow Mongoose	LC	LC	Moderate
Herpestes sanguineus	Slender Mongoose	LC	LC	Moderate
Suricata suricatta	Meerkat	LC	LC	Low
Hyaena brunnea	Brown Hyena	NT	NT	Low
Hystrix africaeaustralis	Cape Porcupine	LC	LC	Low
Lepus saxatilis	Scrub Hare	LC	LC	Low
Pronolagus rupestris	Smith's Red Rock Hare	LC	LC	Low
Elephantulus myurus	Eastern Rock Elephant Shrew	LC	LC	Low
Aethomys namaquensis	Namaqua Rock Mouse	LC	LC	Low
Gerbilliscus brantsii	Highveld Gerbil	LC	LC	Low
Mastomys sp.	Multimammate Mice	LC	LC	Low
Mus musculus musculus		LC	LC	
Otomys sp.	Vlei Rats	LC	LC	Moderate
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT	NT	Moderate
Rhabdomys pumilio	Xeric Four-striped Grass Rat	LC	LC	Low
Aonyx capensis	African Clawless Otter	NT	NT	Low
Steatomys krebsii	Kreb's African Fat Mouse	LC	LC	Low
Orycteropus afer	Aardvark	LC	LC	Low
Procavia capensis capensis	Cape Rock Hyrax	LC	LC	Low
Sciurus sp.	Squirrels	LC	LC	Low

Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Neoromicia capensis	Cape Serotine	LC	LC	Low
Genetta genetta	Common Genet	LC	LC	Low
Genetta tigrina	Cape Genet (Cape Large-spotted Genet)	LC	LC	Low

5.3.2 Herpetofauna

According to the Southern African Reptile Conservation Assessment (SARCA), 42 reptile species have been confirmed to occur within 2628AC (Table 5-4). None of the expected species are regarded as red data listed, none of the expected species were recorded.

Table 5-4: Expected Reptile Species

Scientific name	Common name	Red list Category		PoO
		SA	IUCN	
Agama aculeata distanti	Distant's Ground Agama	LC	LC	Low
Agama atra	Southern Rock Agama	LC	LC	Low
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC	Low
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	LC	Low
Dasypeltis scabra	Rhombic Egg-eater	LC	LC	Low
Cordylus vittifer	Common Girdled Lizard	LC	LC	Low
Pseudocordylus melanotus melanotus	Common Crag Lizard	LC	LC	Low
Elapsoidea sundevallii media	Highveld Garter Snake	LC	LC	Low
Hemachatus haemachatus	Southern Rinkhals	LC	LC	Low
Lygodactylus capensis	Common Dwarf Gecko	LC	LC	Low
Pachydactylus sp.			LC	Low
Pachydactylus affinis	Transvaal Gecko	LC	LC	Low
Pachydactylus capensis	Cape Gecko	LC	LC	Low
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	LC	Low
Nucras lalandii	Delalande's Sandveld Lizard	LC	LC	Low
Aparallactus capensis	Black-headed Centipede-eater	LC	LC	Low
Atractaspis bibronii	Bibron's Stiletto Snake	LC	LC	Low
Boaedon capensis	Brown House Snake	LC	LC	Low
Duberria lutrix lutrix	South African Slug-eater	LC	LC	Low
Homoroselaps dorsalis	Striped Harlequin Snake	NT	NT	Low
Homoroselaps lacteus	Spotted Harlequin Snake	LC	LC	Low
Lamprophis aurora	Aurora House Snake	LC	LC	Low
Lycodonomorphus inornatus	Olive House Snake	LC	LC	Low
Lycodonomorphus rufulus	Brown Water Snake	LC	LC	Low
Lycophidion capense capense	Cape Wolf Snake	LC	LC	Low
Prosymna sundevallii	Sundevall's Shovel-snout	LC	LC	Low
Psammophis crucifer	Cross-marked Grass Snake	LC	LC	Low
Psammophylax rhombeatus	Spotted Grass Snake	LC	LC	Low
Pseudaspis cana	Mole Snake	LC	LC	Low
FAMILY Leptotyphlopidae	Unidentified Leptotyphlopidae		LC	Low
Leptotyphlops scutifrons conjunctus	Eastern Thread Snake	LC	LC	Low
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC	LC	Low
Pelomedusa galeata	South African Marsh Terrapin	LC	LC	Low
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	LC	LC	Low
Trachylepis capensis	Cape Skink	LC	LC	Low
Trachylepis punctatissima	Speckled Rock Skink	LC	LC	Low
Trachylepis varia sensu lato	Common Variable Skink Complex	LC	LC	Low

Stigmochelys pardalis	Leopard Tortoise	LC	LC	Low
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC	Low
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	LC	Low
Bitis arietans arietans	Puff Adder	LC	LC	Low
Causus rhombeatus	Rhombic Night Adder	LC	LC	Low

According to the Southern African Frog Atlas Project (SAFAP), 12 amphibian species have been confirmed to occur within QDGC 2628AC. All these species are expected on site due to suitable habitat. None of these species are of conservation concern (i.e. listed as Least Concern).

Table 5-5: Amphibian Species expected.

Family	Scientific name	Common name	Red list		PoO
			SA	IUCN	
Bufonidae	*Schismaderma carens*	Red Toad	LC	LC	High
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC	LC	High
Bufonidae	*Sclerophrys garmani*	Olive Toad	LC	LC	High
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	LC	LC	High
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC	LC	High
Pipidae	*Xenopus laevis*	Common Platanna	LC	LC	High
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	LC	LC	High
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	LC	LC	High
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	LC	LC	High
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC	LC	High
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	LC	LC	High
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	LC	LC	High

5.3.3 Avifauna

Thirteen (13) avifauna species were observed during the survey of the project area (Table 5-6) based on either direct observation or the presence of visual observations and signs. None of the species recorded are regarded as a SCC.

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

Table 5-6 Avifauna Species recorded.

Species	Common Name	Conservation Status	
		SA	IUCN
Colius striatus	Mousebird, Speckled	Unlisted	LC
Dendroperdix sephaena	Francolin, Crested	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC

Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Oenanthe pileata	Capped Wheatear	Unlisted	LC
Myrmecocichla formicivora	Ant-eating Chat	Unlisted	LC
Scleroptila shelleyi	Shelley's Francolin	Unlisted	LC
Vanellus coronatus	Crowned Lapwing	Unlisted	LC
Lamprotornis bicolor	Pied Starling	Unlisted	LC

5.3.4 Animal Species of Conservation Concern according to the Screening Report

The animal species theme retrieved the sensitivity data for Mammals, Herpetofauna and Avifauna, therefore these three 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 High Sensitivity

Aves-*Circus ranivorus*

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins. There are some wetlands at the project area, however many of them are disturbed and thus the occurrence of C. ranivorus in the project area is therefore considered to be moderate.

5.3.4.2 Medium Sensitivity

Aves-*Tyto capensis*

Tyto capensis (African Grass-owl) is rated as VU on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs, in moist grasslands where it roosts (IUCN, 2017). The species prefers thick grasses around wetlands and rivers which are not present in the project area. Furthermore, this species specifically prefers nesting in dense stands of the grass species *Imperata cylindrica*. Some areas of suitable habitat were present as such the likelihood of occurrence were rated as moderate.

Mammalia-*Chrysospalax villosus*

They are common in well-irrigated farmyards, gardens, golf courses, and present also in exotic plantations, though seemingly at lower densities. In the Wakkerstroom district it is found in thickets of Oldwood trees (Leucosidea sericea) on the banks of streams in valleys but avoid scrubby vegetation in kloofs and along rocky ridges, where it is replaced by Sclater's Golden Mole, *Chlorotalpa sclateri* (Bronner 2013). Some areas of suitable habitat were present as such the likelihood of occurrence were rated as moderate to high.

Mammalia-*Crocidura maquassiensis*

Little is known about the habitats and ecology of this species. The type specimen was collected in a house and the Motlateng specimen from a grassy mountainside beneath a rock at 1,580 m asl (Skinner & Chimimba 2005). Other specimens have also been found on rocky or montane grassland, such as recently in the Soutpansberg Mountains (Taylor et al. 2015). The Chase Valley Heights specimen was brought in by a cat from the garden (P. Taylor pers. comm. 2016), which demonstrates the importance of cataloguing what the cat brings in. The Royal Natal specimen was collected in mixed bracken and grasslands along the Tugela River and a single specimen has been collected from coastal forest (Taylor 1998). Thus, it may tolerate a wide range of habitats, including urban and rural landscapes. This species was not recorded during the field work investigation.

Mammalia-*Dasymys robertsii*

Dasymys robertsii, (VU). African Marsh Rats are dependent on intact rivers and wetland ecosystems, as they have not been found in artificial or degraded wetlands and are thus patchily distributed within the assessment region (Pillay, N. et al 2016). These species have been recorded from a wide variety of habitats, including forest and savannah, swampland and grasslands, but they rely on intact wetlands in these areas. They have not been recorded from agricultural landscapes or dam areas (Pillay, N. et al 2016). They occur specifically in reed beds and among semi-aquatic grasses in wetlands or swampy areas or along rivers and streams, as well as in grassy areas close to water wherein they co-occur with Otomys spp. (Skinner & Chimimba 2005). The current habitat available on the project site provided faourable habitat for this species, however land use impacts could deter them, this species was not encountered during the field survey.

Mammalia-*Hydrictis maculicollis*

Spotted-necked Otters are thought to inhabit freshwater habitats where water is not silt-laden, and is unpolluted, and rich in small fishes (Perrin & Carugati 2000a; d'Inzillo Carranza & Rowe-Rowe 2013). However, anecdotal observations suggest they can occur, and can be common, in relatively polluted rivers, such as the Braamfonteinspruit, Jukskei River and Blesbokspruit, Gauteng Province (Ponsonby, thesis, in prep.), and the Vaal River (Power 2014). More surveys are needed to determine at what threshold of water quality otter densities decline. The home range of these otters has been estimated at 5.9–27.4 km2 and the mean length of river within home ranges was 14.8 km (Perrin et al. 2000). This species was not recorded during the field work investigation, even though suitable habitat in the form of open water and streams are present.

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). This species was not recorded during the field work investigation, possibly due to the prevalence of human activity in the project area and the limited suitable habitat that is present.

Invertebrate-*Clonia uvarovi*

Uvarov's Clonia is endemic to the highveld region of South Africa, and has only been recorded from Gauteng and North-West Provinces. The threat status of Uvarov's Clonia (*Clonia uvarovi*) is Vulnerable under criterion B1. Its extent of occurrence is relatively small (~5,000 km2), it has only been recorded in five locations, and the area, extent and quality of its habitat are expected to be in decline due to grazing pressure, cultivation, urban development, invasive alien plants and climate change. Furthermore, this species is not known to occur in any protected areas. This species was not recorded during field work.

5.4 Site Sensitivity Verification

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

5.4.1 Screening Report

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Terrestrial Biodiversity Theme sensitivity is Very High for the PAOI, with a CBA1, CBA 2 and NPAES present (Figure 5-5);
- Plant Species Theme sensitivity is Medium for the PAOI, (Figure 5-6); and
- Animal Species Theme sensitivity is High and Medium for the PAOI, with the possibility of two sensitive mammal species being present (Figure 5-7).

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

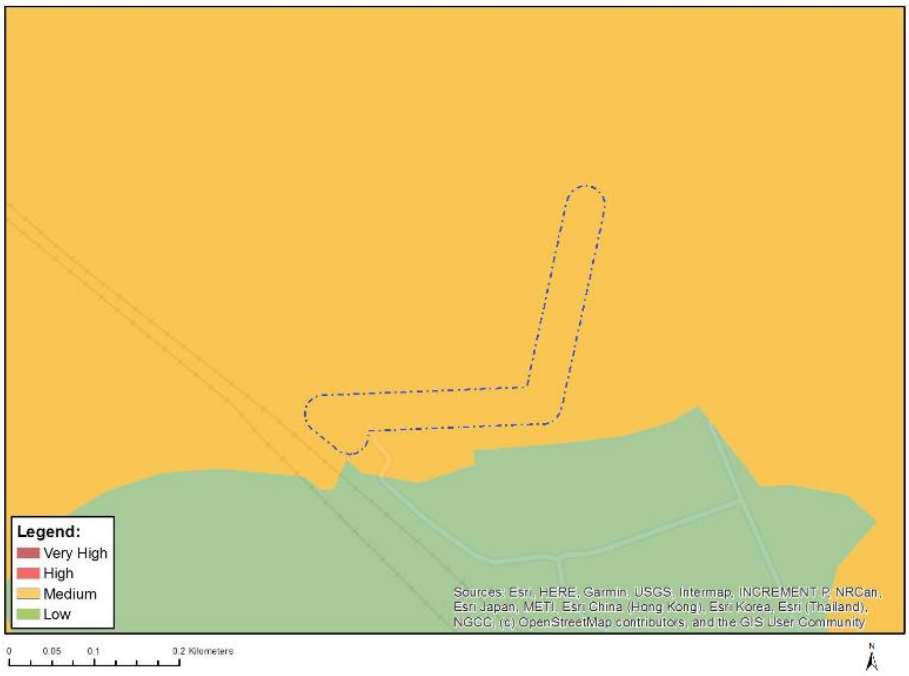
Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	CBA 1
Very High	ESA 2
Very High	National Protected Area Expansion Strategy (NPAES)

Figure 5-5: Relative Terrestrial Biodiversity Theme Sensitivity

From Figure 5-5, with the refinement of this infield assessment the sensitive features namely CBA 1 and NPAES features can be discounted, with the Vulnerable ecosystem feature only being represented in the project area.

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)
Medium	Khadia beswickii
Medium	Sensitive species 1147
Medium	Brachycorythis conica subsp. transvaalensis
Medium	Sensitive species 1248

Figure 5-6: Relative Plant species sensitivity

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
Medium	Aves-Tyto capensis
Medium	Mammalia-Chrysospalax villosus
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Invertebrate-Clonia uvarovi

Figure 5-7: Relative Animal species sensitivity

5.4.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the overall PAOI in Table 5-7 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 previous section, and consideration is given to any observed or likely presence of SCC or protected species.

Table 5-7: Screening Tool Comparison

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**High**	**Medium**	Disputed – Habitat is generally transformed and SCC likely.
Plant Theme	**Medium**	**Medium**	Validated - The composition and Medium species diversity and number of plant species recorded coupled with large, transformed areas present.
Terrestrial Theme	**Very High**	**Very High**	Validated – Certain habitat sensitivities are regarded as very high sensitivity due to the role of this intact habitat to biodiversity within an area.

6 Site Ecological Importance

The ecological sensitivity map for the site is represented in Figure 6-1 for the entire project area. The Disturbed Riparian Grassland 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, as well as the important role it plays regionally. 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.
Disturbed Riparian Grassland	Impacted seasonally wet portions of land. Even though disturbed, the ecological integrity, importance and 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 the SCC recorded.	Provides refuge and grazing areas. Aids in trapping sediment and nutrients derived from land runoff. Provides 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	**Medium**	Medium 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.	**Medium**	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or	**Medium** 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

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
		due to the role of this habitat as a water resource.				impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.	required for high impact activities.

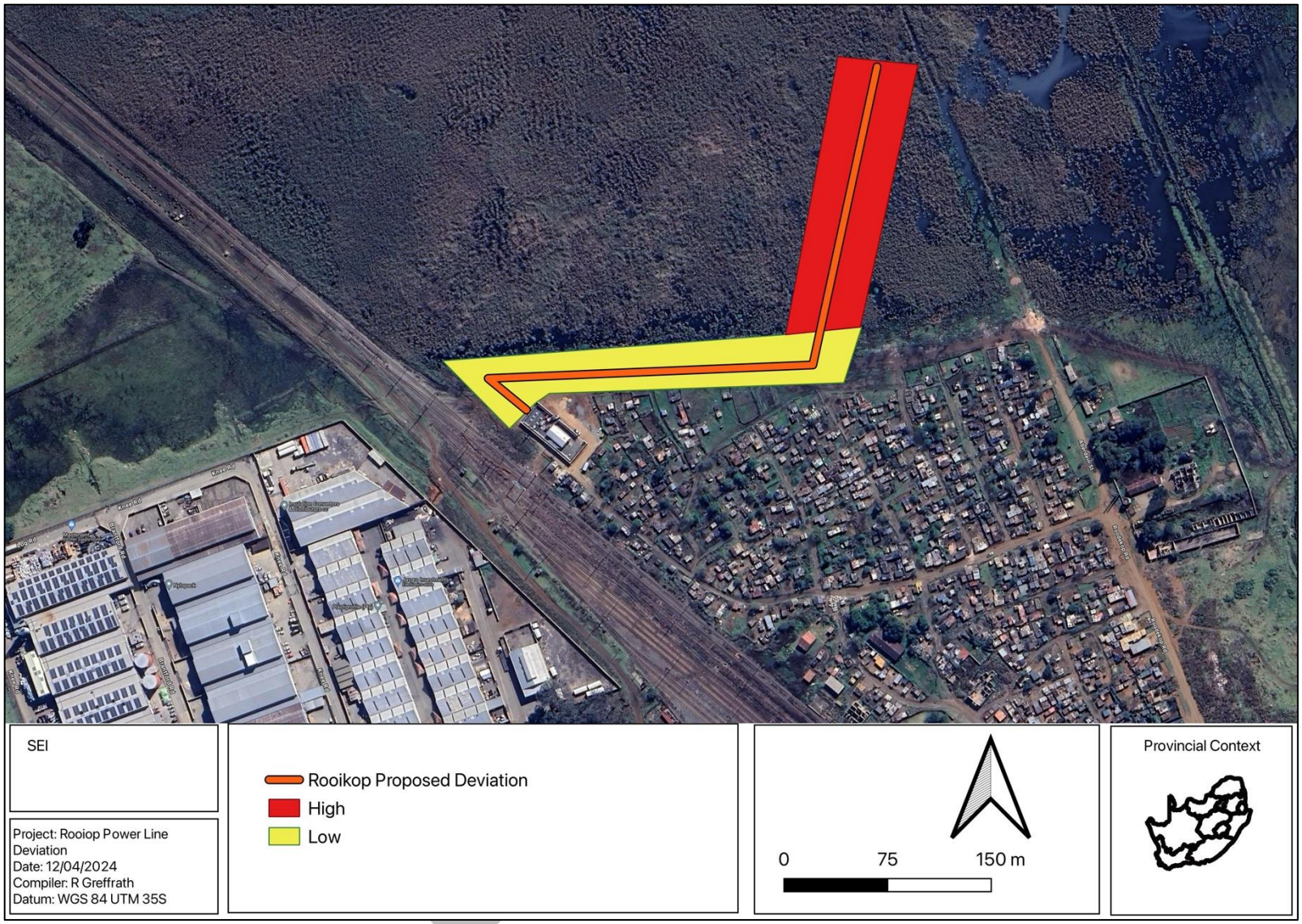


Figure 6-1: SEI for Rooikop

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 suite of anticipated activities, is used in this section, as per guidelines. It allows for rapid spatial inspection and evaluation of 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) influence and areas of potential indirect (secondary and tertiary) influences, as these relate to the PAOI.

7.1 Present Impacts to Biodiversity

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

- Historic and current land modification.
- Domestic animals.
- Rural 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 Rooikop 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

- CBA Important area and Ecological support area will be impacted on, High SEI habitat will be lost,
- The likelihood of losing SCC 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	• • Spilling of hazardous waste • Water and wastewater leakages • Dumping of waste products • Random events such as fire (cooking fires or cigarettes)	• Loss of flora including possible SCC • Increased potential for soil erosion • Habitat fragmentation • Increased potential for establishment of invasive alien vegetation
Direct mortality of fauna	• Roadkill, via vehicle collisions • Avifauna collisions with transmission line wires. • Electrocution.	• 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	• 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

	• Unsanitary conditions surrounding infrastructure	
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 proposed powerline 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 disturbed riparian Grassland and Riparian areas. No animal or plant SCC were recorded within the PAOI.

During this phase the infrastructure will be constructed, this includes roads, Powerline and ancillary infrastructure. 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 environment.

Error! Reference source not found. summarises the significance of the operational phase impacts on biodiversity before and after implementation of mitigation measures.

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 possible SCC) due to collisions with substation, electrocution, 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 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 7-8: 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 possible 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	3 (Regional)	4 (Long-Term)	8 (High)	5 (High)	75 (Definite)
	Yes	Negative	3 (Site only)	4 (Long-Term)	8 (High)	3 (Medium)	45 (Medium)
Corrective Actions	• Refer to Table 9-1						

7.5 Rehabilitation Phase

7.5.1 Project Activities Assessed

This phase is when the powerlines 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 7-9: 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 7-10: 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 Rooikop project can best be described by considering current disturbance in the general area. Taking into consideration the general disturbed and often transformed state of the site, as well as the sensitivity of the habitat present, the cumulative impact is regarded as Low to Moderate.

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. Below Table 9-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the 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.	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.	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 be considered, and high 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 tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

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
Any individual of the 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 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.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
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. 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 protection of these species. Should animals not move out of the area	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase

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/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
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 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: 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 signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

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

Most of the project area has been altered both currently and historically with much of the powerline following impacted habitat. The present land use had a direct impact on both the fauna and the flora along the powerline route, which is evident in the disturbed and transformed habitats, and the species encountered. However, the disturbed riparia grassland and riparian habitats can be regarded as important, not only within the local landscape, but also regionally as they are used for habitat, foraging and movement corridors. The habitat sensitivity of the wetlands and rivers is regarded as very high. This is due to the species recorded as well as the role of this largely intact habitat to biodiversity within a very fragmented local landscape. The very high wetlands sensitivity terrestrial areas still:

- Serve as and represent CBA important as per the Conservation Plan;
- Serve as and represent ESA per the Conservation Plan; and
- Support various organisms and may play an important role in the ecosystem if left to recover from the superficial impacts.

CBA designated areas are considered a significant and ecologically sensitive area and needs to be kept in a pristine or near-natural state to ensure the continued functioning of ecosystems.

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

The proposed development \may be favourably considered, and no fatal flaws are expected, if mitigation measures in this and other specialist reports are followed. It is thereby suggested that a route which avoids the wetlands, be designed. The future development must adhere to the prescribed mitigation measures. Whilst the post-mitigation impact significance is low for the aspects that have been considered.

12 Impact Statement

The main expected impacts of the Rooikop powerline will include the following:

- habitat loss and fragmentation, including the possible loss of SCC.
- degradation of surrounding habitat; and
- 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 SCC, and there 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), 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 are managed in terms of the objectives set forth on this report.

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Appendix A: CV

Mr. Rudolph Greffrath

Terrestrial Ecology Specialist

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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

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- 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.
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Appendix B: Expected Plant Species

Family	*Genus*	*Sp1*	IUCN	Ecology
Malvaceae	*Sida*	*rhombifolia*		
Apocynaceae	*Aspidoglossum*	*biflorum*		
Santalaceae	*Thesium*	*deceptum*		
Acanthaceae	*Barleria*	*macrostegia*		
Geraniaceae	*Geranium*	*multisectum*		
Convolvulaceae	*Convolvulus*	*farinosus*		
Asteraceae	*Helichrysum*	*aureum*		
Fabaceae	*Argyrolobium*	*tuberosum*		
Caryophyllaceae	*Pollichia*	*campestris*		
Poaceae	*Cynodon*	*transvaalensis*		
Polygalaceae	*Polygala*	*houtboshiana*		
Poaceae	*Trachypogon*	*spicatus*		
Asteraceae	*Schkuhria*	*pinnata*		
Poaceae	*Pennisetum*	*sphacelatum*		
Asparagaceae	*Asparagus*	*cooperi*		
Iridaceae	*Gladiolus*	*permeabilis*		
Cyperaceae	*Cyperus*	*obtusiflorus*		
Sapotaceae	*Mimusops*	*zeyheri*		
Asteraceae	*Hilliardiella*	*hirsuta*		
Santalaceae	*Thesium*	*rasum*		
Poaceae	*Poa*	*annua*		
Asteraceae	*Conyza*	*podocephala*		
Apocynaceae	*Cordylogyne*	*globosa*		
Poaceae	*Diheteropogon*	*amplectens*		
Asteraceae	*Helichrysum*	*nudifolium*		
Santalaceae	*Thesium*	*impeditum*		
Caryophyllaceae	*Dianthus*	*mooiensis*		
Amaranthaceae	*Dysphania*	*schraderiana*		
Asteraceae	*Athrixia*	*elata*		
Anacardiaceae	*Searsia*	*leptodictya*		
Aizoaceae	*Khadia*	*acutipetala*		
Apocynaceae	*Ancylobothrys*	*capensis*		
Asteraceae	*Crepis*	*hypochaeridea*		
Asphodelaceae	*Bulbine*	*narcissifolia*		
Iridaceae	*Gladiolus*	*crassifolius*		
Rosaceae	*Cliffortia*	*nitidula*		
Asteraceae	*Cenia*	*microglossa*		

Asteraceae	*Schistostephium*	*crataegifolium*		
Dioscoreaceae	*Dioscorea*	*sylvatica*		
Phytolaccaceae	*Phytolacca*	*octandra*		
Poaceae	*Eragrostis*	*nindensis*		
Poaceae	*Aristida*	*diffusa*		
Malvaceae	*Abutilon*	*sonneratianum*		
Rubiaceae	*Pentanisia*	*angustifolia*		
Anacardiaceae	*Searsia*	*discolor*		
Ebenaceae	*Euclea*	*crispa*		
Fabaceae	*Trifolium*	*africanum*		
Fabaceae	*Indigofera*	*oxytropis*		
Lamiaceae	*Teucrium*	*trifidum*		
Droseraceae	*Drosera*	*burkeana*		
Malvaceae	*Sida*	*chrysantha*		
Rubiaceae	*Afrocanthium*	*gilfillanii*		
Ebenaceae	*Diospyros*	*lycioides*		
Poaceae	*Alloteropsis*	*semialata*		
Agapanthaceae	*Agapanthus*	*campanulatus*		
Orchidaceae	*Satyrium*	*hallackii*		
Asteraceae	*Felicia*	*filifolia*		
Convolvulaceae	*Ipomoea*	*oblongata*		
Rhamnaceae	*Ziziphus*	*zeyheriana*		
Apocynaceae	*Stenostelma*	*umbelluliferum*		
Crassulaceae	*Crassula*	*setulosa*		
Cyperaceae	*Isolepis*	*cernua*		
Asteraceae	*Berkheya*	*seminivea*		
Orchidaceae	*Habenaria*	*bicolor*		
Fabaceae	*Trifolium*	*africanum*		
Poaceae	*Andropogon*	*appendiculatus*		
Solanaceae	*Solanum*	*retroflexum*		
Poaceae	*Harpochloa*	*falx*		
Asteraceae	*Aster*	*peglerae*		
Apocynaceae	*Stenostelma*	*periglossoides*		
Dioscoreaceae	*Dioscorea*	*quartiniana*		
Asteraceae	*Lopholaena*	*coriifolia*		
Apocynaceae	*Xysmalobium*	*undulatum*		
Asteraceae	*Hilliardiella*	*sutherlandii*		
Malvaceae	*Hermannia*	*lancifolia*		
Hyacinthaceae	*Ornithogalum*	*flexuosum*		
Fabaceae	*Melolobium*	*wilmsii*		
Poaceae	*Imperata*	*cylindrica*		
Asteraceae	*Denekia*	*capensis*		

Lamiaceae	*Ajuga*	*ophrydis*		
Menispermaceae	*Antizoma*	*angustifolia*		
Hyacinthaceae	*Drimia*	*multisetosa*		
Poaceae	*Heteropogon*	*contortus*		
Asphodelaceae	*Trachyandra*	*erythrorrhiza*		
Cyperaceae	*Eleocharis*	*limosa*		
Asteraceae	*Arctotis*	*arctotoides*		
Acanthaceae	*Barleria*	*obtusa*		
Poaceae	*Brachiaria*	*serrata*		
Apocynaceae	*Parapodium*	*costatum*		
Poaceae	*Paspalum*	*distichum*		
Solanaceae	*Solanum*	*rigescens*		
Amaryllidaceae	*Scadoxus*	*multiflorus*		
Combretaceae	*Combretum*	*erythrophyllum*		
Asteraceae	*Hilliardiella*	*oligocephala*		
Anacardiaceae	*Searsia*	*rigida*		
Asphodelaceae	*Trachyandra*	*saltii*		
Asteraceae	*Ursinia*	*nana*		
Fabaceae	*Senegalia*	*caffra*		
Asteraceae	*Berkheya*	*zeyheri*		
Anacardiaceae	*Searsia*	*magalismontana*		
Poaceae	*Echinochloa*	*jubata*		
Poaceae	*Hyparrhenia*	*dregeana*		
Fabaceae	*Elephantorrhiza*	*elephantina*		
Scrophulariaceae	*Selago*	*capitellata*		
Rubiaceae	*Agathisanthemum*	*bojeri*		
Asparagaceae	*Asparagus*	*suaveolens*		
Iridaceae	*Gladiolus*	*sericeovillosus*		
Asphodelaceae	*Aloe*	*jeppeae*		
Poaceae	*Cymbopogon*	*caesius*		
Asteraceae	*Senecio*	*barbertonicus*		
Cyperaceae	*Abildgaardia*	*ovata*		
Poaceae	*Chloris*	*virgata*		
Apocynaceae	*Aspidoglossum*	*ovalifolium*		
Poaceae	*Lolium*	*perenne*		
Asteraceae	*Tagetes*	*minuta*		
Asparagaceae	*Asparagus*	*laricinus*		
Apocynaceae	*Aspidoglossum*	*lamellatum*		
Santalaceae	*Thesium*	*exile*		
Orchidaceae	*Eulophia*	*cooperi*		
Poaceae	*Hyparrhenia*	*hirta*		
Ranunculaceae	*Ranunculus*	*dregei*		

Poaceae	*Aristida*	*bipartita*		
Asteraceae	*Dimorphotheca*	*caulescens*		
Solanaceae	*Solanum*	*sisymbriifolium*		
Asteraceae	*Garuleum*	*woodii*		
Fabaceae	*Macrotyloma*	*axillare*		
Fabaceae	*Indigofera*	*dimidiata*		
Lamiaceae	*Syncolostemon*	*pretoriae*		
Solanaceae	*Solanum*	*mauritianum*		
Asteraceae	*Senecio*	*isatideus*		
Convolvulaceae	*Falkia*	*oblonga*		
Orchidaceae	*Habenaria*	*epipactidea*		
Orchidaceae	*Orthochilus*	*leontoglossus*		
Poaceae	*Elionurus*	*muticus*		
Orchidaceae	*Eulophia*	*tuberculata*		
Poaceae	*Panicum*	*repens*		
Asteraceae	*Tripteris*	*aghillana*		
Fabaceae	*Leobordea*	*hirsuta*		
Fabaceae	*Rhynchosia*	*totta*		
Malvaceae	*Hermannia*	*grandistipula*		
Fabaceae	*Dichilus*	*strictus*		
Solanaceae	*Physalis*	*angulata*		
Orchidaceae	*Habenaria*	*nyikana*		
Hyacinthaceae	*Dipcadi*	*viride*		
Orobanchaceae	*Harveya*	*speciosa*		
Vitaceae	*Rhoicissus*	*tridentata*		
Juncaceae	*Juncus*	*rigidus*		
Poaceae	*Eustachys*	*paspaloides*		
Acanthaceae	*Blepharis*	*stainbankiae*		
Rubiaceae	*Galium*	*capense*		
Fabaceae	*Eriosema*	*burkei*		
Fabaceae	*Indigofera*	*daleoides*		
Cyperaceae	*Cyperus*	*congestus*		
Iridaceae	*Gladiolus*	*papilio*		
Orchidaceae	*Eulophia*	*ovalis*		
Fabaceae	*Vicia*	*sativa*		
Convolvulaceae	*Ipomoea*	*crassipes*		
Hypoxidaceae	*Hypoxis*	*acuminata*		
Crassulaceae	*Crassula*	*nodulosa*		
Asteraceae	*Athrixia*	*phylicoides*		
Asphodelaceae	*Aloe*	*ecklonis*		
Poaceae	*Digitaria*	*monodactyla*		
Poaceae	*Tristachya*	*leucothrix*		

Aizoaceae	*Lithops*	*lesliei*		
Asteraceae	*Helichrysum*	*setosum*		
Orobanchaceae	*Striga*	*bilabiata*		
Fabaceae	*Rhynchosia*	*pedunculata*		
Apiaceae	*Alepidea*	*peduncularis*		
Fabaceae	*Indigastrum*	*burkeanum*		
Anacardiaceae	*Searsia*	*rigida*		
Fabaceae	*Mundulea*	*sericea*		
Asteraceae	*Senecio*	*hieracioides*		
Asteraceae	*Cineraria*	*parvifolia*		
Fabaceae	*Tephrosia*	*longipes*		
Amaranthaceae	*Achyranthes*	*aspera*		
Apocynaceae	*Pachycarpus*	*schinzianus*		
Crassulaceae	*Crassula*	*alba*		
Fabaceae	*Abrus*	*laevigatus*		
Lobeliaceae	*Monopsis*	*decipiens*		
Commelinaceae	*Cyanotis*	*speciosa*		
Apocynaceae	*Asclepias*	*eminens*		
Hyacinthaceae	*Ledebouria*	*inquinata*		
Pteridaceae	*Cheilanthes*	*viridis*		
Malvaceae	*Hermannia*	*geniculata*		
Asteraceae	*Cineraria*	*aspera*		
Cyperaceae	*Bulbostylis*	*burchellii*		
Poaceae	*Andropogon*	*schirensis*		
Fabaceae	*Lablab*	*purpureus*		
Santalaceae	*Osyris*	*lanceolata*		
Fabaceae	*Indigastrum*	*fastigiatum*		
Asteraceae	*Senecio*	*coronatus*		
Iridaceae	*Moraea*	*stricta*		
Fabaceae	*Rhynchosia*	*reptabunda*		
Rubiaceae	*Vangueria*	*infausta*		
Asphodelaceae	*Aloe*	*pretoriensis*		
Poaceae	*Alloteropsis*	*semialata*		
Fabaceae	*Argyrolobium*	*campicola*		
Scrophulariaceae	*Buddleja*	*saligna*		
Lamiaceae	*Stachys*	*caffra*		
Ebenaceae	*Diospyros*	*austroafricana*		
Cyperaceae	*Fuirena*	*coerulescens*		
Fabaceae	*Tephrosia*	*capensis*		
Cyperaceae	*Scirpoides*	*burkei*		
Poaceae	*Sporobolus*	*discosporus*		
Fabaceae	*Chamaecrista*	*comosa*		

Asteraceae	*Helichrysum*	*harveyanum*		
Poaceae	*Sporobolus*	*natalensis*		
Cyperaceae	*Isolepis*	*costata*		
Juncaceae	*Juncus*	*exsertus*		
Scrophulariaceae	*Jamesbrittenia*	*aurantiaca*		
Menyanthaceae	*Nymphoides*	*thunbergiana*		
Lythraceae	*Ammannia*	*schinzii*		
Poaceae	*Panicum*	*schinzii*		
Brassicaceae	*Nasturtium*	*officinale*		
Hypoxidaceae	*Hypoxis*	*multiceps*		
Polygalaceae	*Polygala*	*illepida*		
Asteraceae	*Helichrysum*	*caespititium*		
Asteraceae	*Cotula*	*coronopifolia*		
Orchidaceae	*Eulophia*	*livingstoneana*		
Molluginaceae	*Psammotropha*	*breviscapa*		
Poaceae	*Eragrostis*	*curvula*		
Fabaceae	*Erythrina*	*zeyheri*		
Cyperaceae	*Kyllinga*	*pulchella*		
Fabaceae	*Indigofera*	*obscura*		
Euphorbiaceae	*Jatropha*	*lagarinthoides*		
Thymelaeaceae	*Lasiosiphon*	*caffer*		
Poaceae	*Digitaria*	*ternata*		
Iridaceae	*Moraea*	*pallida*		
Poaceae	*Arundinella*	*nepalensis*		
Fabaceae	*Zornia*	*linearis*		
Ruscaceae	*Sansevieria*	*aethiopica*		
Fabaceae	*Rhynchosia*	*sordida*		
Poaceae	*Eragrostis*	*stapfii*		
Lamiaceae	*Leonotis*	*ocymifolia*		
Crassulaceae	*Crassula*	*arborescens*		
Iridaceae	*Moraea*	*simulans*		
Fabaceae	*Rhynchosia*	*adenodes*		
Asphodelaceae	*Aloe*	*marlothii*		
Lobeliaceae	*Lobelia*	*sonderiana*		
Scrophulariaceae	*Diclis*	*rotundifolia*		
Poaceae	*Aristida*	*canescens*		
Fabaceae	*Vigna*	*vexillata*		
Cucurbitaceae	*Kedrostis*	*africana*		
Asteraceae	*Helichrysum*	*chionosphaerum*		
Thymelaeaceae	*Gnidia*	*gymnostachya*		
Poaceae	*Setaria*	*nigrirostris*		
Geraniaceae	*Pelargonium*	*sidoides*		

Alliaceae	*Tulbaghia*	*leucantha*		
Cyperaceae	*Fuirena*	*pubescens*		
Fabaceae	*Argyrolobium*	*speciosum*		
Bruniaceae	*Brunia*	*noduliflora*		
Alismataceae	*Alisma*	*plantago-aquatica*		
Convolvulaceae	*Cuscuta*	*campestris*		
Solanaceae	*Solanum*	*panduriforme*		
Solanaceae	*Withania*	*somnifera*		
Apocynaceae	*Asclepias*	*gibba*		
Lamiaceae	*Salvia*	*runcinata*		
Poaceae	*Eragrostis*	*capensis*		
Solanaceae	*Datura*	*stramonium*		
Asteraceae	*Nidorella*	*anomala*		
Myrsinaceae	*Myrsine*	*africana*		
Asteraceae	*Dimorphotheca*	*spectabilis*		
Amaryllidaceae	*Haemanthus*	*humilis*		
Fabaceae	*Indigofera*	*hedyantha*		
Polygonaceae	*Persicaria*	*attenuata*		
Poaceae	*Setaria*	*sphacelata*		
Poaceae	*Koeleria*	*capensis*		
Thymelaeaceae	*Lasiosiphon*	*kraussianus*		
Asteraceae	*Geigeria*	*burkei*		
Asteraceae	*Athrixia*	*angustissima*		
Poaceae	*Miscanthus*	*junceus*		
Asteraceae	*Helichrysum*	*kraussii*		
Fabaceae	*Dolichos*	*falciformis*		
Amaranthaceae	*Amaranthus*	*muricatus*		
Asteraceae	*Vernonia*	*galpinii*		
Poaceae	*Paspalum*	*dilatatum*		
Malvaceae	*Hermannia*	*coccocarpa*		
Poaceae	*Leptochloa*	*fusca*		
Asteraceae	*Aster*	*harveyanus*		
Santalaceae	*Thesium*	*transvaalense*		
Proteaceae	*Protea*	*caffra*		
Acanthaceae	*Crabbea*	*acaulis*		
Malvaceae	*Melhania*	*prostrata*		
Cyperaceae	*Fimbristylis*	*complanata*		
Poaceae	*Trichoneura*	*grandiglumis*		
Asteraceae	*Helichrysum*	*lepidissimum*		
Fabaceae	*Indigofera*	*hilaris*		
Thymelaeaceae	*Lasiosiphon*	*capitatus*		
Dioscoreaceae	*Dioscorea*	*sylvatica*		

Poaceae	*Leersia*	*hexandra*		
Fabaceae	*Dichilus*	*lebeckioides*		
Fabaceae	*Tephrosia*	*semiglabra*		
Juncaceae	*Juncus*	*lomatophyllus*		
Thymelaeaceae	*Lasiosiphon*	*microcephalus*		
Poaceae	*Digitaria*	*diagonalis*		
Rosaceae	*Rubus*	*rigidus*		
Poaceae	*Agrostis*	*eriantha*		
Poaceae	*Urochloa*	*panicoides*		
Asteraceae	*Helichrysum*	*rugulosum*		
Amaranthaceae	*Chenopodium*	*album*		
Potamogetonaceae	*Potamogeton*	*pectinatus*		
Asteraceae	*Helichrysum*	*cephaloideum*		
Poaceae	*Panicum*	*maximum*		
Gentianaceae	*Exochaenium*	*grande*		
Geraniaceae	*Monsonia*	*angustifolia*		
Asteraceae	*Dicoma*	*gerrardii*		
Pteridaceae	*Adiantum*	*raddianum*		
Malvaceae	*Hermannia*	*cordata*		
Hypericaceae	*Hypericum*	*aethiopicum*		
Poaceae	*Eragrostis*	*sclerantha*		
Celastraceae	*Pterocelastrus*	*echinatus*		
Poaceae	*Eragrostis*	*tef*		

Appendix C: Plant Species Recorded

Scientific Name	**Common Name**	**Threat Status (SANBI 2021)**	**Invasive Category**
Tagetes minuta	Tall Khaki Weed		Alien Invasive
Datura stramonium	Common Thorn Apple		Cat 1B
Eucalyptus camaldulensis	Red River Gum		Cat 1B
Gleditsia triacanthos	Honey Locust		Cat 1B
Pennisetum clandestinum	Kikuyu Grass	Exotic	Cat 1B
Verbena bonariensis	Tall Verbena		Cat 1B
Melinis repens	Natal Red Top	Increaser 2 - Pioneer to subclimax	Grass
Themeda triandra	Red Grass	Decreaser - Climax	Grass
Phragmites australis	Common Reed	Decreaser	Grass
Chamaecrista mimosoides	Fishbone Dwarf Cassia		Herb
Typha capensis	Bulrush	Medicinal	Reed
Cucumis hirsutus	Wild Cucumber	Medicinal	Trailing Herb
Asparagus laricinus	Cluster leaved asparagus		Weed
Bidens pilosa	Common Black-jack		Weed
Plantago major			Weed
Alternanthera pungens			
Amaranthus deflexus			
Aristida congesta congesta	Tassel Tree-awn	Increaser 2 - Pioneer	
Asparagus laricinus			
Canna indica	Canna		
Celtis africana	White Stinkwood		
Chilianthus hirta			
Chloris virgata	Feather top Chloris	Pioneer increaser 2	
Combretum erythrophyllum	River Bushwillow		
Conyza canadensis			
Cosmos bipinnata			
Cynodon dactylon	Couch Grass	Increaser 2 - Pioneer	
Cyperus congestus			
Cyperus denudatus	Winged Sedge		
Eragrostis trichophora	Hairy Love Grass	Increaser 2 - Subclimax	
Harpochloa falx	Caterpillar Grass	Increaser 1 - Climax	
Kyllinga erecta			
Pellaea calomelanos			
Pentarrhinum insipidum			
Pentzia globosa			

Polydora poskeana			
Ricinus communis	Caster-oil Plant		
Setaria sphacelata var. sphacelata	Bristle Grass	Decreaser - Climax	
Solanum mauritianum	Bugweed	Alien Invasive*	
Sporobolus africanus	Ratstail dropseed	Subclimax increaser 3	
Urochloa mosambicensis	*Bushveld Signal Grass*	Increaser 2 - Pioneer to subclimax	
Vachellia karoo	Sweet Thorn		