BIODIVERSITY BASELINE AND IMPACT ASSESSMENT FOR THE PROPOSED MARALLA 132KV POWER LINE

Sutherland, Northern Cape, South Africa

May 2022

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**BIODIVERSITY BASELINE AND IMPACT ASSESSMENT FOR THE PROPOSED MARALLA 132KV POWER LINE**
Submitted to	
Report Writer	**Marnus Erasmus** Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015. Martinus is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.
Report Writer / Reviewer	**Andrew Husted** Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

DECLARATION

I, Marnus Erasmus, declare that:

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

Marnus Erasmus

Biodiversity Specialist

The Biodiversity Company

September 2021

DECLARATION

I, Andrew Husted, declare that:

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

Andrew Husted

Ecologist

The Biodiversity Company

September 2021

Table of Contents

List of Tables

List of Figures

1 Introduction

The Biodiversity Company was commissioned to conduct a terrestrial assessment for the proposed 132kV overhead power line (OHL) to connect the Maralla East and West Wind Energy Facilities (WEF) to the national grid via the existing Karusa substation. The power line is approximately 18 km long, and six alternatives were provided.

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

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

1.1 Project Area

The extent of the project area of Influence (POAI) comprised a 100 m corridor width, also referred to as the project area. The priority for the assessment was afforded the power line servitudes. Areas identified at a desktop level as ecologically important features were further investigated during the site assessment.

1.2 Project Description

The project is situated south-east of the town of Sutherland in the Karoo Hoogland Local Municipality in the Northern Cape Province (Figure 1-1). The 132kV grid connection traverses the following properties:

- Farm Kentucky 206 remainder ;
- Farm Drie Roode Heuwels 180 Remainder ;
- Farm Orangefontein 203 Portion 1 and Remainder ; and
- Farm De Hoop 202 Remainder

The OHL will be a 132kV steel single or double structure with kingbird conductor (between 15 and 20 m in height – above ground level). Standard overhead line construction methodology will be employed – drill holes (typically 2 – 3 m in depth), plant poles, string conductor. It is not envisaged that any large excavations and stabilized backfill will be required however this will only be verified on site once the Geotech has been undertaken at each pole position (part of construction works).

The surrounding land uses include natural areas, secondary roads, and water resources in the form of drainage lines.

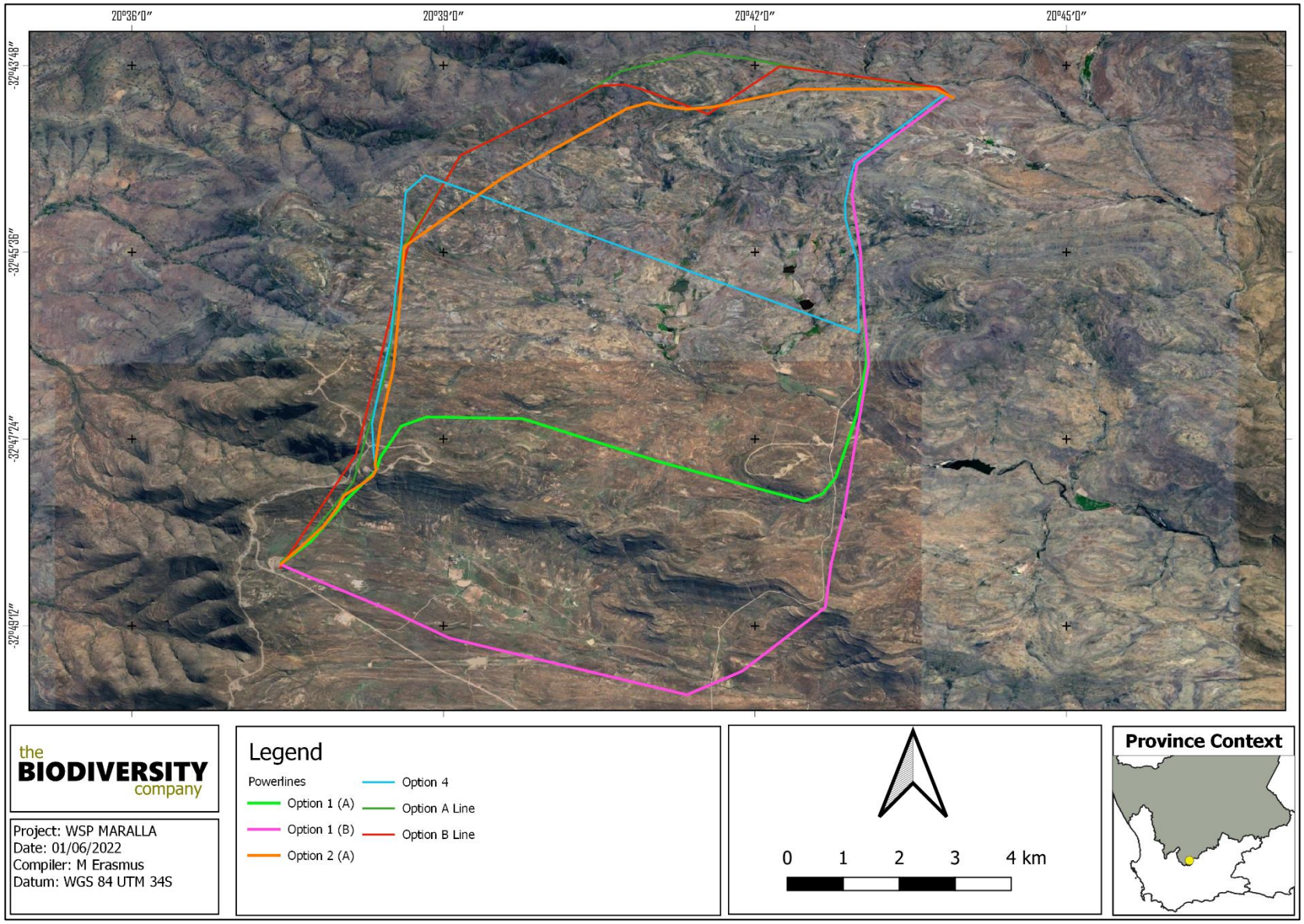


Figure 1-1 The project area in a local context.

1.3 Scope of Work

The proposed methodology includes both a desktop review and a field work component. A desktop review of distribution lists (including Red Data Listed (RDL) species) and available literature will be conducted to guide the field work component. The principle aim of the assessment was to provide information to guide the risk of the proposed activity to the flora and fauna communities of the associated ecosystems within the project area/corridor. This was achieved through the following:

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

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the project area and infrastructure provided by the client and any alterations to the route would have affected the area surveyed;
- The project area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends;
    - Due to time constraints, only certain parts of the power line alternatives were assessed in field, portions not accessed will be assessed by extrapolation of field data.
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

1.5 Key Legislative Requirements

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

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

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)

	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA, 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
	Northern Cape Nature Conservation act no. 9 of 2009
	Northern Cape Planning and Development Act no. 7 of 1998

2 Methods

2.1 Desktop Assessment

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

2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
    - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large,

intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- Critical Biodiversity Areas (Northern Cape Department of Environment and Nature Conservation, 2008) – Critical Biodiversity Areas (CBAs) are natural or near-natural features, habitats or landscapes that include terrestrial, aquatic and marine areas that are considered critical for:
    - meeting national and provincial biodiversity targets and thresholds;
    - safeguarding areas required to ensure the persistence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
    - conserving important locations for biodiversity features or rare species.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

2.1.2 Desktop Flora Assessment

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

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

- Field Guide to Fynbos (Manning,2018);
- Wild Flowers of Namaqualand (le Roux,2015);
- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A field guide to Wild flowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);

- Mesembs of the World (Smith *et al.,* 1998);
- Medicinal Plants of South Africa (Van Wyk *et al.,* 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.,* 2015).

Additional information regarding ecosystems, vegetation types, and Species of Conservation Concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012); and
- Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2016).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

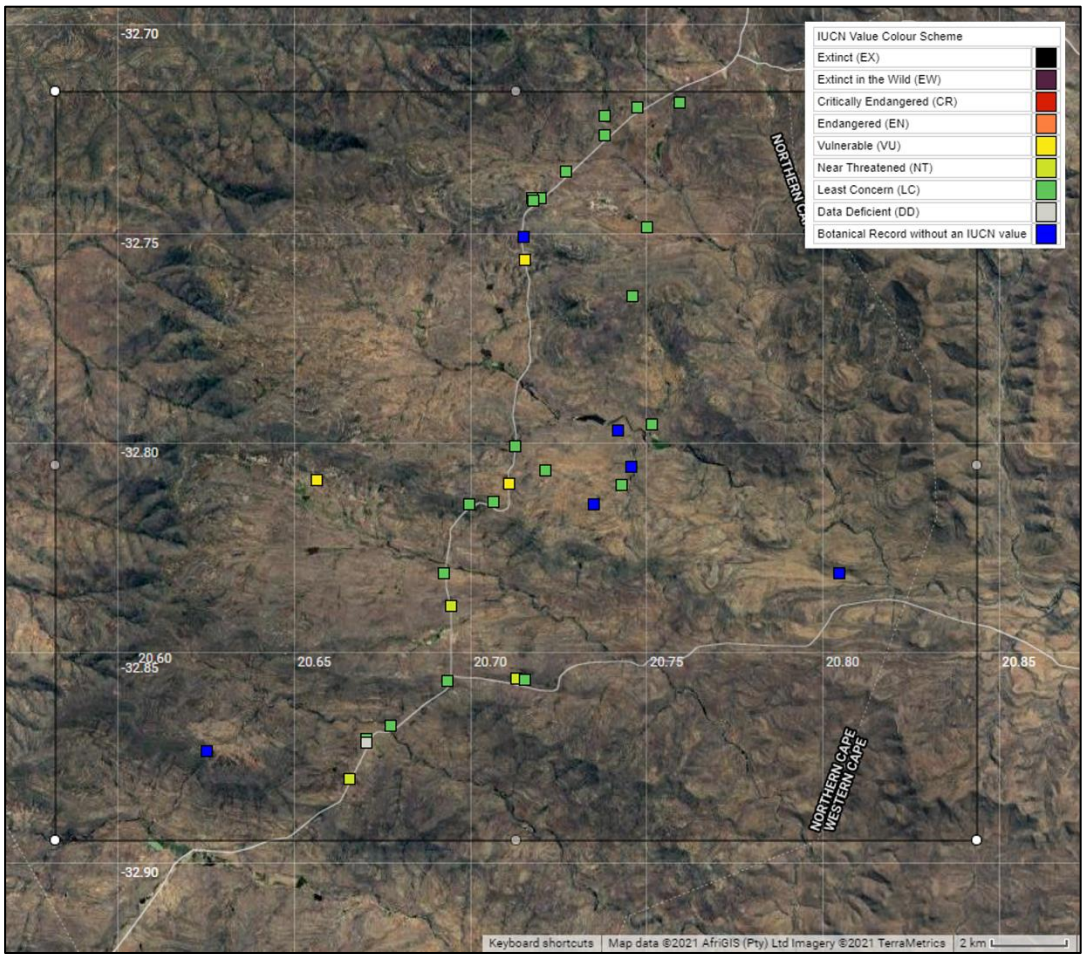


Figure 2-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. The red squares are cluster markers of botanical records as per POSA data.***

2.1.3 Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compilation of expected species lists;
- Identification of any Red Data or SCC potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

Mammal distribution data were obtained from the following information sources:

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al.,* 2010);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za) (EWT, 2016); and
- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2019) (mammalmap.adu.org.za).

While the Avifauna distribution and other pertinent data was obtained from:

- Southern African Bird Atlas Project 2 (SABAP2, 2019);
- Birdlife South Africa (2015);
- Birdlife. (2017). Important Bird Areas Factsheets;
- Checklist of the Birds of the World (Del Hoyo *et al.,* 1996);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.,* 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.,* 2005).

A herpetofauna desktop assessment of the possible species in the area was undertaken and attention was paid to the SCCs, sources used included the IUCN (2017) and ADU (2019). Herpetofauna distributional data was obtained from the following information sources:

- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.,* 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- Animal Demography Unit (ADU) - FrogMAP (frogmap.adu.org.za);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.,* 2004); and
- Ensuring a future for South Africa's frogs (Measey, 2011).

2.2 Biodiversity Field Assessment

A single field survey was undertaken in September 2021, to determine the presence of SCC. Effort was made to cover all the different habitat types within the limits of time and access, focus being placed on areas where proposed infrastructure was going to be placed.

2.2.1 Flora Survey

The fieldwork and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site. 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 a highly efficient method 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. drainage lines, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

2.2.2 Fauna Survey

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

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls;
- Identification of tracks and signs; and
- Utilization of local knowledge.

Site selection for trapping focussed on the representative habitats within the project area. Sites were selected on the basis of GIS mapping and Google Earth imagery and then final selection was confirmed through ground truthing during the surveys. Habitat types sampled included pristine, disturbed and semi-disturbed zones, drainage lines and wetlands.

The herpetofauna field assessment was conducted in each habitat or vegetation type within the project area, as identified from the desktop assessment, with a focus on those areas which will be most impacted by the proposed development (i.e. the infrastructure development and waste dumping areas). The herpetological field survey comprised the following techniques:

- Hand searching is used for reptile species that shelter in or under particular habitats. Visual searches, typically undertaken for species which activities occur on surfaces or for species that are difficult to detect by hand-searches or trap sampling. 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.).

2.3 Terrestrial Site Ecological Importance

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 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 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 from Functional Integrity and Conservation Importance

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 criteria

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

	likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

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

Table 2-5 Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance

Site Ecological Importance		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 in the context of the proposed development activities

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

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

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

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

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a LC ecosystem.	3.1.1.1
Ecosystem Protection Level	Relevant – Overlaps mainly with a Not Protected Ecosystem.	3.1.1.2
SAIIAE	Relevant –Overlaps with a LT river system that is also an Upstream Management Area	3.1.1.3
Protected Areas	Irrelevant – Located 51 km from the nearest protected area.	-
National Protected Areas Expansion Strategy	Relevant – Overlaps with the Western Karoo NPAES	3.1.1.4
Conservation Plan	Relevant – Intersects: • CBA1 and CBA2; •ESA1 (Western Cape); and •ONA (Western Cape).	3.1.1.5
Important Bird and Biodiversity Areas	Irrelevant -52 km from the closest IBA (Anysberg Nature Reserve).	-
Strategic Water Source Areas	Irrelevant – 75+ km to the closest SWSA.	-
Succulent Karoo Ecosystem Programme	Relevant: Overlaps with a bird endemic area	3.1.1.6
Renewable Energy Development Zones	Relevant - The project area falls within the Komsberg Wind REDZ	3.1.1.7

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed development overlaps a LC ecosystem (Figure 3-1).

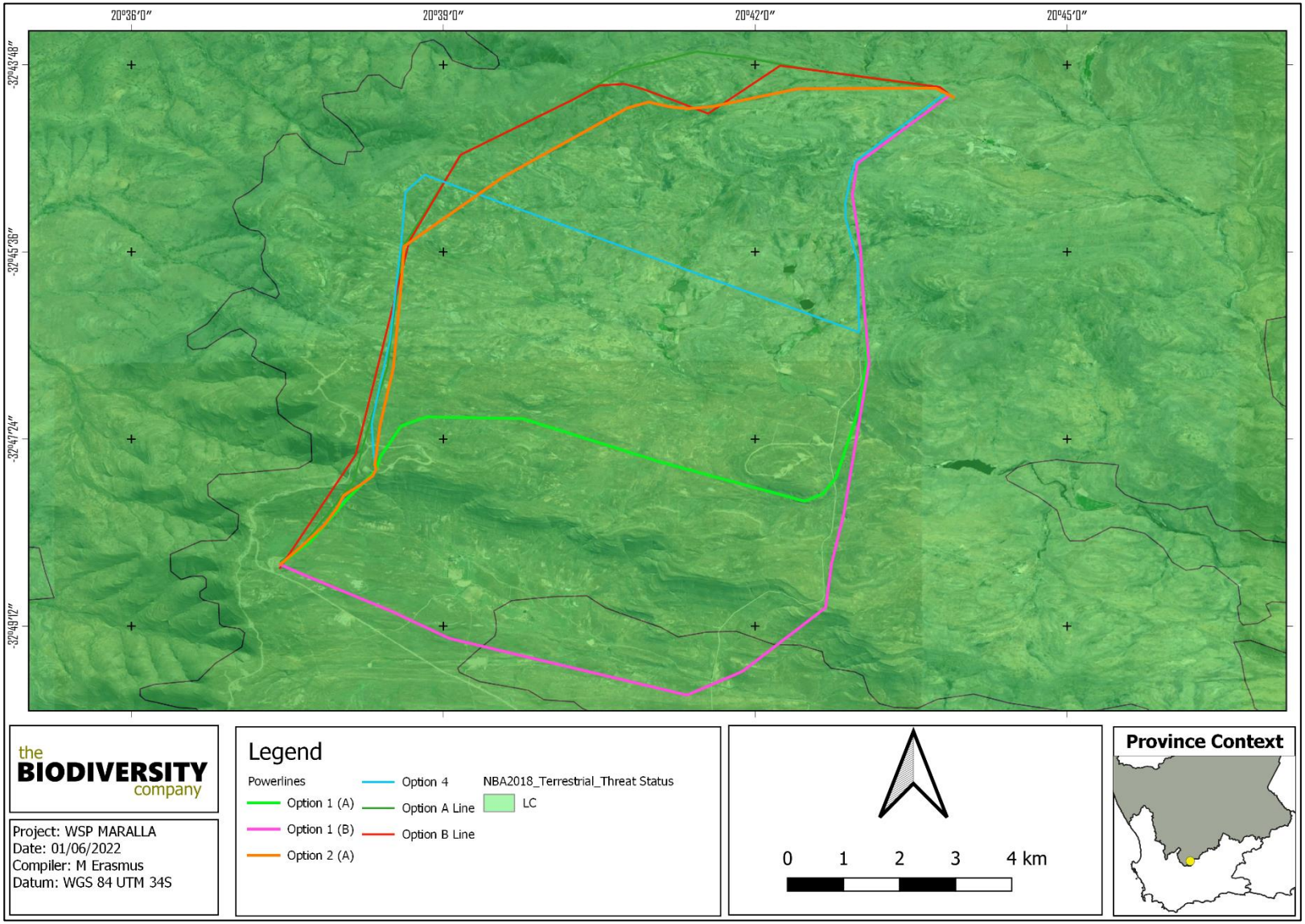


Figure 3-1 Map illustrating the ecosystem threat status associated with the proposed project area

3.1.1.2 Ecosystem Protection Level

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

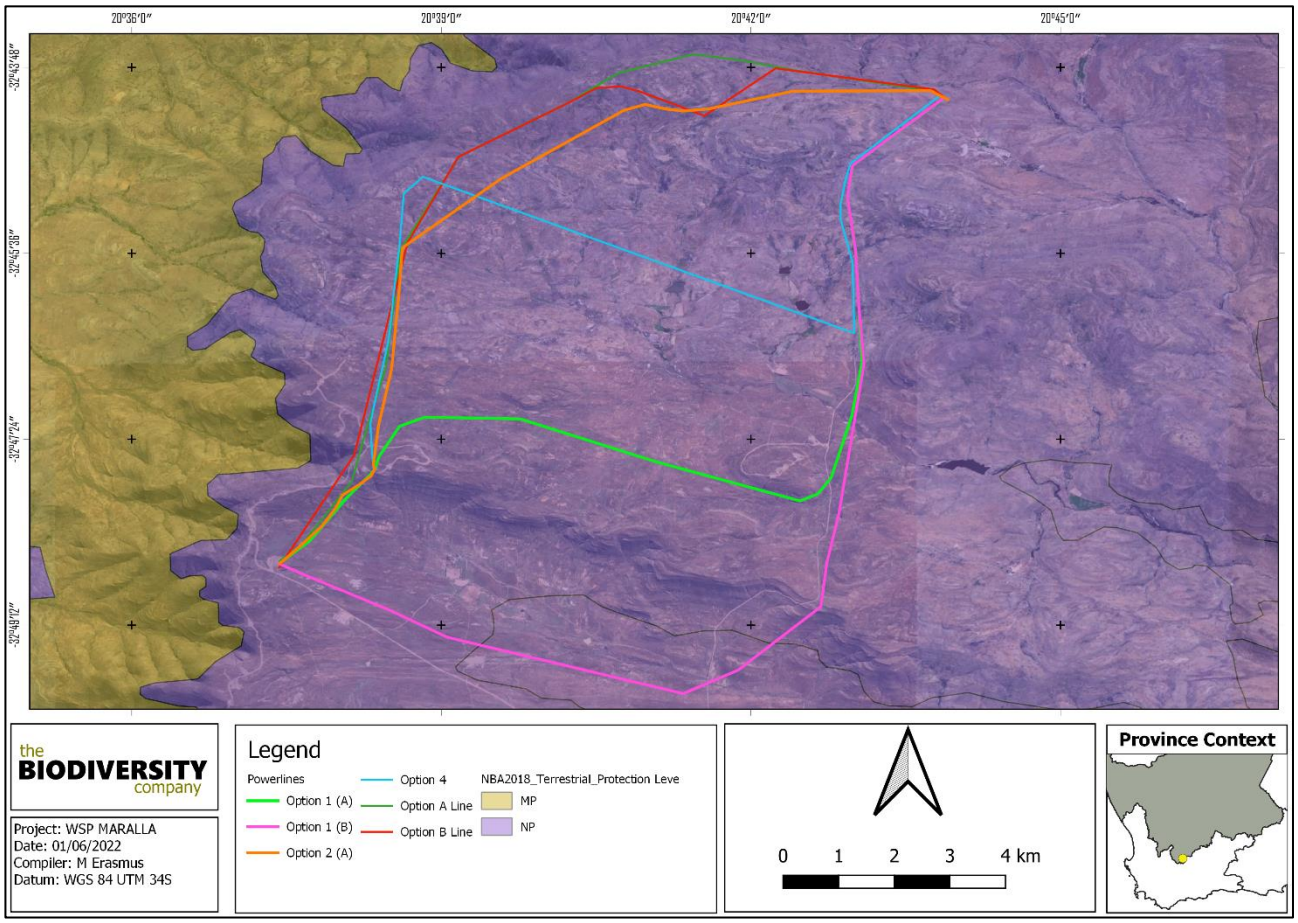


Figure 3-2 ***Map illustrating the ecosystem protection level associated with the proposed project area.***

3.1.1.3 Wetland National Biodiversity Assessment

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA) 2018. National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018.

Ecosystem threat status (ETS) of river ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT (Least Threatened), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al*., 2019). Figure 3-3 shows that the project area does intersect with two systems that is LT. It is also important to note that these river systems are classified as Freshwater Ecosystem Priority Areas (FEPA) (Upstream Management Area). The

proposed activity will may to a substantial negative impact to these systems, by reducing the water quality through increased pollutants and direct impact to the systems and their embankments.

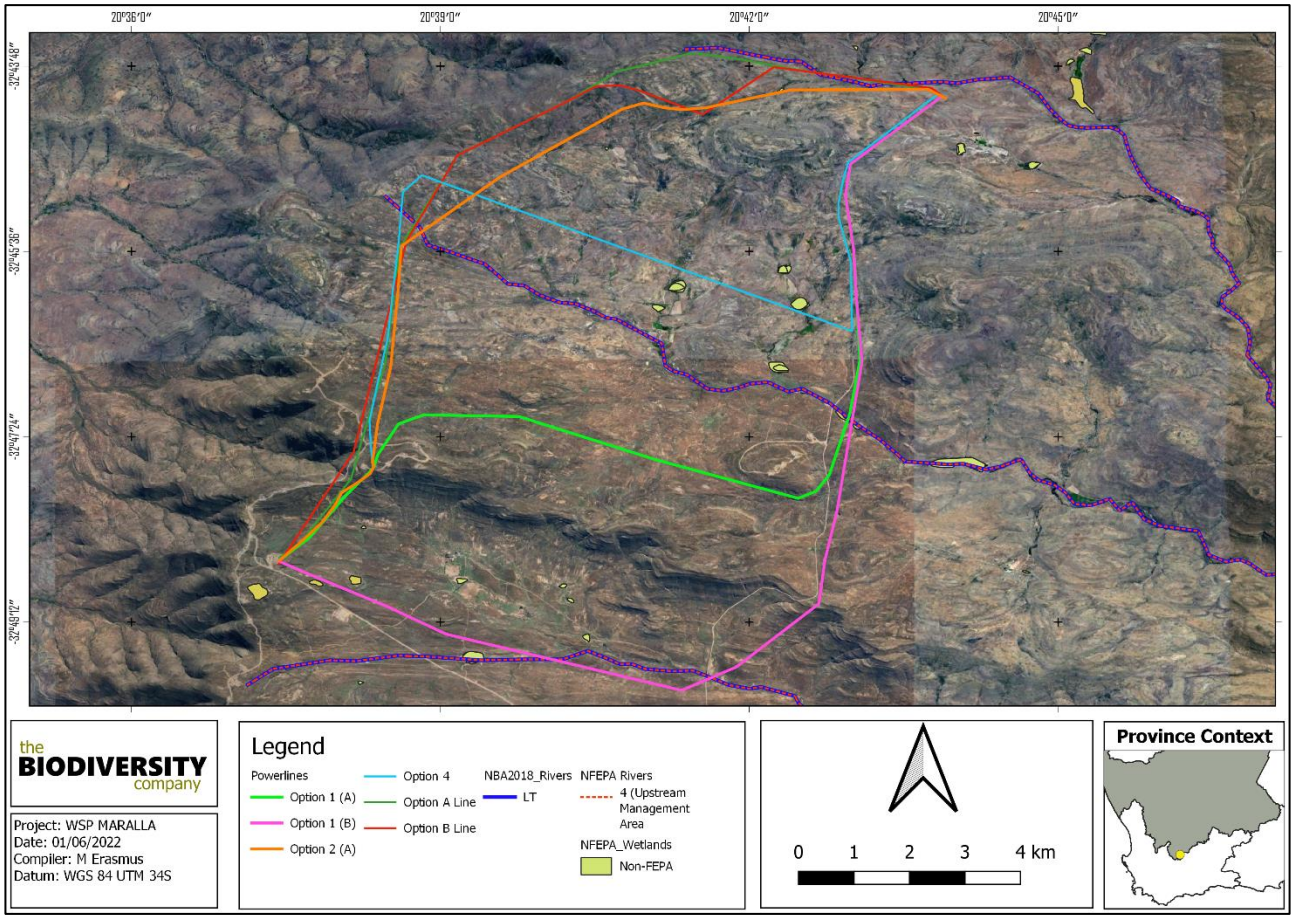


Figure 3-3 ***Map illustrating the ecosystem threat status associated with the proposed project area.***

3.1.1.4 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2010 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010).

The project area crosses the Western Karoo NPAES area as can be seen in Figure 3-4.

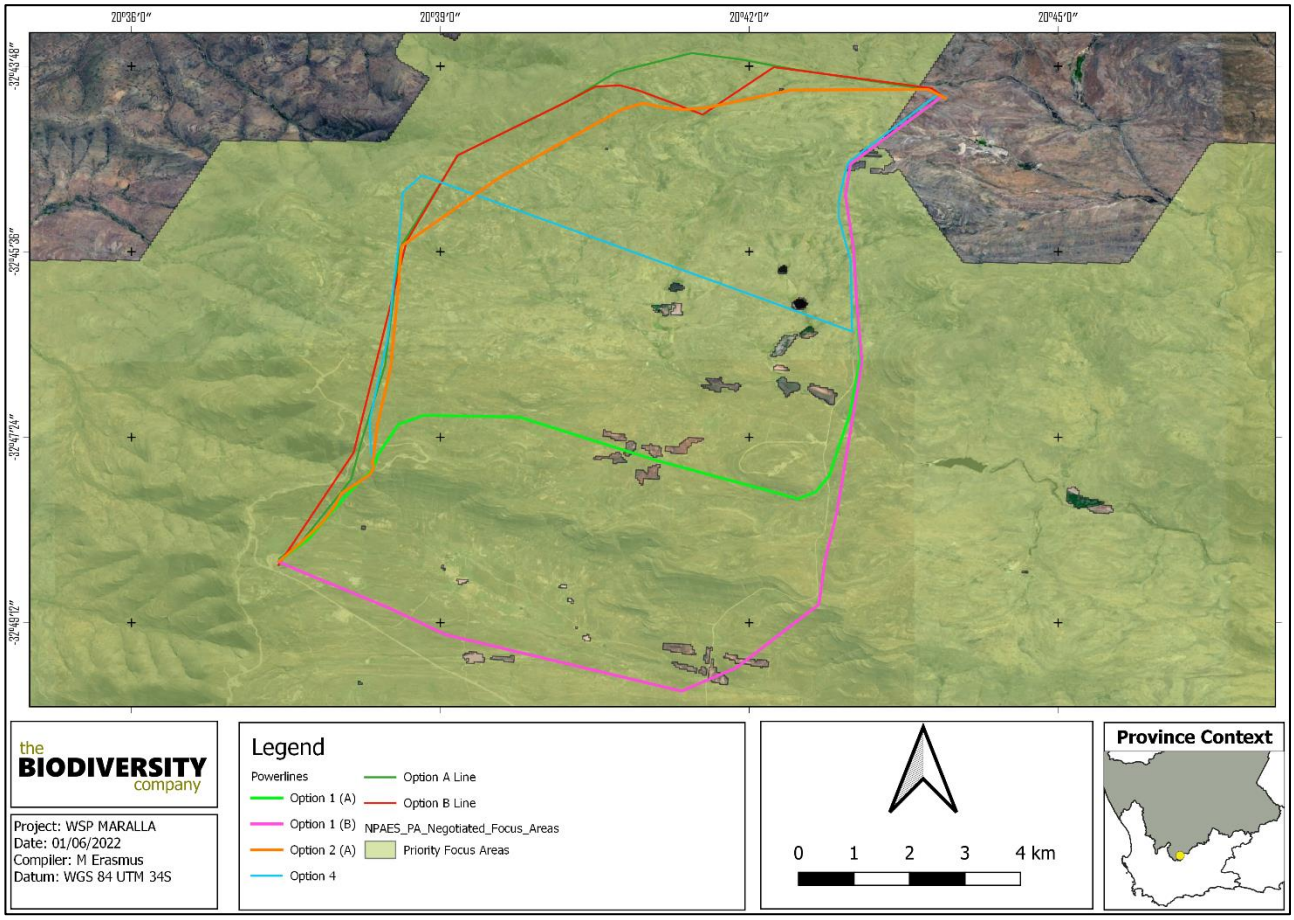


Figure 3-4 The project area in relation to the National Protected Area Expansion Strategy

3.1.1.5 Critical Biodiversity Areas and Ecological Support Areas

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

Figure 3-5 shows that the project area overlaps with areas classified as:

- CBA1 and CBA2;
- ESA1 (Western Cape); and
- ONA (Western Cape).

The Namakwa District Biodiversity Spatial Plan (NDBSP) categorises CBAs into the following types:

- T1 – Critically Endangered (CR) vegetation types and irreplaceable biodiversity areas (areas definitely required to meet conservation targets). T2 – Endangered (EN) and Vulnerable (VU) vegetation types and important terrestrial habitats. ESA including corridors.

The proposed development traverses T2 CBAs that have been defined as such because they are slope habitats

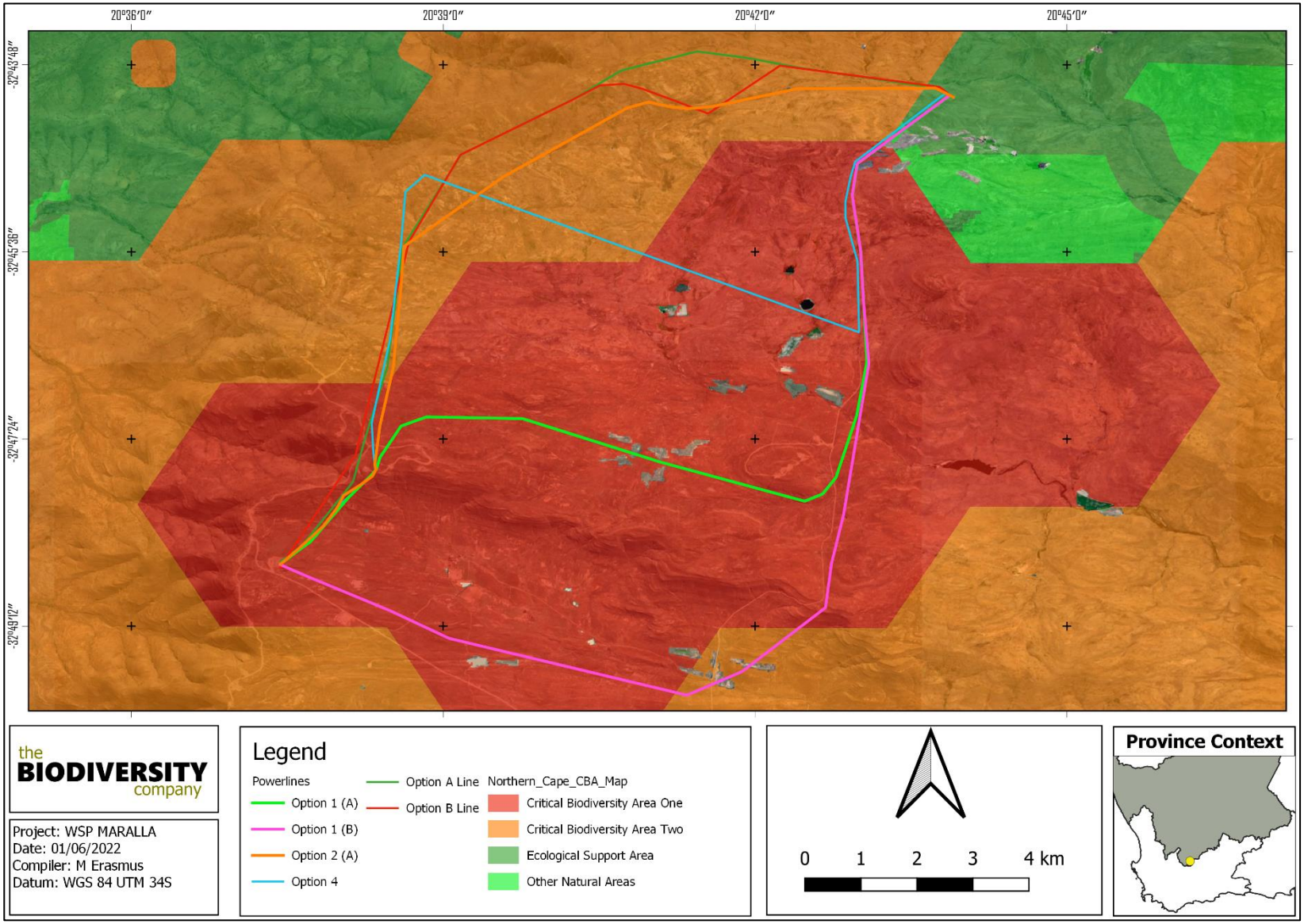


Figure 3-5 ***Map illustrating the locations of Critical Biodiversity Areas proximal to the proposed project area.***

3.1.1.6 Succulent Karoo Ecosystem Programme

Succulent Karoo Ecosystem Programme (SKEP) is a long term bioregional conservation programme, with the aim to conserve ecosystems and to develop conservation as a land-use rather than instead of land-use (SANBI, 2021). Their focal areas are:

- Increasing local, national and international awareness of the unique biodiversity of the Succulent Karoo.
- Expanding protected areas and improving conservation management, particularly through the expansion of public-private-communal-corporate partnerships.
- Support the creation of a matrix of harmonious land uses.
- Improve institutional co-ordination to generate momentum and focus on priorities, maximise opportunities for partnerships, and ensure sustainability.

The areas of SKEP endemism for mammals, amphibians, reptiles and birds were assessed in relation to the project area, it was found that the project area overlaps with a unique bird habitat and functions as local centre for biodiversity and this area is key for maintaining processes (Figure 3-6).

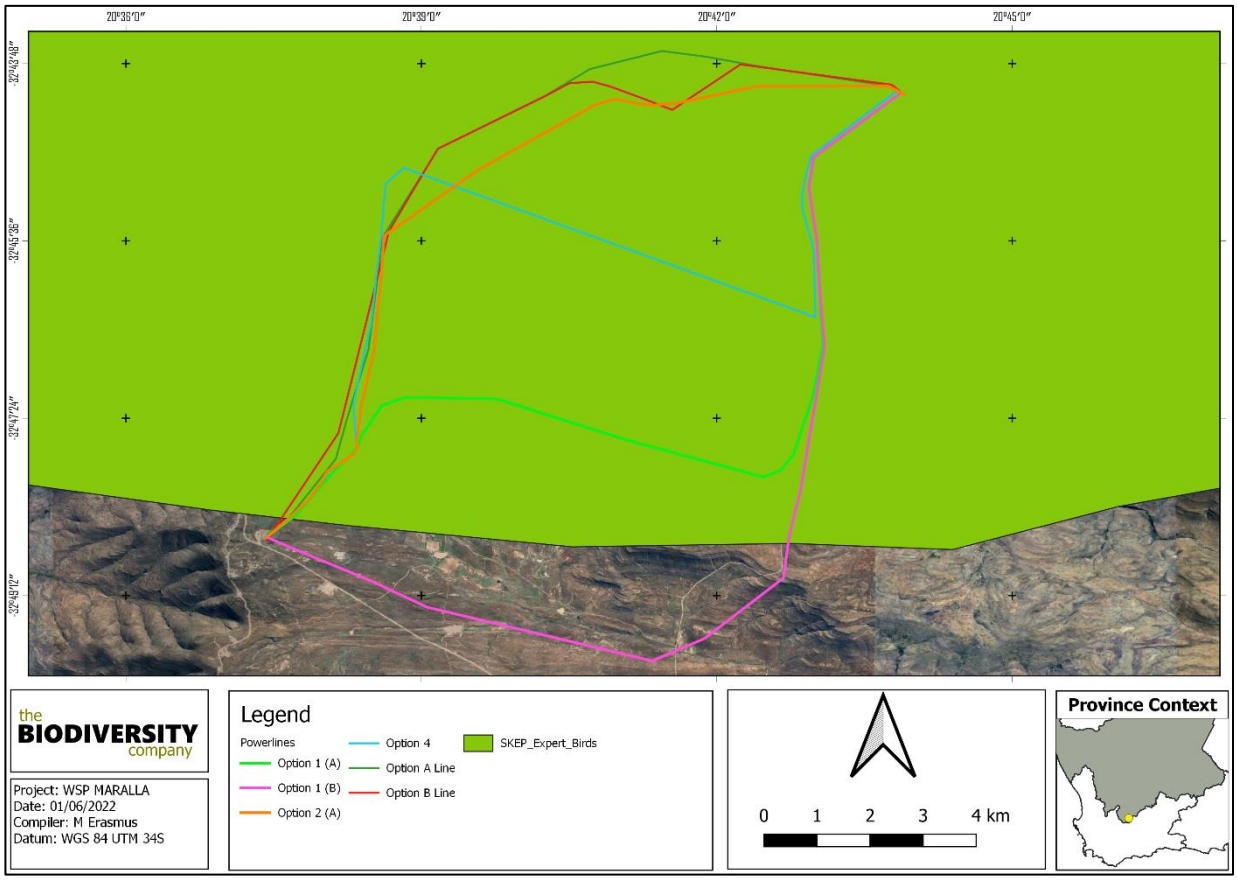


Figure 3-6 The project area in relation to the Succulent Karoo Ecosystem Programme

3.1.1.7 Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

More detailed information can be obtained from https://egis.environment.gov.za/redz. Information here includes the Government Notice No. 142, 144 and 145 in Government Gazette No. 44191 that specifies the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large-scale wind and solar photovoltaic energy facilities in these REDZs.

The project area falls within the Komsberg Wind REDZ (Figure 3-7).

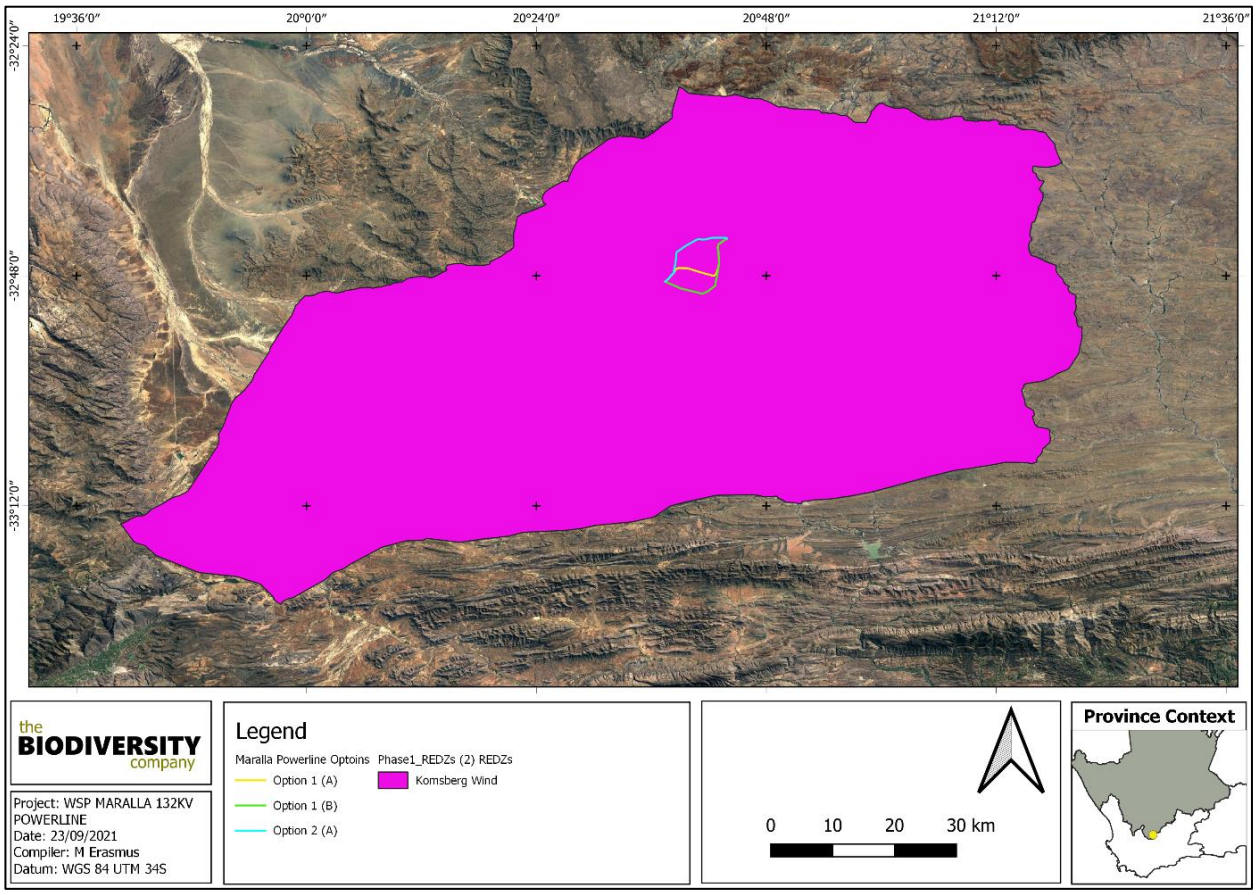


Figure 3-7 The project area in relation to the Renewable Energy Development Zone spatial data.

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

The proposed OHL is situated within Renosterveld, which is an evergreen, fire-prone shrubland dominated by evergreen asteraceous shrubs, principally *Dicerothamnus rhinocerotis*, and possesses a high biomass and diversity of geophytes. The proposed development overlaps with Shale Renosterveld. This broad-scale vegetation type accounts for 86% of the total area of Renosterveld. Rainfall patterns permit a relatively high proportion of grass cover and abundance of non-succulent shrubs, and therefore, the structure of the vegetation is more congruent with proximal karoo types than other Renosterveld types.

A landscape-scale ecosystem process that is important for maintaining the wellbeing of Renosterveld is fire. Fire is a disturbance that creates gaps in plant communities which provides space for plant establishment. Disturbance by fire can contribute to the maintenance of diversity and spatial

heterogeneity by impeding competitive exclusion. In addition, the ethylene gas produced from veld fires stimulates flowering and the karrikins within the smoke stimulates seed germination. Regarding the dynamics of Mountain Renosterveld, vegetation cover begins to re-establish within the first nine months following the fire and remains at a relatively high level from years 3 to 10 (van der Merwe & van Rooyen, 2011). There is a distinctive species composition between the first two years (years 1 and 2) following the fire and the remaining years (year 3 to 10).

On a fine-scale vegetation type, the proposed OHL overlaps mainly with Central Mountain Shale Renosterveld (Figure 3-8). Central Mountain Shale Renosterveld occurs in the Western and Northern Cape on the southern and south-eastern slopes of the Klein Roggeveldberge and Komsberg, below the Komsberg section of the Great Escarpment, as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area.

The Renosterveld type is poorly known. This vegetation type is described as follows:

- Topography – Slopes and broad ridges of low mountains and escarpments;
- Geology – Clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones. Glenrosa and Mispah forms are prominent;
- Climate – Arid to semi-arid climate. MAP 180 – 410 mm, with relatively even rainfall throughout the seasons, albeit minimally elevated during Autumn-Winter. Mean daily maximum and minimum temperatures 29.9˚C and 0.9 ˚C for January and July, respectively; and
- Important Taxa;
    - Low shrubs: *Elytropappus rhinocerotis, Diospyros austro-africana, Eriocephalus africanus* var. *africanus, E. ericoides* subsp. *ericoides, E. grandifloras, Felicia ovata, Pteronia glauca, P. incana, P. sordida, Zygophyllum spinosum*.
    - Succulent shrubs: *Delosperma subincanum, Drosanthemum lique, Euphorbia stolonifera, Trichodiadema barbatum, Tylecodon reticulatus* subsp. *reticulatus, T. wallichi* subsp. *wallichi*.
    - Geophytic herbs: *Bulbine asphodeloides, Drimia intricate, Othonna auriculifolia, Oxalis obtusa.*
    - Succulent Herbs: *Crassula deceptor, C. muscosa, C. tomentosa* var. *glabrifolia, Senecio radicans.*

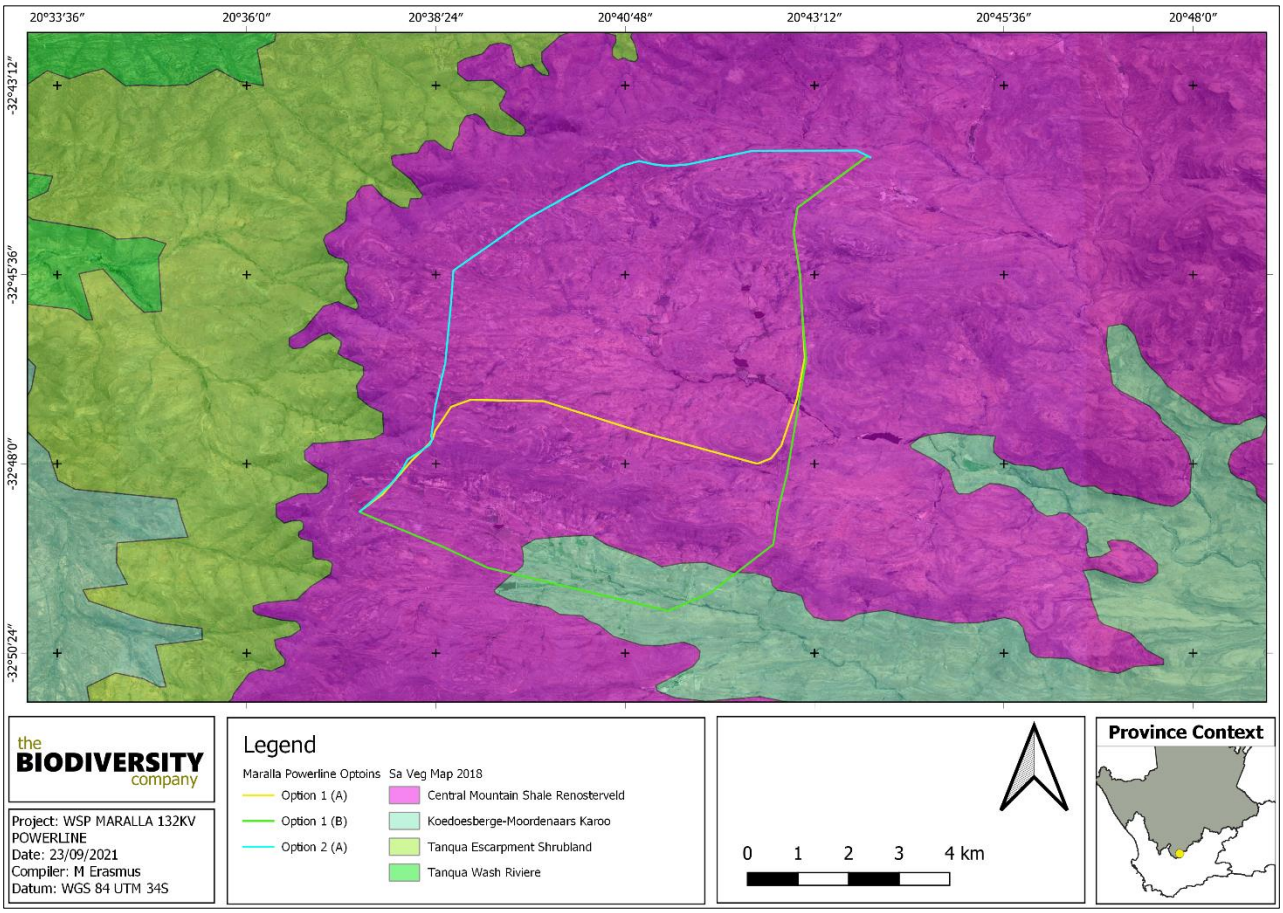


Figure 3-8 Map illustrating the vegetation type associated with the proposed project area

3.1.2.2 Expected Flora Species

The POSA database indicates that 166 species of indigenous plants are expected to occur within the assessment area and immediate landscape. Appendix A provides the list of species and their respective conservation status and endemism. Six (6) SCC based on their conservation status could be expected to occur within the assessment area and are provided in Table 3-2 below.

Table 3-2 Threatened flora species that may occur within the assessment area associated with proposed project area, DD: Data deficient, VU = Vulnerable, and NT = Near Threatened

Family	Species Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Aizoaceae	*Antimima pumila*	DD	Endemic	Rocky slopes, possibly favouring south-facing slopes.	High
Fabaceae	*Lotononis venosa*	EN	Endemic	Open karroid scrub on sandy clay alluvium. Known only from four locations. Extent of occurrence 84 km² and area of occupancy 16 km².	Moderate
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer. Known from five locations. EOO 350 km², AOO <20 km².	Moderate
Iridaceae	*Romulea eburnea*	VU	Endemic	Shale soils in the Klein Roggeveld. Rare and localised as it known from only two locations.	High
Iridaceae	*Ixia mollis*	VU	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known from only five locations in the Olifants River Valley between Clanwilliam and Citrusdal and the western Cederberg. EOO 74 km²	Low
Iridaceae	*Geissorhiza karooica*	NT	Endemic	Coarse shale slopes. Known from six locations. EOO 497 km²	High

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 9 amphibian species are expected to occur within the area (Appendix B). None of these species are threatened.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 53 reptile species are expected to occur within the area (Appendix C). One (1) is regarded as threatened (Table 3-3).

Table 3-3 Threatened reptile species that are expected to occur within the proposed project area. EN=Endangered, VU = Vulnerable, and NT = Near Threatened, LC=Least Concern.

Species	Common Name	Conservation Status	Endemism	Likelihood of Occurrence
Psammobates tentorius verroxii	Verrox's Tent Tortoise	NT	Near-Endemic	**Confirmed**

Psammobates tentorius is widely distributed but has been exhibiting declines and is therefore regarded as NT (Hofmeyer *et al*, 2018). Threats include overgrazing, destructive or illegal mining, and unsustainable land use involving ploughing of natural veld for fodder cropping, uncontrolled harvesting of natural products and irresponsible tourism activities in sensitive areas. Climate change further exacerbates habitat loss. This species was confirmed present on site during the September 2021 assessment.

3.1.3.3 Mammals

The IUCN Red List Spatial Data lists 56 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Eight (8) of these expected species are regarded as threatened (Table 3-4), five of these have a low likelihood of occurrence based on the lack of suitable habitat in the project area.

Table 3-4 Threatened mammal species that are expected to occur within proposed project area. CR=Critically Endangered, EN=Endangered, VU = Vulnerable, and NT = Near Threatened, LC=Least Concern.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	**Moderate**
Bunolagus monticularis	Riverine Rabbit	EN	CR	**Low**
Felis nigripes	Black-footed Cat	VU	VU	**High**
Graphiurus ocularis	Spectacular Dormouse	NT	LC	**Low**
Leptailurus serval	Serval	NT	LC	**Low**
Panthera pardus	Leopard	VU	VU	**Low**
Pelea capreolus	Grey Rhebok	NT	NT	**Confirmed**
Poecilogale albinucha	African Striped Weasel	NT	LC	**Moderate**

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

recorded in the more arid Karoo region of South Africa. The habitat in the project area is regarded as suitable for the species as such the likelihood of occurrence is rated as high.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy, and they no longer occur north of the Orange River in the Northern Cape, or in parts of the North-West Province (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. In the central part of the project area, mountainous habitat can be found that could be suitable. This species was confirmed present on site during the September 2021 assessment.

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

3.1.3.4 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 120 bird species have the potential to occur in the vicinity of the project area. The full list of potential bird species is provided in Appendix E. Of the potential bird species, nine (9) species are listed as SCC either on a regional or global scale (Table 3-5).

Table 3-5 List of bird species of regional or global conservation importance that are expected to occur in the project area. EN=Endangered, VU = Vulnerable, and NT = Near Threatened, LC=Least Concern.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Afrotis afra	*Korhaan, Southern Black*	VU	VU	Confirmed
Aquila verreauxii	*Eagle, Verreaux's*	VU	LC	Moderate
Circus maurus	*Harrier, Black*	EN	VU	Moderate
Coracias garrulus	*Roller, European*	NT	LC	Moderate
Eupodotis vigorsii	*Korhaan, Karoo*	NT	LC	Moderate
Neotis ludwigii	*Bustard, Ludwig's*	EN	EN	Confirmed
Phoenicopterus roseus	*Flamingo, Greater*	NT	LC	Moderate
Polemaetus bellicosus	*Eagle, Martial*	EN	VU	Confirmed

Afrotis afra (Southern Black Korhaan) is listed as VU on a regional and global scale (IUCN, 2017). They are endemic to the South-Western side of South Africa. Their habitat varies from non-grassy areas to the Fynbos biome, Karoo biome and the western coastline of South Africa. The main threat to them is habitat loss, in an eight year span they loss 80% of their range due to agricultural developments. Their diet consists of insects, small reptiles and plant material, including seeds and green shoots (Hockey *et al.* 2005). This species was confirmed present on site during the September 2021 assessment.

Aquila verreauxii (Verreaux's Eagle) is listed as VU on a regional scale and LC on a global scale. This species is locally persecuted in southern Africa where it coincides with livestock farms, but

because the species does not take carrion, is little threatened by poisoned carcasses. Where hyraxes are hunted for food and skins, eagle populations have declined (IUCN, 2017).

Coracias garrulous (European Roller) is a winter migrant from most of South-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller has a preference for bushy plains and dry savannah areas (IUCN, 2017). There is a moderate chance of this species occurring in the project area.

Eupodotis vigorsii (Karoo Korhaan) is listed as NT on a regional scale and as LC on a global scale. This species has a very large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The likelihood of the species occurring in the project area is rated as moderate.

Neotis ludwigii (Ludwig's Bustard) is listed as EN both locally and internationally. This species is found in the desert, grassland and shrubland specifically in rocky areas such as mountains and cliffs. The main reason for the decline in the numbers are ascribed to the collisions with power lines. This species was confirmed present on site during the September 2021 assessment.

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and VU on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). This species was confirmed present on site during the August 2021 assessment.

3.1.4 Review of previous reports

The following reports were used in order to substantiate and supplement the findings and general understanding:

- In 2016, Simon Todd conducted fauna & flora specialist study for the Environmental Impact Assessment for the proposed Maralla West Wind Energy Facility;
    - Six (6) Flora SCC were found: *Boophone disticha* (Declining), *Brunsvigia josephinae* (VU), *Eriocephalus grandiflorus* (Rare), *Adromischus phillipsiae* (Rare), *Drimia altissima* (Declining) and *Cliffortia arborea (VU)* at base of cliffs along the escarpment. Several provincially protected species also occurred in large scale due to the broad range of species protected on a provincial level.
    - From the Faunal study conducted by Todd in 2016, the most notable comment was that the drainage systems within the site do not contain wide floodplains or alluvial terraces which are the known preferred habitat of the Riverine Rabbit (*Bunolagus monticularis*) (CR). Grey Rhebok (*Pelea capreolus)* (NT) I was found commonly in the area. The author added that tortoises (Angulate Tortoises, *Chersina angulata* with occasional observations of Karoo Tent Tortoises, *Psammobates tentorius tentorius*) may be negatively impacted by the development as they are vulnerable to collisions with motor vehicles and predation by avian predators. The author continued and said that attractive species such as Tent Tortoises are also vulnerable to collection for use as pets or trade, and the increased accessibility resulting from the new roads that will be constructed as part of the development would raise the risk for these species.

- Chris van Rooyen Consulting performed the avifauna assessment for the Biotherm Maralla East and West Wind Projects. This assessment was conducted in April 2016. During their survey, all the SCC in Table 3 5 were recorded, except Roller, European (*Coracias garrulus*).

3.2 Field Assessment

The following sections provides the results from the field survey for the proposed OHLs that was undertaken during September 2021 and April 2022.

3.2.1 Flora Assessment

This section is divided into two sections:

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

3.2.1.1 Indigenous Flora

The species composition of the assessment area was consistent with typical Central Mountain Shale Renosterveld vegetation Type. Distinctive vegetation communities were observed and can be classified into ridges and rocky slopes, shurbland and drainage lines.

The ridges and rocky slope floral community was typically dominated by *Dicerothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Montinia caryophyllacea*, *Pteronia glomerata*, *P. aspalatha, Wiborgia sericea, Eriocephalus africanus* var. *paniculatus*,

The shurbland areas on deeper soils generally consisted of species such as *Dicerothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Ruschia intricata, Ruschia spinosa, Eriocephalus ericoides* var. *ericoides*, *Hermannia cuneifolia*, and *Asparagus capensis*. The patches of disturbed grazing areas were dominated by pioneer species comprising of *Gazania rigida*, *Arctotheca calendula* and *Senecio arenarius*.

The drainage lines of the assessment area were dominated by *Dicerothamnus rhinocerotis*, *Pseudoschoenus inanis, Berkheya spinosa* and *Euryops lateriflorus*

Geophytes and succulents were ubiquitous throughout the assessment area and occurred within all the communities described above. Geophytes were particularly abundant within the lowland areas. It is important to note that these growth forms, and their non-succulent relatives, are protected under the Northern Cape Legislation and include:

- All species of Amaryllidaceae; All species of Asphodelaceae; All species of Crassulaceae; All Iridaceae;All species of Mesembryanthemaceae: All *Colchicum* (Colchicaceae); All *Euphorbia* (Euphorbiaceae);All *Lachenalia* (Hyacinthaceae); and All Oxalis (Oxalidaceae).

Representatives of these protected flora are illustrated in Figure 3-9

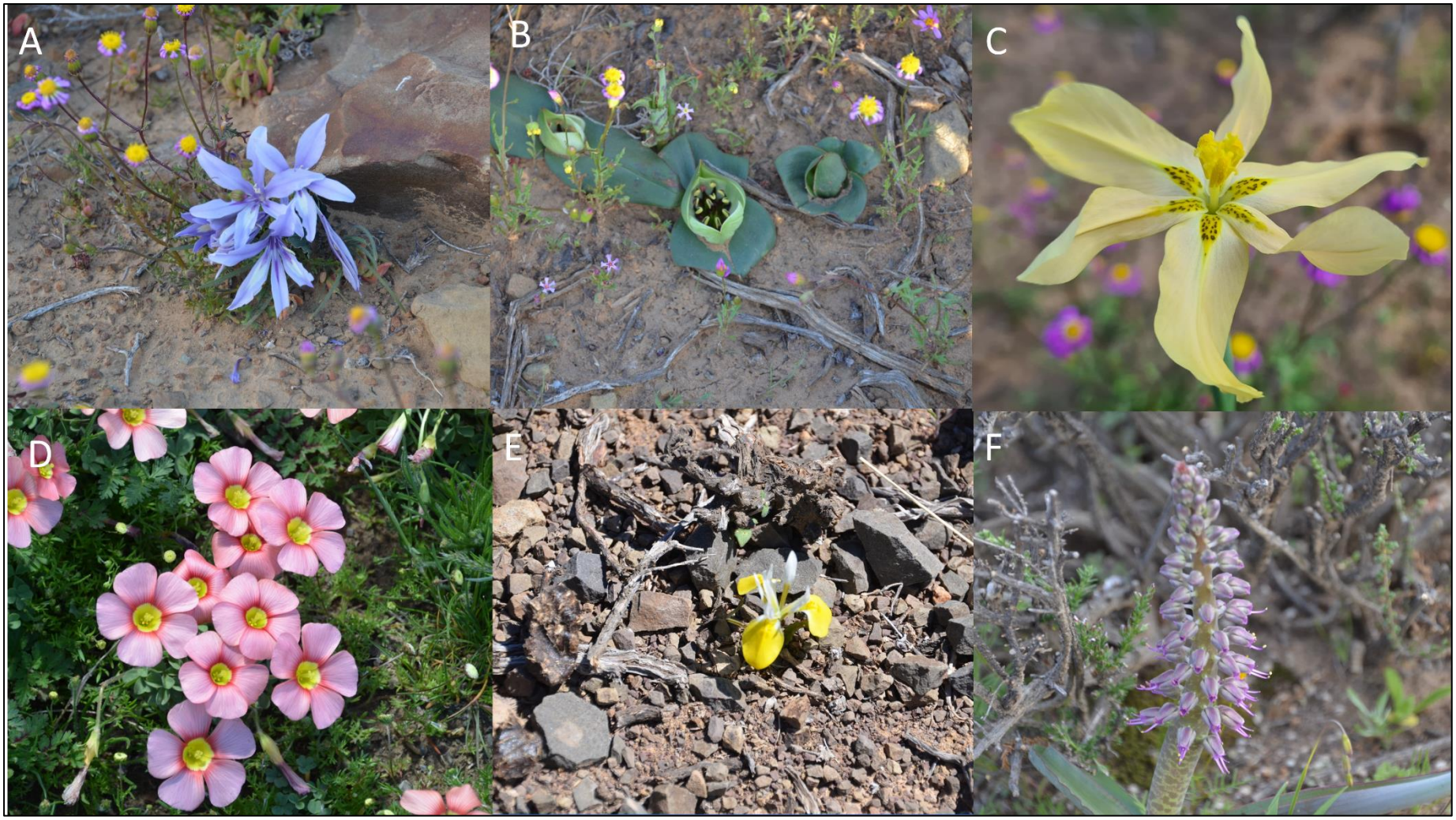


Figure 3-9 ***Photographs illustrating a portion of the protected flora recorded during the assessment: A) Babiana cuneata, B) Colchicum eucomoides, C) Moraea pallida, D) Oxalis obtusa, E) Moraea flava and F) Lachenalia violacea.***

3.2.1.2 Alien and/or invasive plant species

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43726, 18 September 2020. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

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

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

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

One species was recorded within the assessment area, *Erodium moschatum.* This species is not listed under the Alien and Invasive Species List 2016, Government Gazette No. 40166.

Considering that IAPs primarily tend to encroach into disturbed areas, the disturbance generated from the activities associated with the proposed development, suggests that these species may invade the corridor. Considering the predominantly natural integrity of the vegetation within the assessment area, IAP species must be controlled by implementing an Invasive Alien Plant Management Programme from the onset of the project which is in compliance of section 75 of the Act as stated above.

3.2.1.3 Species of Concervation Concern

3.2.1.3.1 Red data plants

In addition to the protected flora, one (1) threatened plant species occur within the assessment area (Table 3-6). These species were recorded within the Ridges, Rocky Slopes and Rocky Areas, they are expected to occur ubiquitous throughout these habitats due to the intact state of these habitats still and have thus been considered in the overall habitat sensitivity.

Table 3-6 Flora SCC recorded within the assessment area associated with the project area. NT = Near-Threatened.

Family	Species	Common Name	Conservation Status	Endemism
Asteraceae	*Eriocephalus grandiflorus*	Shrub	Rare	Endemic

3.2.2 Faunal Assessment

3.2.2.1 Amphibians and Reptiles

Relatively few species of herpetofauna were recorded within the assessment area, with five of the expected species observed during the survey period (Table 3-7; Figure 3-10). The species recorded comprised of one amphibian and five (5) reptile species. The lack of species richness may be attributed to a combination of the inherent secretive nature of herpetofauna species, limited time available for fieldwork and no night survey was undertaken.

One of the five species recorded are regarded as NT, and four are protected under NC provincial legislation.

Table 3-7 Herpetofauna species recorded within the assessment area associated with the project area. Species highlighted in bold are of conservation concern as they are either threatened or protected. LC = Least Concern and NT = Near-Threatened

Family	Species	Common Name	Conservation Status	Endemism
		Reptile		
Agamidae	*Agama atra*	Southern Rock Agama	LC	Near-Endemic
Cordylidae	***Karusasaurus polyzonus***	**Karoo Girdled Lizard**	**LC**	**Near-Endemic**
Lacertidae	***Pedioplanis lineoocellata pulchella***	**Common sand lizard**	**LC**	**Near-Endemic**
Testudinidae	***Chersina angulata***	**Angulate Tortoise**	**LC**	
Testudinidae	***Psammobates tentorius verroxii***	**Verrox's Tent Tortoise**	**NT**	**Near-Endemic**
		Amphibian		
Pyxicephalidae	*Amietia fuscigula*	Common River Frog	LC	

Figure 3-10 ***Photographs illustrating a portion of the herpetofauna observed within the assessment area.; A) Angulate Tortoise (Chersina angulata) B) Southern Rock Agama (Agama atra), C) Verrox's Tent Tortoise (Psammobates tentorius verroxii) , and D) Common Sand Lizard (Pedioplanis lineoocellata pulchella).***

3.2.2.2 Mammals

A total of fifteen (15) mammal species were either directly observed or deduced to be present in the project area based on visual cues (tracks, scat etc.) during the surveys (Table 3-8). This represents 26.7% of the 56 species expected (Appendix D). As the survey was conducted over a short time frame, it is believed that should a longer study be performed, more species would be identified. A single threatened species, *Palea capreolus* (Grey Rhebok), was recorded.

A selection of photographs of mammal species observed during the survey are provided in Figure 3-11, while the full list of species recorded are listed in Table 3-8.

Table 3-8 ***Summary of mammal species observed or deduced to be present in the project area based on visual signs (tracks, scats etc.) within the proposed project area during the survey. Species highlighted in bold are of conservation concern as they are either threatened or protected. LC = Least Concern and NT = Near-Threatened. SLS= South Africa, Lesotho, Swaziland.***

Family	Species	Common Name	Conservation Status	Endemism
Bathyergidae	***Cryptomys hottentotus***	**African Mole Rat**	**LC**	**Endemic**
Bovidae	***Antidorcas marsupialis***	**Springbok**	**LC**	
Bovidae	***Pelea capreolus***	**Grey Rhebok**	**NT**	**SLS**
Bovidae	***Raphicerus campestris***	**Steenbok**	**LC**	
Bovidae	**Sylvicapra grimmia**	**Common Duiker**	LC	
Canidae	*Canis mesomelas*	Black-backed Jackal	LC	
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC	
Herpestidae	*Atilax paludinosus*	Water Mongoose	LC	
Herpestidae	***Cynictis penicillata***	**Yellow Mongoose**	**LC**	
Hystricidae	***Hystrix africaeaustralis***	**Cape Porcupine**	**LC**	
Leporidae	***Lepus capensis***	**Cape Hare**	**LC**	**Endemic**
Leporidae	***Pronolagus saundersiae***	**Hewitt's Red Rock Hare**	**LC**	**Endemic**
Muridae	***Aethomys namaquensis***	***Namaqua rock rat***	**LC**	
Orycteropodidae	***Orycteropus afer***	**Aardvark**	**LC**	
Procaviidae	***Procavia capensis***	**Rock Hyrax**	**LC**	

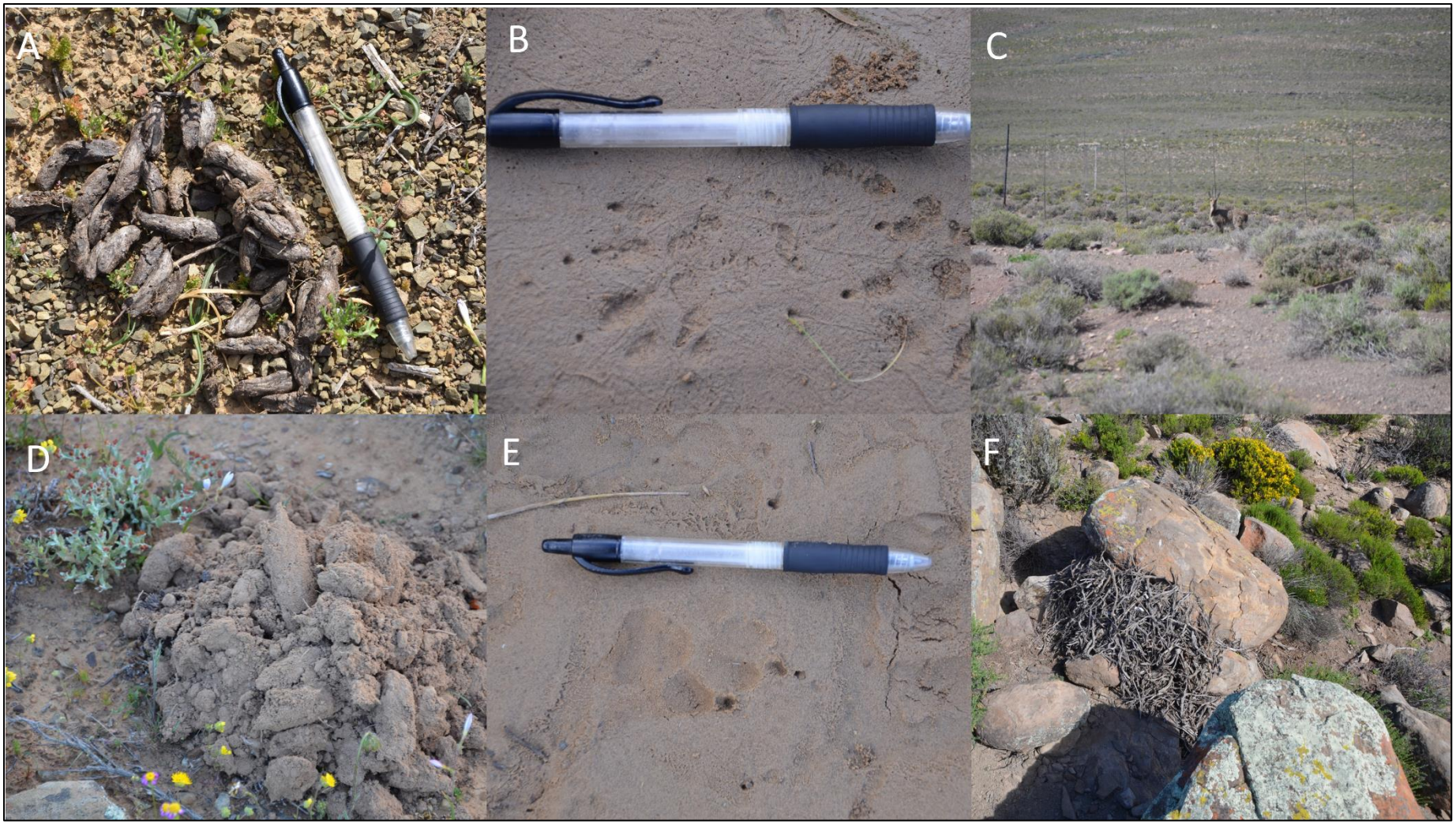


Figure 3-11 ***A selection of mammal species observed within the proposed project area: A)Cape Porcupine (Hystrix africaeaustralis) scat, B)Water Mpngoose (Atilax paludinosus) track , C) Grey Rhebok (Pelea capreolus), D) African Mole Rat (Cryptomys hottentotus), E) Black Backed Jackal (Canis mesomelas) and F) Namaqua rock rat (Aethomys namaquensis) den.***

3.2.2.3 Avifauna

Fourty-one (41) avifauna species were observed within the assessment area during the survey period, based on either direct observations or species calls. The species recorded could be regarded as species typical of Renosterveld. Majority of the avifauna species recorded are protected under provincial legislation, with three (3) species regarded as red-listed.

A selection of photographs of avifaunal species observed during the survey are provided in Figure 3-11, while the full list of species recorded are listed in Table 3-9

Table 3-9 ***Summary of avifaunal species observed or deduced to be present in the project area based on visual signs (tracks, scats etc.) within the proposed project area during the survey. Species highlighted in bold are of conservation concern as they are either threatened or protected. EN = Endangered, LC = Least Concern and VU = Vulnerable***

Family	Species	Common Name	Conservation Status	Endemism
Accipitridae	***Buteo rufofuscus***	**Jackal Buzzard**	**LC**	**Near-Endemic**
Accipitridae	***Circaetus pectoralis***	**Black-chested Snake-eagle**	**LC**	
Accipitridae	***Melierax canorus***	**Pale Chanting Goshawk**	**LC**	
Accipitridae	***Polemaetus bellicosus***	**Eagle, Martial**	**EN**	
Alaudidae	***Calendulauda albescens***	**Karoo Lark**	**LC**	**Near-Endemic**
Alaudidae	***Galerida magnirostris***	**Large-billed Lark**	**LC**	
Alaudidae	***Mirafra apiata***	**Cape Clapper Lark**	**LC**	**Near-Endemic**
Anatidae	***Alpochen aegyptica***	**Egyptian Goose**	**LC**	
Anatidae	***Anas undulata***	***Duck, Yellow-billed***	**LC**	
Anatidae	***Tadorna cana***	**South African Shelduck**	**LC**	
Anatidae	***Plectropterus gambensis***	**Goose, Spur-winged**	**LC**	
Burhinidae	***Burhinus capensis***	***Thick-knee, Spotted***	**LC**	
Charadriidae	***Vanellus coronatus***	**Crowned Lapwing**	**LC**	
Charadriidae	***Charadrius tricollaris***	**Plover, Three-banded**	**LC**	
Cisticolidae	***Cisticola subruficapilla***	**Grey-backed Cisticola**	**LC**	
Cisticolidae	***Prinia maculosa maculosa***	**Shrub Karoo Prinia**	**LC**	**Near-Endemic**
Corvidae	*Corvus albus*	Pied Crow	LC	
Corvidae	*Corvus capensis*	Crow, Cape	LC	
Emberizidae	***Emberiza capensis***	**Cape Bunting**	**LC**	
Falconidae	***Falco rupicolus***	**Rock Kestrel**	**LC**	
Fringillidae	***Crithagra flaviventris***	**Yellow Canary**	**LC**	
Fringillidae	***Serinus alario***	**Canary, Black-headed**	**LC**	**Endemic**
Hirundinidae	***Hirundo fuligula***	**Rock Martin**	**LC**	
Laniidae	***Lanius collaris***	***Fiscal, Common (Southern)***	**LC**	
Malaconotidae	***Telophorus zeylonus***	**Bokmakierie**	**LC**	**Endemic**
Muscicapidae	***Cercomela schlegelii***	**Karoo Chat**	**LC**	
Muscicapidae	***Cercomela sinuata***	**Sickle-winged Chat**	**LC**	**Near-Endemic**
Muscicapidae	***Cercotrichas coryphoeus***	**Karoo Scrub-robin**	**LC**	
Muscicapidae	*Oenanthe monticola*	**Mountain Wheatear**	**LC**	
Muscicapidae	*Myrmecocichla formicivora*	**Chat, Anteating**	**LC**	

Nectariniidae	***Nectarinia famosa***	**Malachite Sunbird**	**LC**	
Otididae	***Afrotis afra***	**Southern Black Korhaan**	**VU**	**Endemic**
Otididae	***Neotis ludwigii***	**Ludwig's Bustard**	**EN**	**Near-Endemic**
Phasianidae	***Corturnix corturnix***	**Common Quail**	**LC**	
Phasianidae	***Pternistis capensis***	**Cape Spurfowl**	**LC**	**Endemic**
Phasianidae	***Scleroptila africanus***	**Grey-winged Francolin**	**LC**	**SLS**
Ploceidae	*Ploceus capensis*	Weaver, Cape	LC	
Pycnonotidae	*Pycnonotus capensis*	Cape Bulbul	LC	Endemic
Strigidae	***Bubo africanus***	**Spotted Eagle-owl**	**LC**	
Sturnidae	***Onychognathus nabouroup***	**Pale-winged Starling**	**LC**	
Threskiornithidae	*Bostrychia hagedash*	Hadada ibis	LC	

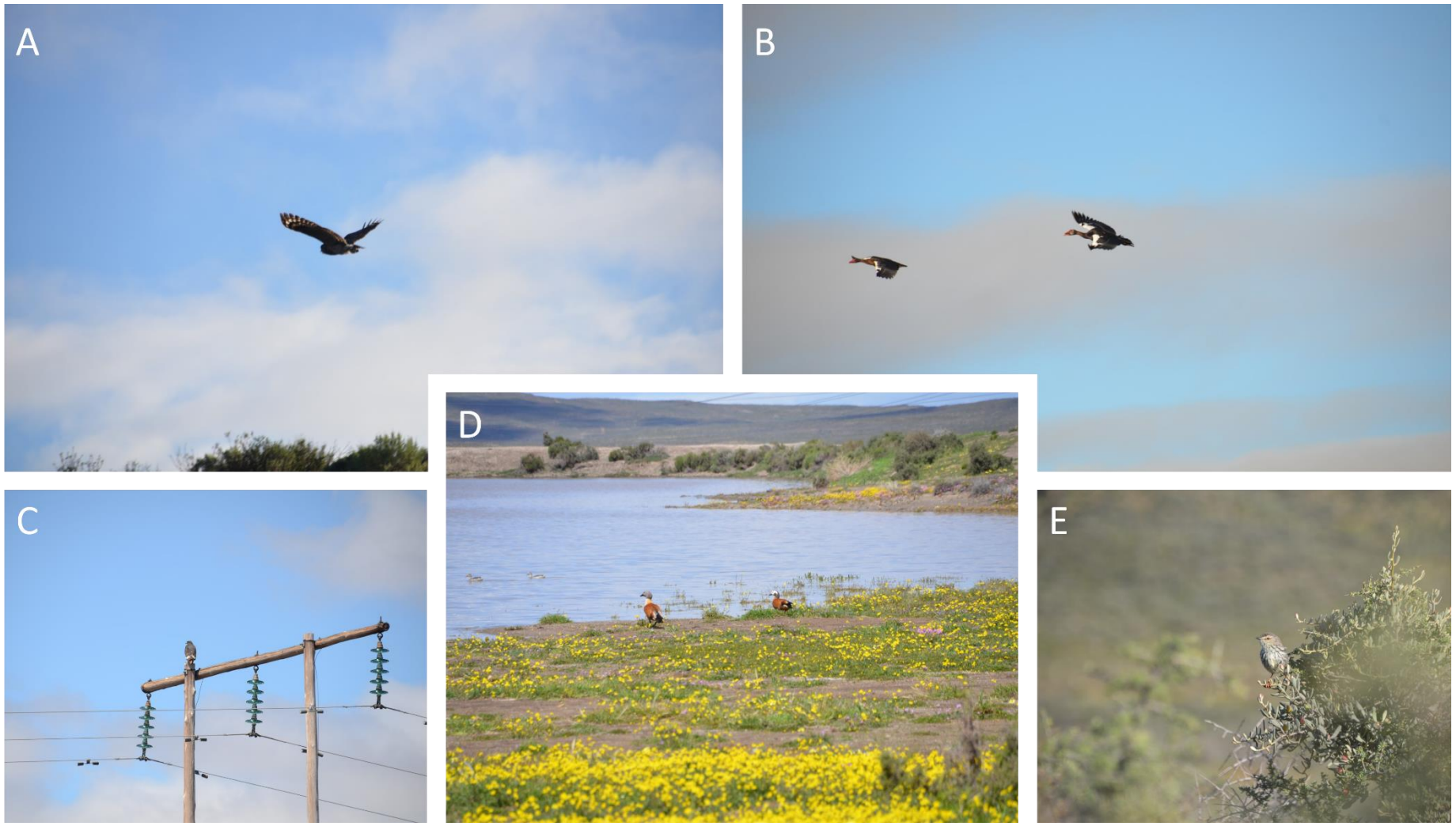


Figure 3-12 ***Photographs illustrating the avifauna species recorded within the assessment area. A) Spotted Eagle-owl (Bubo africanus) B Spur - winged Goose (Plectropterus gambensis), C) Jackal Buzzard (Buteo rufofuscus), D) South African Shelduck (Tadorna cana) and E) Prinia maculosa maculosa (Shrub Karoo Prinia).***

3.2.2.3.1 Species with a Collision and Electrocution Risk

Birds prone to collisions can be divided into five categories; 1) large species with high body weight ratio to wing span resulting in low manoeuvrability, 2) species that are distracted in flight this include predatory birds and smaller species with areal displays, 3) species flying at high speeds, 4) crepuscular species that are active in low light conditions, and 5) species with limited narrow forward vision (Jenkins et al., 2010; Noguera et al., 2010). Species that tend to fly in flocks also may be influenced more by collisions as the birds flying in the rear will not be able to detect the power lines.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices are simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties. Winds parallel or diagonal to cross-arms are the most detrimental, due to exacerbating the difficulty in manoeuvrability during landing or take-off. Some of the bird species commonly impacted by power lines are shown in Appendix F.

Polemaetus bellicosus (Eagle, Martial) has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thornbush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). In South Africa, 138 active Martial Eagle nests have been found along 1,750 km of power lines, potentially showing the pylons provide artificial nesting sites, although this species remains extremely vulnerable to power line related fatalities (G. Tate *in litt*. 2020). The individual observed during the August 2021 was observed flying over the project area, most likely foraging.

Afrotis afra (Southern Black Korhaan) is listed as VU on a global scale (BirdLife International, 2016a). The species is endemic to southwestern South Africa. The species is restricted to the non-grassy, winter rainfall or mixed winter-summer rainfall fynbos, renosterveld and succulent Karoo biomes, and the extreme south of the Nama-Karoo biome, in a narrow strip along the southern and western coastlines of South Africa. The diet comprises of insects, small reptiles and plant material. The global population has not been quantified. The principle threat is habitat loss and fragmentation due to expanding agriculture (BirdLife International, 2016a). Moreover, agricultural activity decreases breeding success due to increased chick and egg predation because of a general decrease in vegetation cover and an increase in predators such as Pied Crows. Collisions with power lines are also an emerging threat. The specimens observed within the assessment area were displaying breeding behaviour and therefore, the area forms part of the species breeding range. Considering the decrease in breeding success within the species' range, the area is considered vital for the continued population wellbeing.

Neotis ludwigii (Ludwig's Bustard) is listed as EN on a global scale (BirdLife International, 2018). The species has a large range centred on the dry biomes of the Karoo and Namib in southern Africa, being found in the extreme south-west of Angola, western Namibia and South Africa. This species inhabits open lowland and upland plains with grass and light thornbush, sandy open shrub-veld and semi-desert in the arid and semi-arid Namib and Karoo biomes. Ludwig's Bustard is nomadic and a partial migrant, moving to the western winter-rainfall part of its range in winter. The diet includes invertebrates, small vertebrates and vegetable matter. The global population is estimated to be 100 000 – 499 999 individuals. The primary threat to the species is collisions with overhead power lines, with potentially thousands of individuals involved in such collisions each year (Jenkins *et al*.

2011). Collision rates on high voltage transmission lines in the Karoo may exceed one Ludwig's Bustard per kilometre per year. Bustards have limited frontal vision so may not see power lines, even if they are marked (Martin and Shaw 2010).

4 Habitats and Site Ecological Importance

4.1 Habitats

Four main preliminary habitat types were delineated for the project footprint (Table 4-1). These habitats are shown in Figure 4-1, and are briefly discussed below.

Table 4-1 Summary of habitat types delineated within the assessment area of the proposed OHL.

Habitat Type	Description	Dominant Flora	Ecosystem Processes and Services	Approximate Area (ha)	Habitat Sensitivity
Transformed	Areas denuded of vegetation for wind turbine infrastructure and associated infrastructure such as roads.	N/A	None	16	Very Low
Ridges, Rocky Slopes and Rocky Areas	Steep to moderately steep slopes with shallow soils. Outcrops	*Dicerothamnus rhinocerotis* *Oedera genistifolia* *Ixia thomasiae* *Eriocephalus punctulatus* *Pteronia glomerata*	Capture precipitation and run-off from melting snow. Rising air currents are used by raptor species to increase flight efficiency.	127	Very High to High
Shrubland	Low to no slope with deep soils.	*Ruschia intricata Euryops lateriflorus* *Pteronia glomerata* *Oxalis obtusa*	Provides grazing for livestock. Aids in filtration of water permeating through the soil into drainage lines.	257	High
Drainage features	Channel through which surface water naturally collates and flows. Perennial or ephemeral systems were both considered for this habitat type.	*Dicerothamnus rhinocerotis* *Pseudoschoenus inanis* *Euryops lateriflorus* *Berkheya spinosa*	Provides surface water within the landscape. Aids in trapping sediment and nutrients derived from land runoff.	42	Very High to High

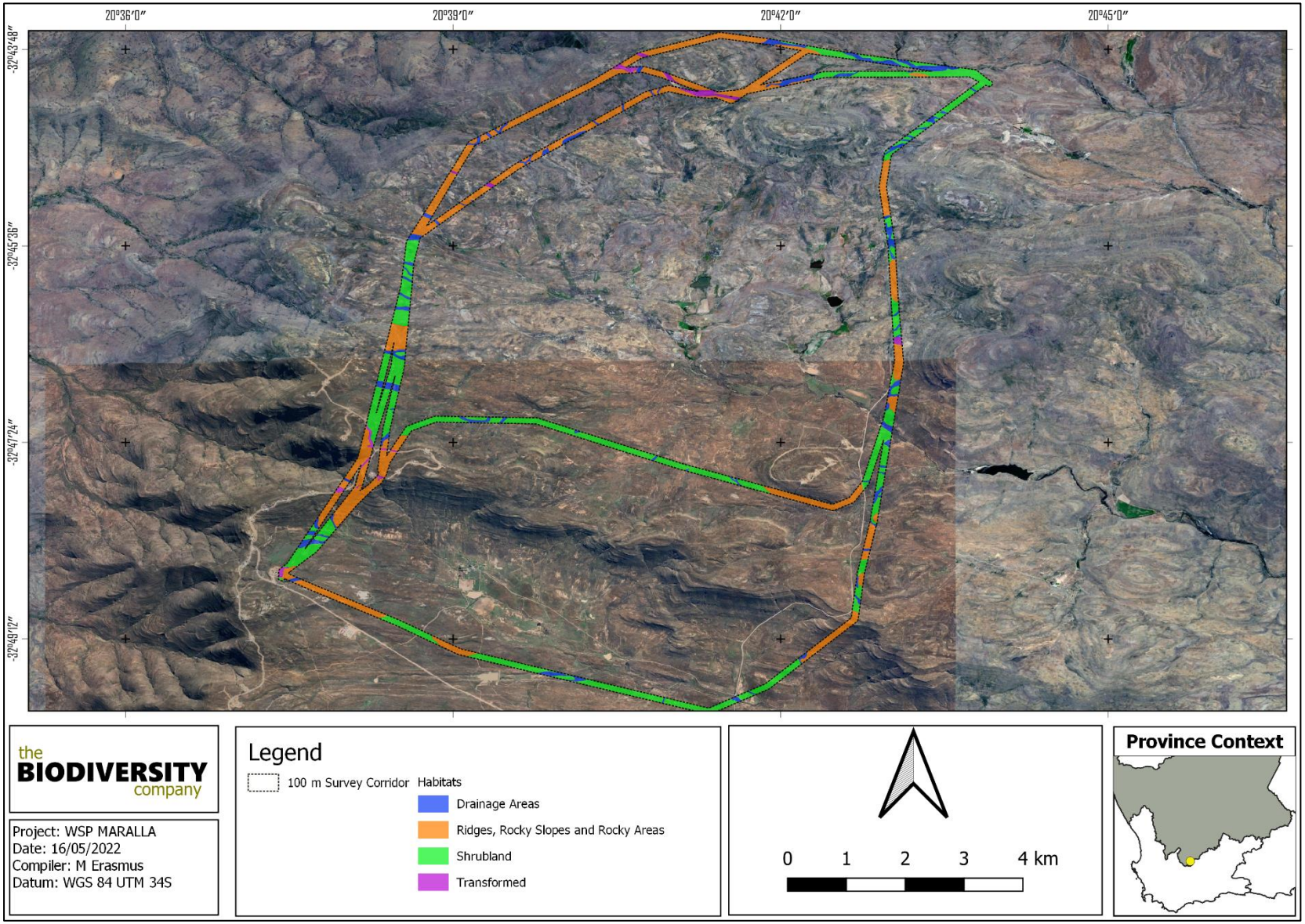


Figure 4-1 Habitats delineated for the project area.

4.1.1 Drainage features

The drainage lines and larger streams within the project area can be regarded as non-perennial and possess surface flow only briefly during and following a period of rainfall (ephemeral), which is a feature of semi-arid/arid regions. These seasonal streams create an ecological link between the stream and its surrounding terrestrial landscape and has the same function albeit on a smaller scale than a river (Figure 4-2 and Figure 4-3). This habitat is important as a movement corridor as it creates a link between the system and its surrounding terrestrial landscape for several faunal species, especially birds and mammals, and plays a vital role as a water resource not only for the biodiversity but also the local community. This habitat unit can be regarded as highly important, not only within the local landscape, but also regionally.

These habitats are dominated by *Dicerothamnus rhinocerotis* and *Pseudoschoenus inanis*. The smaller drainage lines are however also important and the presence of several species of conservation concern such as *Brunsvigia josephinae* (VU) was confirmed present within these areas by Simon Todd in 2016. The larger streams function as FEPA Upstream Management Areas.

Figure 4-2 An example of a drainage feature from the project area

Figure 4-3 An example of a larger drainage feature from the project area

4.1.2 Shrubland

This habitat is the remainder of the shrubland that has been disturbed by the historic and current grazing (Figure 4-4 and Figure 4-5). This habitat type is regarded as semi-natural shrubland, but slightly disturbed due to the grazing by livestock, mismanagement and also human infringement. The current ecological condition of this habitat with regard to the main driving forces, are intact, which is evident in the amount of, and importance of the species recorded in the flora and faunal assessment, and also to the high species diversity and number of plant species recorded. Current human infringement still occurs throughout, especially in areas close to roads.

The unit acts as a greenland which supports viable plant species populations and is also used for foraging by fauna. The unit also serves as a movement corridor for fauna within a landscape fragmented.

Figure 4-4 An example of a shrubland from the project area

Figure 4-5 An example of a shrubland from the project area

4.1.3 Ridges, Rocky Slopes and Rocky Areas

This habitat includes areas that are rocky outcrops, stony and rocky ridges with varying slopes, bedrock protruding from the soil layer with the associated boulders and large rocks that occur within the shrubland habitat (Figure 4-6 and Figure 4-7). The habitat is used by faunal species as fine-scale habitats and is important to consider for mitigation actions when an area is cleared for placement of the infrastructure. These habitats can be considered as ecological hotspots being an important

habitat for fauna and flora, especially plants as well as reptiles. The habitat has been infringed upon by livestock, which has had an impact on this habitat, although minor. This habitat type has undergone impacts associated with human activity especially due to the use of the area for grazing. This habitat forms part of a unique landscape within the region and provides refugia, food and a more natural environment.

Figure 4-6 An example of a ridges, rocky slopes habitat from the project area

Figure 4-7 An example of a rocky habitat from the project area

4.1.4 Transformed

This habitat unit represents all areas recently cleared for the construction of wind turbines and associated infrastructure such as secondary roads. This habitat is regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state. Due to the transformed nature of this habitat, it is regarded as having a very low

sensitivity. Due to the lack of high resolution satellite imagery, only a small extent of this habitat could be accurately delineated.

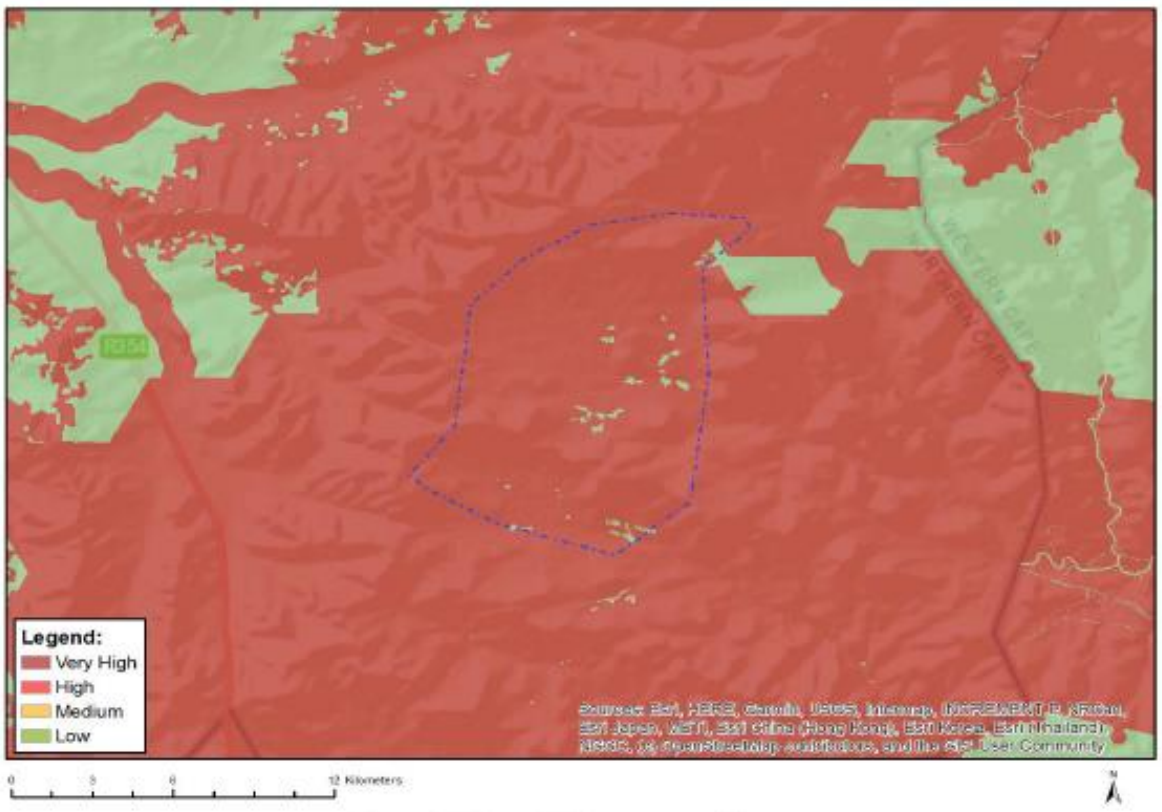
Figure 4-8 An example transformed habitat from the project area

Figure 4-9 An example of a rocky habitat from the project area

4.2 Site Ecological Importance

The biodiversity theme sensitivity as indicated in the screening report was derived to be Very High, mainly due to the area being CBA 1 & 2 and ESA (Figure 4-10).

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	Critical biodiveristy area 1
Very High	Critical biodiveristy area 2
Very High	Ecological support area
Very High	Protected Areas Expansion Strategy

Figure 4-10 Terrestrial Biodiversity Theme Sensitivity, DEA Screening Report

The different terrestrial habitat types that were delineated within the project area, can be seen in (Table 4-2). Based on the criteria provided in Section 2.3 of this report, all habitats within the assessment area of the proposed development were allocated a sensitivity category. The sensitivities of the habitat types delineated are illustrated in Figure 4-11. Very High and High Sensitivity' areas are due to the following:

- Habitats within the assessment area were observed to be utilised by threatened species during the field survey. These species comprised of one (1) VU avifauna species, two (2) EN avifauna species, and 1 NT mammal and reptile;
- Unique and low resilience habitats;
- Threatened and Protected flora species were abundant and ubiquitous within; and
- A high richness of protected fauna species was present.

Table 4-2 Summary of habitat types delineated within the field assessment area of the project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Low	Very Low	Very Low	Low	Very Low
Drainage features	Medium	High	High	Low	High
Shrubland	Medium	Medium	Medium	Low	High
Ridges, Rocky Slopes and Rocky Areas	Medium	Medium	Medium	Low	High
Ridges and Rocky Slopes with steep slope and some Drainage features	High Slope Habitats FEPA Rivers	High	High	Low	Very High

Interpretation of the SEI in the context of the proposed development activities is provided in Table 4-3.

Table 4-3 Guidelines for interpreting Site Ecological Importance) in the context of the proposed development activities

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

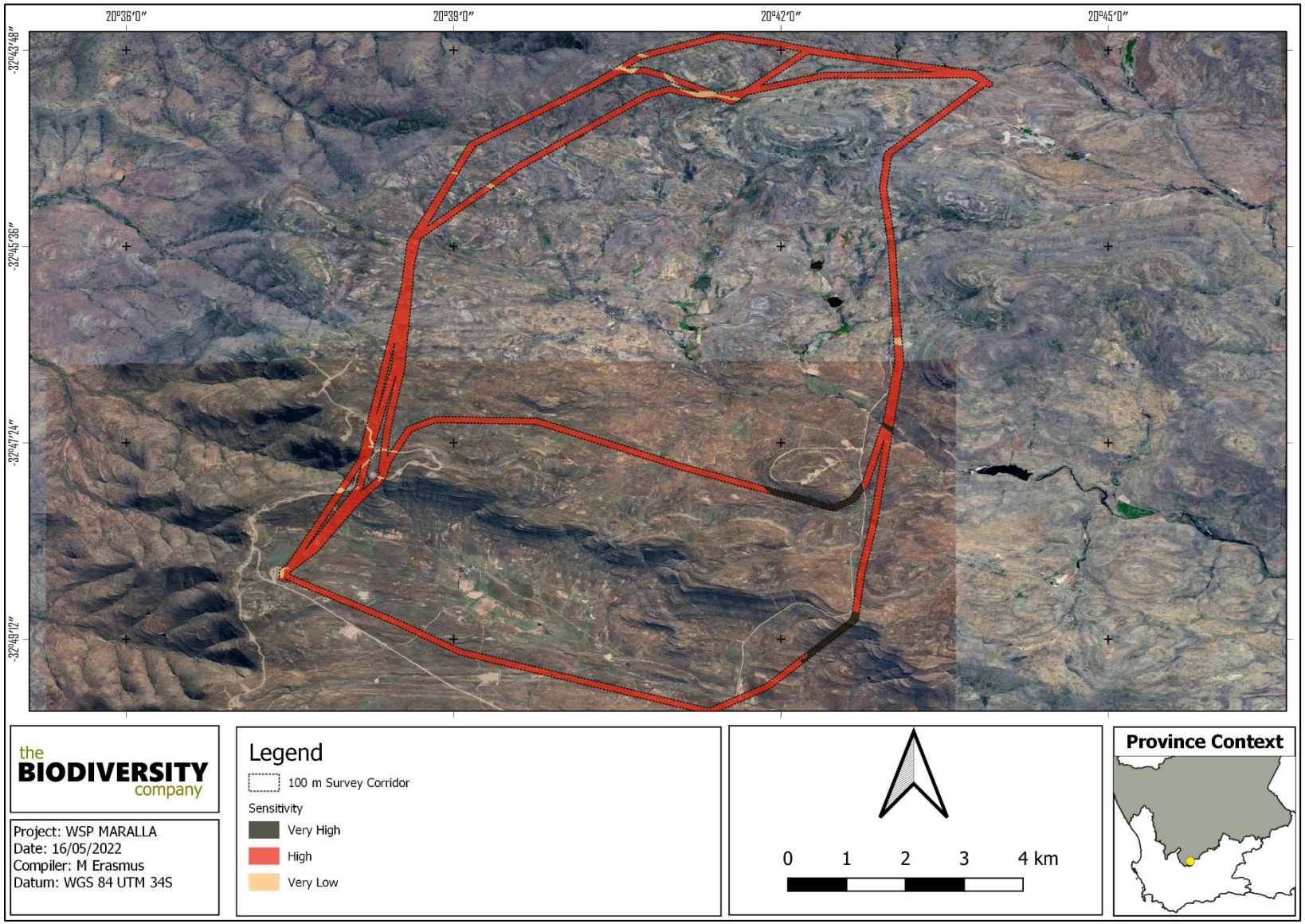


Figure 4-11 Sensitivity of the project area in relation to the 100 m project area

5 Impact Assessment

5.1 Risk Assessment Methodology

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in Table 5-1.

Table 5-1 Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	0 – 30		31 to 60		61 – 100
Environmental Significance Rating (Negative (-))	**Low (-)**		**Moderate (-)**		**High (-)**

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Environmental Significance Rating (Positive (+))	Low (+)	Moderate (+)	High (+)

5.1.1 Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure 5-1 below.

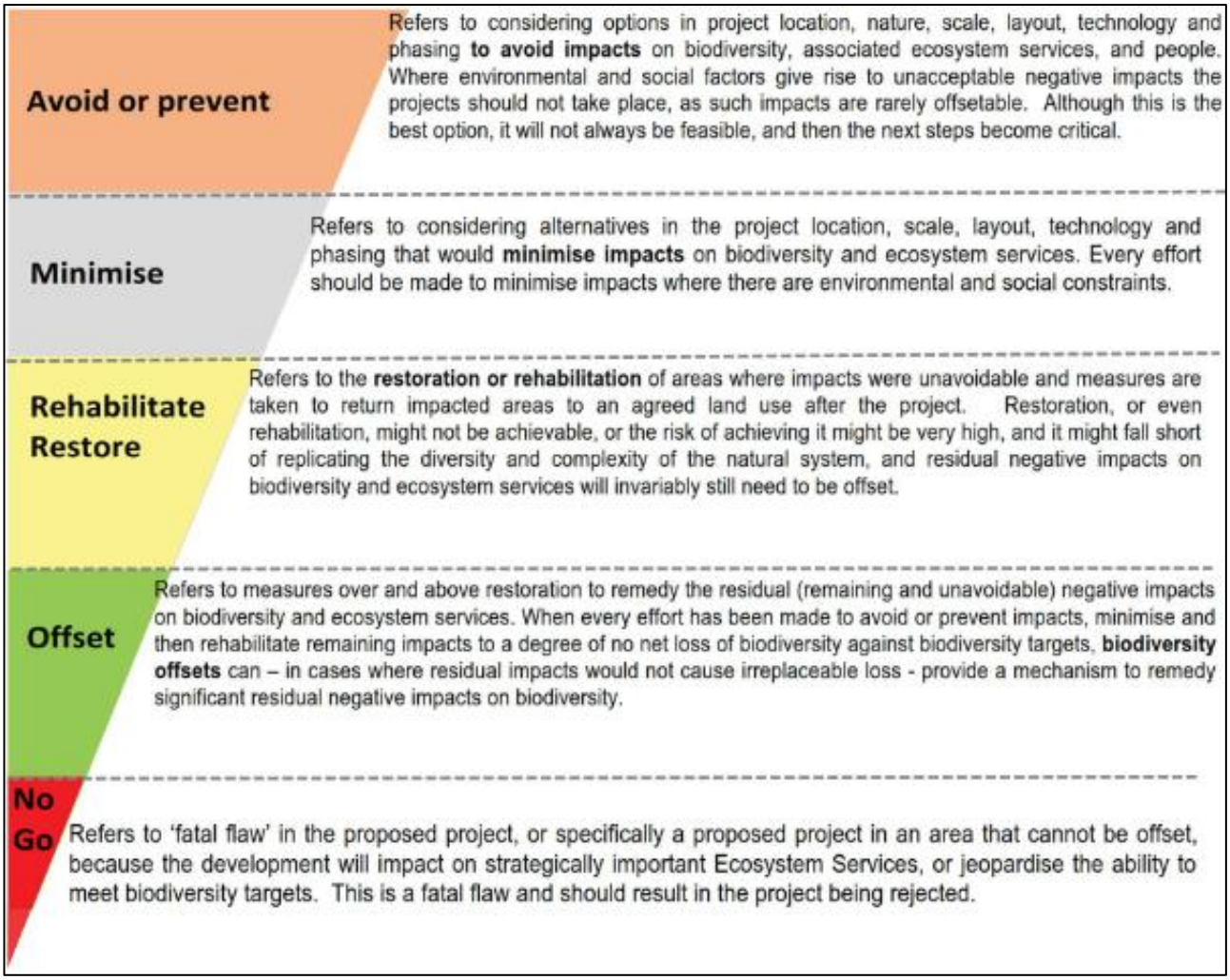


Figure 5-1 Mitigation Sequence/Hierarchy

5.2 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, a limited amount of negative impacts to biodiversity were observed within the general and assessment area. These include:

- Wind Turbine construction and associated infrastructure;
- Present energy distribution infrastructure, including power lines;
- Historical sheep grazing land-use;
- Roads and associated vehicle traffic and road kills; and
- Fences.

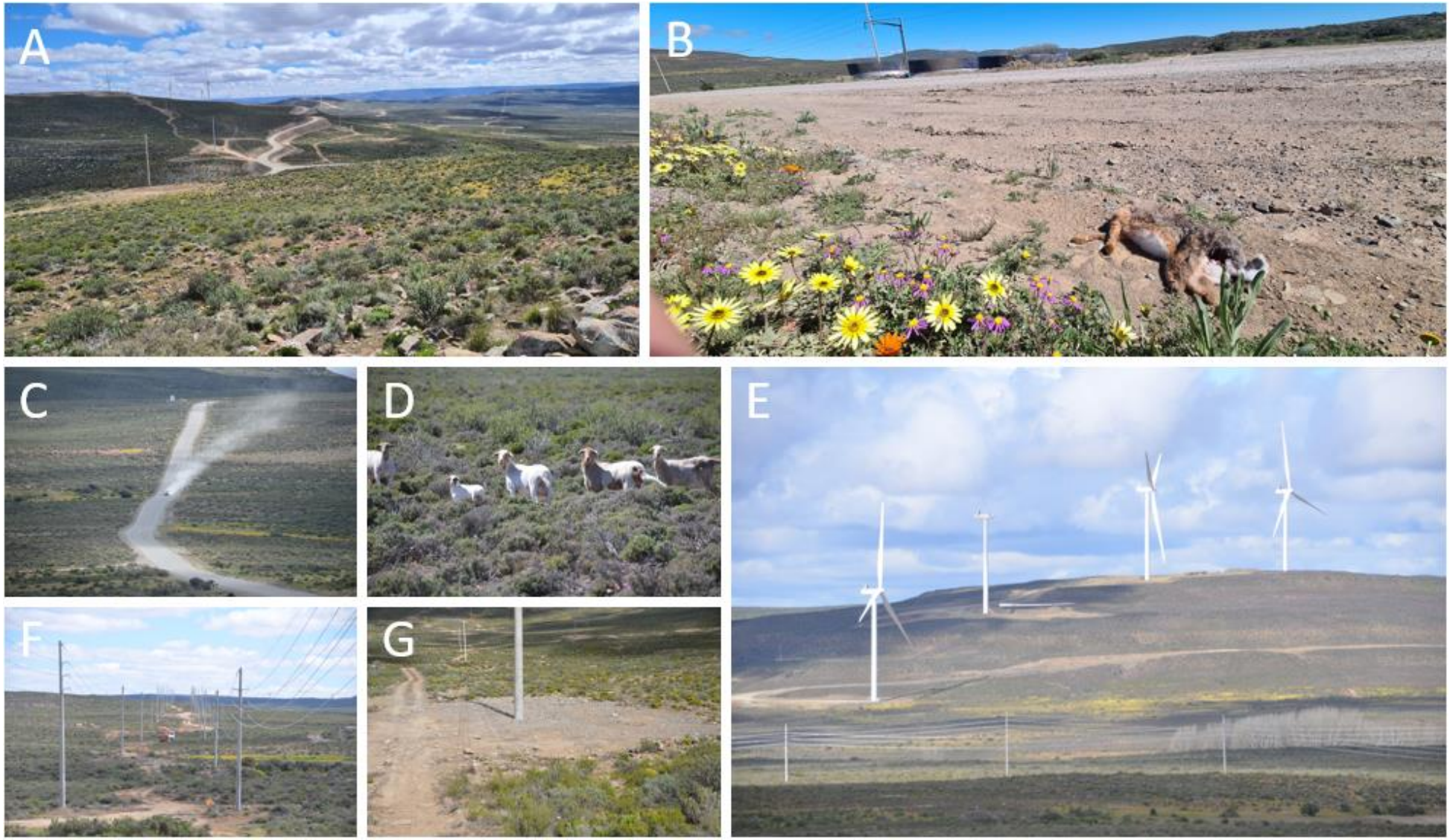


Figure 5-2 Photographs illustrating impacts to biodiversity A) Wind Turbine development B) Roads and associated road kills, C) Gravel roads, D) Livestock and E and F) Existing wind turbine infrastructure and power lines and G) Vegetation clearing.

5.3 Initial Impact – No-go Scenario

It is the specialist's opinion that if none of the proposed activities be considered, that sensitive receptors will remain intact in most of the areas if no unlawful anthropogenic developments take place. The current ecological state of the area holistically, is intact, which will degrade taking into consideration the proposed activities.

The larger project area could improve naturally over time, especially with the reduction of sheep farming, and will improve significantly with rehabilitation, if managed. The reality of the area being managed is however, very unlikely and more wind farm developments are expected in the area. To summarise, the no-go option will result in zero additional impacts and could result in the improvement of the area, especially the water resource systems which, in an environmental aspect, will be the suitable option.

5.4 Alternatives Considered

Three alternatives were initially provided. After taking into consideration the needs of the landowner and the ecological findings (or constraints), an updated layout was received in April 2022, where two additional alternatives were added (Figure 5-3). This including the alternative provided by the specialist, results in 6 alternatives as seen in the report. All alternatives traverse either very high or high sensitivity areas, but direct disturbances can be limited with avoidance and mitigation measures.

Option 4 (blue) (Figure 5-3) is considered the preferred option. Option A (dark green) (Figure 5-3) is considered the 2nd preferred option if option 4 isn't feasible. This is attributed to the existing adjacent impacts stemming from the wind farm developments. It was observed during the site visit, that there are already existing power lines and associated access roads, with several more under construction. It's the specialist opinion that if feasible, the proposed alternative should attempt to use/partner with existing infrastructure and/or access roads to limit the overall impact (Figure 5-4 and Figure 5-5).

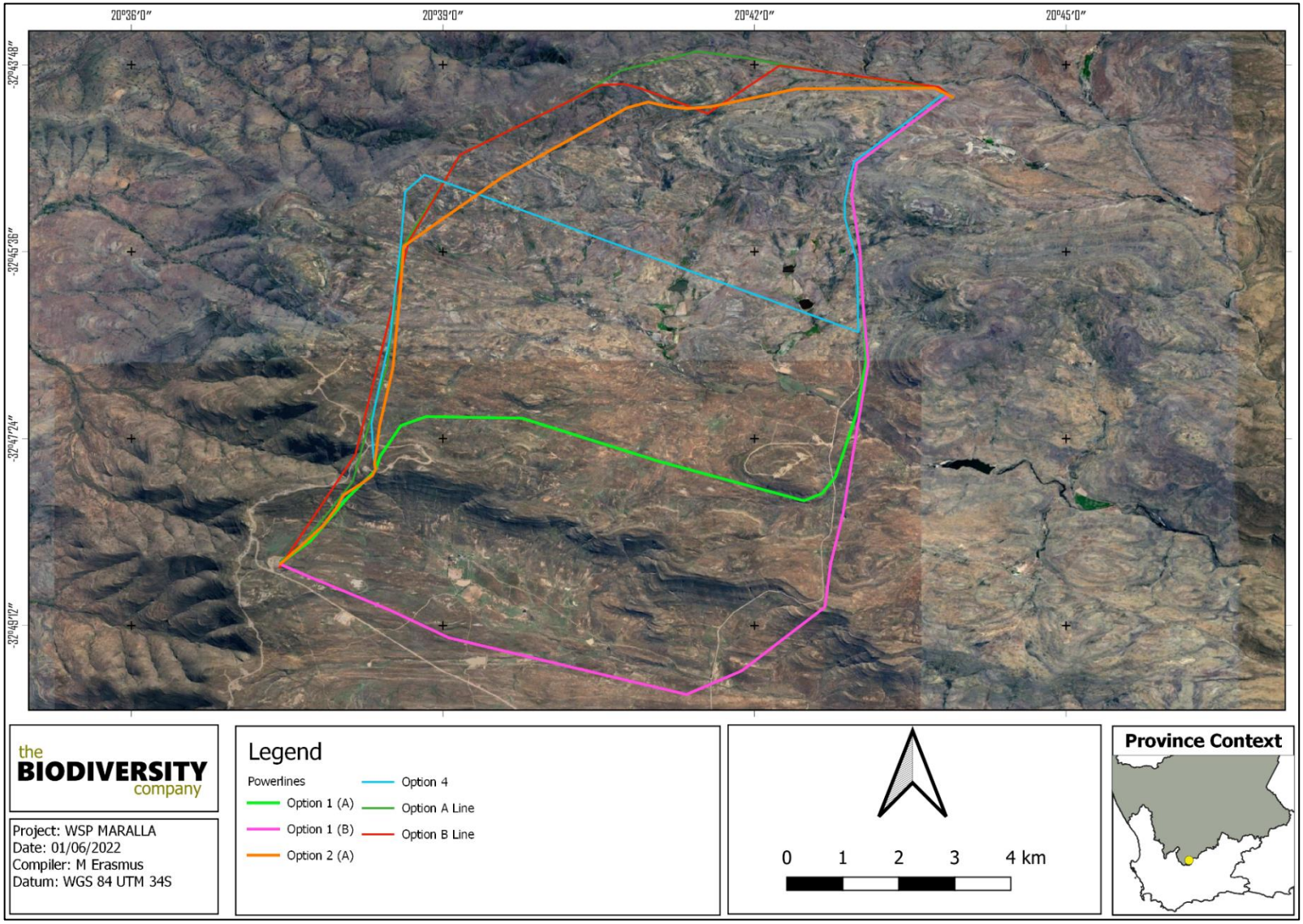


Figure 5-3 Map with all alternatives in relation to the area.

Figure 5-4 Existing servitude that should be used in correlation with the option A and option 4.

Figure 5-5 Extent of existing servitude which should be used in relation to the option A and option 4.

5.5 Identification of Additional Potential Impacts

The potential impacts during the construction and operation phases of the proposed development are presented in Table 5-2.

Table 5-2 Potential impacts to biodiversity associated with the proposed activity

Main Impact	**Project activities that can cause loss of habitat (especially with regard to the construction):**	**Secondary impacts anticipated**
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected and threatened species (Rare and NT plants)	Displacement/loss of flora & fauna (including possible SCC) Increased potential for soil erosion Habitat fragmentation Increased potential for establishment of alien & invasive vegetation
	Access roads and servitudes	
	Soil dust precipitation	
	Dumping of waste products	
	Random events such as fire (cooking fires or cigarettes)	
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including potential SCC) Spreading of potentially dangerous diseases due to invasive and pest species Alteration of fauna assemblages due to habitat modification
	Vehicles potentially spreading seed	
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	
Main Impact	**Project activities that can cause the Direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Project activities that can cause direct mortality of fauna	Loss of ecosystem services
	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) Bird collisions with power lines	
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4.Reduced dispersal/migration of fauna	Loss of landscape used as corridor	Loss of ecosystem services Reduced plant seed dispersal
	Compacted roads	
	Removal of vegetation	
	Light, noise and dust disturbance	
	Power lines	
Main Impact	**Project activities that can cause pollution in water courses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff	Chemical (organic/inorganic) spills	Faunal mortality (direct and indirectly) Loss of ecosystem services
	Erosion	
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance and dust.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, generators) during construction as well as during maintenance	Loss of ecosystem services
	Vehicles	
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**

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

5.6 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. The mitigation actions required to lower the risk of the impact are provided in Section 5.6.6 of this report.

Due to the nature of the project, the actual footprint of the pole/pylon infrastructure has a small localised, impact. It is the creation off access and service roads that is a more important aspect to note and will be considered in relation to the power lines as no road layout has been received. The method of connection and spanning of the power lines between poles have also not been received and thus no impact regarding that can be conducted.

The power lines will traverse a large extent of currently undisturbed vegetation which would increase the potential impact of the power lines and the associated roads. The drainage lines along the routes, which are sensitive systems, can easily be spanned by a power line. The route however traverses high elevation areas along a few ridges, which is the area considered to be very high sensitivity. The main significant risk is the creation of the road not only within this sensitive area, but also the residual high potential erosion impact as well as the severing of a movement corridor, especially for avifauna. As the drainage systems present are of small ephemeral systems, it should not be difficult for the power line to traverse these features with low impact. Disturbance in these areas should be kept to a minimum and while the power line may be able to span these features with minimal impact, access roads may cause more damage and only essential crossing points should be used and identified in the field to minimize their impact.

5.6.1 Construction Phase

The following potential impacts were considered on terrestrial communities. This phase refers to the period when construction of the proposed infrastructure is built/installed. This phase usually has the largest direct impact on biodiversity.

5.6.1.1 Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community;

The proposed vegetation clearance for the pylon footprint and the associated access roads; clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove vegetation as well as remove and fragment communities/ecosystems for terrestrial plant species. The exposed road surface will also result in direct and indirect erosion of the servitude due to the loss of vegetation cover. These disturbances will increase the potential for the establishment of alien and invasive vegetation; disruption in natural areas of phytomass and disturbance of the soil. The associated human activities will increase the potential and likelihood of establishment of alien and invasive vegetation. These will all result in the destruction, further loss and fragmentation of the vegetation community/ ecosystems. The impact of the construction phase on the impact on flora is shown in Table 5-3 below.

Table 5-3 ***Assessment of significance of potential impacts on the habitats, ecosystems and vegetation community associated with the construction phase of the project.***

Potential Impact: Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	5	3	4	5	4	68	High	(-)	High
With Mitigation	4	2	3	2	3	33	Moderate	(-)	High
Mitigation and Management Measures See sections 5.6.6									

5.6.1.2 Introduction of alien species, especially plants

Clearance of vegetation and movement between areas will increase the potential for the establishment of alien and invasive vegetation. The proposed vegetation clearance for the pylon footprint and the associated access roads; clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove indigenous vegetation and potentially create an environment where alien species can be introduced. The "edge effect" caused by these disturbances will likely result in alien and invasive vegetation being established in these areas. The impact of the construction phase is shown in Table 5-4 below.

Table 5-4 ***Assessment of significance of potential impacts on the terrestrial biodiversity associated with the construction phase of the project.***

Potential Impact: Introduction of alien species, especially plants	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	3	3	3	4	52	Moderate	(-)	High
With Mitigation	3	2	2	2	2	18	Low	(-)	High
Mitigation and Management Measures See sections 5.6.6									

5.6.1.3 Destruction of threatened plant species.

The vegetation clearance for the pylon footprint and the associated access roads; clearing new roads/servitudes as well as potential widening of existing roads/servitudes will physically remove vegetation This will result in direct and indirect erosion of these working areas due to the loss of vegetation cover. This will increase the potential for the establishment of alien and invasive vegetation; disruption in natural areas of phytomass and the disturbance of the soil. These aspects will result in the destruction, further loss and fragmentation of the vegetation community/ ecosystems, including potential SCC individuals. The impact of the construction phase on the impact on flora is shown in Table 5-5 below.

Table 5-5 ***Assessment of significance of potential impacts on the terrestrial flora associated with the construction phase of the project.***

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence

Destruction of threatened plant species.									
Without Mitigation	5	4	5	5	4	**76**	**High**	(-)	High
With Mitigation	3	2	4	3	3	**36**	**Moderate**	(-)	High
Mitigation and Management Measures **See sections 5.6.6**									

5.6.1.4 Displacement and fragmentation of the faunal community due to habitat loss, direct mortalities and disturbance (noise, dust and vibration)

The removal of vegetation will result in the direct loss of habitat, forcing fauna species (including potential IUCN listed species) to move into new areas. This will likely result in the disruption of faunal populations by interfering with their movements and/or breeding activities. Direct mortalities may arise from earth moving or transport vehicles and increased traffic due to construction work and the transportation of staff/materials. The unregulated movement of local people will also increase the likelihood of poaching of species in what was previously seen as secluded habitat for fauna species. The unregulated movement of local people could lead to introduction of diseases and feral species such as cats and dogs. The impact of the construction phase on the impact on fauna is shown in Table 5-6 below.

Table 5-6 Assessment of significance of potential impacts on the terrestrial fauna associated with the construction phase of the project.

Potential Impact: Displacement and fragmentation of the faunal community due to habitat loss, direct mortalities and disturbance (noise, dust and vibration)	**Magnitude**	**Extent**	**Reversibility**	**Duration**	**Probability**	**Significance**		**Character**	**Confidence**
Without Mitigation	4	3	3	4	4	**56**	**Moderate**	(-)	High
With Mitigation	3	2	3	2	2	**20**	**Low**	(-)	High
Mitigation and Management Measures **See sections 5.6.6**									

5.6.2 Operational Phase

The following potential impacts were considered on biodiversity (fauna and flora) during the operational phase. This phase refers to when construction has been completed and the proposed infrastructure has been built and is functional.

5.6.2.1 Continued disturbance of vegetation communities, especially threatened species, and encroachment by alien invasive plant species.

Due to the vegetation communities that were cleared within the footprint area during the construction phase, being entirely transformed, indirect impacts to the surrounding vegetation communities and ecosystems are the main impact considered. The edges of the access and service roads will likely be degraded by impacts such as dust (reduces the effectiveness of photosynthesis and pollination), livestock and alien vegetation will become a concern in these disturbed areas. The unregulated movement of local people into the areas surrounding the footprint will likely result in plant harvesting. The impact of the construction phase on the impact on fauna is shown in Table 5-7 below.

Table 5-7 ***Assessment of significance of potential impacts on the terrestrial flora associated with the operational phase of the project.***

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Continued disturbance of vegetation communities, especially threatened species, and encroachment by alien invasive plant species									
Without Mitigation	4	2	3	2	4	**44**	**Moderate**	(-)	High
With Mitigation	3	1	2	1	2	**14**	**Low**	(-)	High
Mitigation and Management Measures **See sections 5.6.6**									

5.6.2.2 Ongoing displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbances (such as collisions, dust and noise).

Ongoing displacement due to sensory disturbance during operation (noise, light, dust, pollution and vibrations) from the service vehicles. The footprint area of the access route will likely be impacted by poaching, litter and roadkill.

The power line is anticipated to have a noteworthy impact during operation as during this time the power line will pose a threat to avifauna, especially sensitive species which are expected to occur in the area. If mitigation measures are followed this impact can be reduced as depicted in the tables below. The direct mortality of avifauna due to the OHL is a 'High' risk in general. Suitable mitigation measures include the installation of both bird flaps and diverters, but these are not 100% effective, especially with regards to mitigating against collisions by *Neotis ludwigii.* The impact of the construction phase on the impact on fauna is shown in Table 5-8 below.

Table 5-8 ***Assessment of significance of potential impacts on the terrestrial fauna associated with the operational phase of the project.***

Potential Impact:	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Ongoing displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbances (such as collisions, dust and noise).									
Without Mitigation	5	3	3	4	5	**75**	**High**	(-)	High
With Mitigation	3	2	2	3	3	**30**	**Moderate**	(-)	High
Mitigation and Management Measures **See sections 5.6.6**									

5.6.3 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 similar to 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.

These are the assumed cumulative impacts that may result from the activities in the immediate vicinity of the project area. Localised impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as other power lines and the associated roads within the area). These include dust deposition, noise and vibration, disruption of wildlife corridors or habitat, surface water quality, and transport.

Long-term cumulative impacts due to extensive wind farm footprints, power lines and substations can lead to the loss of endemic species and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas. A number of turbines and power lines can already be found in the project area and surrounds, with more expected. This combination of obstacles increases the risk of bird collisions and habitat loss. This is however expected, due to the area being demarcated as a REDZ zone. In the light of all above, the expected cumulative impact is High-severely detrimental. Hence why the fourth option is preferred.

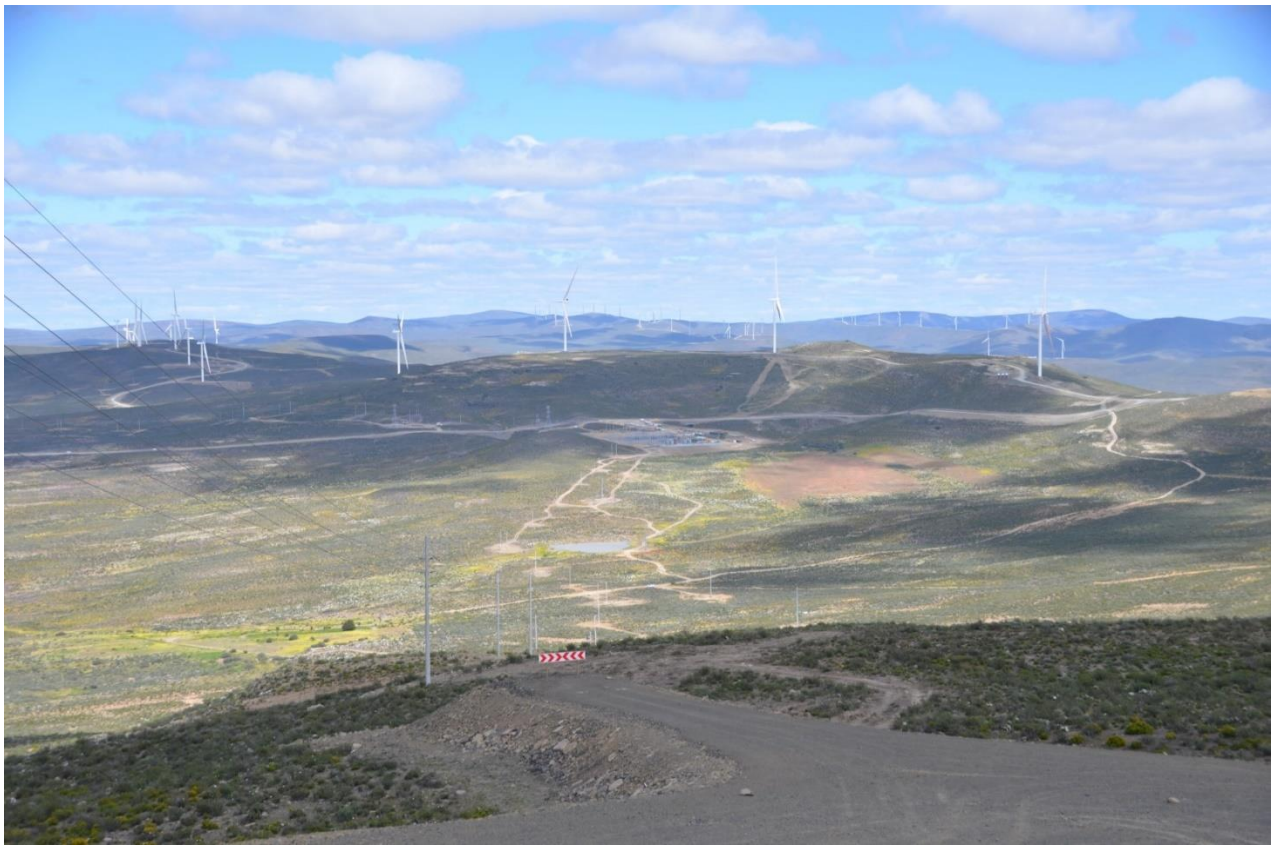


Figure 5-6 Photographs illustrating existing infrastructure within the area.

5.6.4 Irreplaceable Loss

The current proposed layout of the surface infrastructure and the associated impacts will result in the irreplaceable loss of:

- Threatened, protected and endemic plant with a restricted range; and
- CBA 1 & 2 and ESA.

5.6.5 Unplanned Events

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

Table 5-9 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 5-9 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Hydrocarbon spills into the surrounding environment	Contamination of habitat as well as water resources associated with spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural grassland and wetlands	Appropriate/Adequate fire management plan need to be implemented.

5.6.6 Biodiversity Management Outcomes

The aim of the management outcomes is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 5-10 presents the prescribed mitigation measures and the respective timeframes, targets and performance indicators for the biodiversity 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 1 and CBA 2 areas in the vicinity of the project area (including water resource areas);
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Follow the guidelines for interpreting SEI; and
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern).

Table 5-10 Mitigation measures including requirements for timeframes, roles and responsibilities for this report

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
All very high sensitivity areas must be avoided and declared an outright "No-go" area. All high sensitivity areas should be cautiously considered. Should development take place in the high sensitivity areas, the pole spacing should be extended to reduce the number of poles in these areas. The footprint area must be minimised and clearing must also be restricted to the direct impact area and the 100 m corridor may not be cleared as a whole.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
Drainage lines must be avoided for pole placement and access roads, and a no-go buffer of 20 m 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 pylon footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted too flat areas as far as possible. No further loss (unnecessary) of very high/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. All structure footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted offsite. No materials may be stored and all materials must be removed from the project area once the construction phase has been concluded. No permanent construction structures should be permitted. 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 prevent them leaking	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

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 in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any threatened/protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Pylon infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. All protected and red-data plants should be relocated, and as many other geophytic 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 correct 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 on their own relevant specialists must be contacted to advise on how the species can be relocated	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase
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 evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
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, dust and erosion is limited, this is especially true due to the presence of the Verrox's Tent Tortoise's. The speed limits should be restricted to at least 30 km/h.	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. • Driving on access roads close to very high and highly sensitive areas at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period;	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
Monitoring of the OHL route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.	Life of project	Environmental Officer & Contractor,	Monitoring of the OHL route	Ongoing
For transmission towers in high to very high sensitivity locations, it is recommended to install bird guard/spike structures (close to or along drainage features especially) to prevent birds from landing on and/or nesting on the towers. This has been linked with increases in corvid populations which can impact local reptile and avifauna species. Poles: The poles should be fitted with bird perches on top of the poles to draw birds, particularly vultures, away from the potentially risky insulators.	Construction Phase	Project manager, Environmental Officer	Installation of bird mitigation	From design to installation
Appropriate bird mitigation measures should be put in place to avoid bird collisions and direct impacts to the infrastructure, as SCC presence in the area is high. These mitigation measures should entail the installation of 'bird-flappers' and bird-friendly power line structures. This is particularly relevant to the portions of the proposed power line which crosses the drainage features. Power line: The span that crosses drainage lines should be marked with Bird Flight Diverters on the earth wire of the line, five metres apart, alternating black and white;	Construction Phase	Project manager, Environmental Officer	Installation of bird mitigation	From design to installation

The appropriate bird mitigation measures structures need to be monitored and serviced and should be made a top priority for the duration of the project.	Life of operation	Project manager, Environmental Officer	Presence and condition of mitigation structures	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 100 meter grid corridor.	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
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored 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 with regard to 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 project area to inform contractors and site staff of the presence of Red / Orange List 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 very high sensitivity areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the 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 made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

6 Recommendations

The following further recommendations are provided:

- The suggested route be rather used or considered for the project;
- The infrastructure layout for the proposed access roads or use of existing roads needs to be provided in order to assess the impact more accurately, potentially reducing the current post-mitigation risk;
- Potential design alternatives regarding the placement of poles in high sensitivity areas to reduce the number of poles required in these areas;
- A vegetation alien invasive management plan should be implemented from the onset of the construction phase of the project; and
- A rehabilitation plan needs to be implemented in the disturbed areas.

7 Conclusion and Impact Statement

7.1 Conclusion

The proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld, which is a poorly studied vegetation type, although it possesses a high level of biodiversity. The conservation status is classified as Least Threatened albeit the protection level is regarded as 'Not Protected'. Moreover, the proposed activity overlaps with a CBA 1 and CBA 2, as well as a NPAES focus area. The assessment area possesses a high diversity and abundance of protected flora species as well as flora species that are threatened

Regarding the current layout, several of the infrastructure locations fall within sensitive vegetation types, sensitive habitats, and other areas of high biodiversity potential. The current layout as well as the expected access and service road of the development would be considered to have a significant and high negative impact as it would directly affect the ecosystem as well as the habitat of several flora and fauna species. Schedule 1 and schedule 2 protected fauna are ubiquitous within the assessment area and surrounding landscape. Five threatened species of fauna were observed to occur and utilise the habitats within the assessment area during the survey period and comprised of three avifauna species and one mammal and one reptile species. The three avifauna species, *Polemaetus bellicosus* (Eagle, Martial) *Neotis ludwigii* (Ludwigs Bustard) and *Afrotis afra* (Southern Black Korhaan), possess high priority scores indicating that they are particularly susceptible to collisions with power lines. The mammal and reptile species, *Pelea capreolus* (Grey Rhebok) and *Psammobates tentorius veroxii* (Verrox's Tent Tortoise), is unlikely to be impacted by the OHL itself, but will be impacted by the disturbance created during the construction phase. Excessive noise will lead to displacement of the species and the vehicle traffic potentially will lead to direct mortality.

The present land use has had a direct impact on both the fauna and the flora in the area, however minimal. Historically, overgrazing from sheep and mismanagement has led to the deterioration of these habits. However, the very high and high sensitivity areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging, water resource and movement corridors for fauna within a landscape fragmented by development. The habitat existence and importance of these habitats is regarded as crucial, due to the species

recorded as well as the role of this intact unique habitat to biodiversity within a very fragmented disturbed local landscape, not to mention the sensitivity according to various ecological datasets.

The very high and sensitivity terrestrial areas still:

- Serve as and represent CBA 1& 2 and ESA as per the Conservation Plan;
- Utilised by threatened and protected flora and fauna species which were abundant and ubiquitous within;
- Unique and low resilience habitats; and
- Support various organisms and may play a more important role in the ecosystem if left to recover from the superficial impacts.

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

Six alternatives were provided. All alternatives traverse either very high or high sensitivity areas. Option 4 is considered the preferred option. Option A is considered the 2nd preferred option if option 4 isn't feasible. This is attributed to the existing adjacent impacts stemming from the wind farm developments. It was observed during the site visit, that there are already existing power lines and associated access roads, with several more under construction. It's the specialist opinion that if feasible, the proposed alternative should attempt to use/partner with existing infrastructure and/or access roads to limit the overall impact.

Any development on the very high and high sensitivity areas will lead the direct destruction and loss of portions of functional CBA/ESA, and also the floral and faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigations, management and associated monitoring regarding these operational impacts will be the most important factor of this project and must be considered by the issuing authority.

That being said, special consideration needs to be taken regarding the construction and operational phase impacts of the access and service road infrastructure, as they could result in large scale detrimental impacts if not planned, managed and monitored appropriately.

7.2 Impact Statement

No fatal flaws are evident for the proposed project, and it is preferred that the very high declared no-go and that high sensitivity areas be avoided as much is feasible. Mitigation measures as described in this report can be implemented to reduce the significance of the risk. There is still a high possibility of collision by large avifauna species 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 (CBAs and NPAES focus area), development may proceed but with caution. It is the opinions of the specialists that the project may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented. Implementation of the mitigation measures as well as recommendations as described in this report

will reduce the significance of the risk to an acceptable level. Furthermore, cumulative impacts within the broader landscape are a concern, due to the number of WEFs

8 References

ADU (Animal Demography Unit). (2021). Virtual Museum. (Accessed: Ausgust 2021).

Alexander, G. & Marais, J. (2007). A guide to the Reptiles of Southern Africa. Struik, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

BGIS (Biodiversity GIS). (2018). http://bgis.sanbi.org/ (Accessed: August 2021).

BirdLife International. 2016a. *Afrotis afra*. The IUCN Red List of Threatened Species 2016: e.T22691975A93331501. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22691975A93331501.en.

BirdLife International. 2018. *Neotis ludwigii* (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2018: e.T22691910A129456278. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22691910A129456278.en.

Branch, W.R. (1998). Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). (1973). www.cites.org. (Accessed: June 2021).

Chris van Rooyen consulting (2016). Bird Impact Assessment Study: Avifauna 132kv Grid Connection. Biotherm Maralla Wind Project

Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. & Funke, N. (2011). Implementation Manual for Freshwater Ecosystem Priority Areas. Report to the Water Research Commission, Pretoria.

Du Preez, L. & Carruthers, V. (2009). A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

EWT. (2016). Mammal Red List 2016. www.ewt.org.za (Accessed: August 2021).

EWT (Endangered Wildlife Trust). (2017). Threatened Amphibian Programme. (2015). The Southern African Frog Atlas Project https://www.ewt.org.za/TAP/refrence.html (SAFAP, now FrogMAP). http://vmus.adu.org.za (Accessed: June 2020).

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

Goff, F., Dawson, G., & Rochow, J. (1982). Site examination for threatened and endangered plant species. *Environmental Management, 6*(4), 307-316.

González-Salazar, C., Martínez-Meyer, E. and López-Santiago, G. 2014. A hierarchical classification of trophic guilds for North American birds and mammals. Revista Mexicana de Biodiversidad 85: 931-941.

Griffiths, C., Day, J. & Picker, M. (2016). Freshwater Life: A Field Guide to the Plants and Animals of Southern Africa. Struik Nature, Cape Town.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Hofmeyr, M.D., Leuteritz, T. & Baard, E.H.W. 2018b. *Psammobates tentorius*. The IUCN Red List of Threatened Species 2018: e.T170524A115656793. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T170524A115656793.en

IUCN. (2017). The IUCN Red List of Threatened Species. www.iucnredlist.org (Accessed: June 2021).

Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278.

Jenkins, A.R., Shaw, J.M., Smallie, J.J., Gibbons, B., Visagie, R. & Ryan, P.R. 2011. Estimating the impacts of power line collisions on Ludwig's Bustards *Neotis ludwigii*. Bird Conservation International 21: 303-310.

Johnson, S. & Bytebier, B. (2015). Orchids of South Africa: A Field Guide. Struik publishers, Cape Town.

Le Roux, A. (2015). Wild Flowers of Namaqualand, Penguin Random House,South Africa.

Martin, G. R. & Shaw, J. M. 2010. Bird collisions with power lines: Failing to see the way ahead? Biological Conservation 143: 2695-2702.

Manning,J. (2018). Field Guide to Fynbos. Struik Nature, Cape Town

MammalMap. (2017). http://mammalmap.adu.org.za/ (Accessed: August 2021).

Measey, G.J. (2011). Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research. South African National Biodiversity Institute, Pretoria.

Minter, L., Burger, M., Harrison, J.A. & Kloepfer, D. (2004). Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Smithsonian Institute Avian Demography Unit, Washington; Cape Town.

Monadjem, A., Taylor, P.J., Coterrill, F.D.P. & Schoeman, C. (2010). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press, Johannesburg.

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

Noguera, J.C. Perez, I., Minguez, E. (2010). Impacts of terrestrial wind farms on diurnal raptors: developing a spatial vulnerability index and potential vulnerability maps. Ardeola 57: 41-53.

NBA. (2018). Terrestrial Ecosystem Threat Status 2018. http://bgis.sanbi.org/. (Accessed: June 2021).

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem

Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

NPAES. (2011). National Protected Areas Expansion Strategy. www.environment.gov.za (Accessed: June 2021).

Pooley, E. (1998). A Field Guide to Wild Flowers: KwaZulu-Natal and Eastern Region. The Flora Publications Trust; ABC Bookshop, Durban.

Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.

SACAD (South Africa Conservation Areas Database) and SADAP (South Africa Protected Areas Database) (2019). http://egis.environment.gov.za

SANBI. (2016). Red List of South African Plants version 2017.1. Redlist.sanbi.org (Accessed: June 2020).

SANBI. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

Simon Todd Consulting (2016). Environmental Impact Assessment for The Maralla West Wind Energy Facility: Fauna & Flora Specialist Study for EIA.

Skinner, J.D. & Chimimba, C.T. (2005). The Mammals of the Southern African Subregion (New Edition). Cambridge University Press, South Africa.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). (2019). South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Smith, G.F., Chesselet, P., van Jaarsveld, E.J., Hartmann, H., Hammer, S., van Wyk, B., Burgoyne, P., Klak, C. & Kurzweil, H. (1998). Mesembs of the world. Briza Publishers, Pretoria.

Van Oudtshoorn, F. (2004). Guide to the Grasses of Southern Africa. Second Edition. Briza Publikasies, Pretoria.

Van Wyk, B. & Van Wyk, P. (1997). Field guide to trees of Southern Africa. Struik Publishers, Cape Town.

Van Wyk, B. & Malan, S. (1997). Field Guide to the Wild Flowers of the Highveld: Also Useful in Adjacent Grassland and Bushveld, Struik Publishers, Cape Town.

Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. (2013). Medicinal Plants of South Africa. Briza Publications, Pretoria.

Van der Merwe, Helga & van rooyen, Margaretha. (2011). Vegetation trends following fire in the Roggeveld, Mountain Renosterveld, South Africa. South African Journal of Botany. 77. 127-136. 10.1016/j.sajb.2010.07.009.

9 Appendix Items

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

Family	Species	Author1	Rank 1	Sp2	IUCN	Ecology
Aizoaceae	*Antimima pumila*	(Fedde & C.Schust.) H.E.K.Hartmann			DD	Indigenous; Endemic
Aizoaceae	*Galenia pubescens*	(Eckl. & Zeyh.) Druce			LC	Indigenous; Endemic
Aizoaceae	*Cleretum lyratifolium*	Ihlenf. & Struck			LC	Indigenous; Endemic
Aizoaceae	*Hammeria gracilis*	Burgoyne			LC	Indigenous; Endemic
Aizoaceae	*Mesembryanthemum grossum*	Aiton				Indigenous; Endemic
Aizoaceae	*Ruschia sp.*					
Aizoaceae	*Antimima stayneri*	(L.Bolus) H.E.K.Hartmann			LC	Indigenous; Endemic
Aizoaceae	*Cheiridopsis sp.*					
Amaryllidaceae	*Gethyllis campanulata*	L.Bolus			LC	Indigenous; Endemic
Amaryllidaceae	*Gethyllis sp.*					
Amaryllidaceae	*Gethyllis villosa*	(Thunb.) Thunb.			LC	Indigenous; Endemic
Anacardiaceae	*Laurophyllus capensis*	Thunb.			LC	Indigenous; Endemic
Apiaceae	*Chamarea longipedicellata*	B.L.Burtt			LC	Indigenous
Asparagaceae	*Asparagus capensis*	L.	var.	capensis	LC	Indigenous
Asphodelaceae	*Trachyandra sanguinorhiza*	Boatwr. & J.C.Manning			LC	Indigenous; Endemic
Asphodelaceae	*Bulbine alooides*	(L.) Willd.			LC	Indigenous; Endemic
Asphodelaceae	*Haworthia arachnoidea*	(L.) Duval	var.	scabrispina	NE	Indigenous; Endemic
Asphodelaceae	*Trachyandra patens*	Oberm.			LC	Indigenous; Endemic
Asphodelaceae	*Bulbinella latifolia*	Kunth	subsp.	denticulata	LC	Indigenous; Endemic
Asphodelaceae	*Bulbinella elegans*	Schltr. ex P.L.Perry			LC	Indigenous; Endemic
Asphodelaceae	*Bulbine succulenta*	Compton			LC	Indigenous; Endemic
Asphodelaceae	*Trachyandra thyrsoidea*	(Baker) Oberm.			LC	Indigenous; Endemic
Asphodelaceae	*Gonialoe variegata*	(L.) Boatwr. & J.C.Manning			LC	Indigenous
Asphodelaceae	*Bulbinella nutans*	(Thunb.) T.Durand & Schinz	subsp.	nutans	LC	Indigenous; Endemic
Asphodelaceae	*Bulbine capensis*	Baijnath ex G.Will.			LC	Indigenous; Endemic
Asphodelaceae	*Kniphofia sarmentosa*	(Andrews) Kunth			LC	Indigenous; Endemic
Asteraceae	*Felicia australis*	(Alston) E.Phillips			LC	Indigenous; Endemic
Asteraceae	*Dimorphotheca cuneata*	(Thunb.) Less.			LC	Indigenous
Asteraceae	*Gazania leiopoda*	(DC.) Roessler			LC	Indigenous; Endemic
Asteraceae	*Pteronia incana*	(Burm.) DC.			LC	Indigenous; Endemic

Asteraceae	*Leysera tenella*	DC.			LC	Indigenous
Asteraceae	*Lasiospermum pedunculare*	Lag.			LC	Indigenous; Endemic
Asteraceae	*Eriocephalus ericoides*	(L.f.) Druce	subsp.	ericoides	LC	Indigenous
Asteraceae	*Felicia dregei*	DC.			LC	Indigenous; Endemic
Asteraceae	*Eriocephalus punctulatus*	DC.			LC	Indigenous
Asteraceae	*Euryops oligoglossus*	DC.	subsp.	racemosus	LC	Indigenous; Endemic
Asteraceae	*Eriocephalus purpureus*	Burch.			LC	Indigenous; Endemic
Asteraceae	*Steirodiscus capillaceus*	(Thunb.) Less.			LC	Indigenous; Endemic
Asteraceae	*Pteronia empetrifolia*	DC.			LC	Indigenous; Endemic
Asteraceae	*Ursinia nana*	DC.	subsp.	nana	LC	Indigenous
Asteraceae	*Helichrysum leontonyx*	DC.			LC	Indigenous
Asteraceae	*Felicia namaquana*	(Harv.) Merxm.			LC	Indigenous
Asteraceae	*Steirodiscus sp.*					
Asteraceae	*Osteospermum scariosum*	DC.	var.	scariosum	NE	Indigenous
Asteraceae	*Felicia filifolia*	(Vent.) Burtt Davy	subsp.	schaeferi	LC	Indigenous
Asteraceae	*Eriocephalus eximius*	DC.			LC	Indigenous
Asteraceae	*Senecio arenarius*	Thunb.			LC	Indigenous
Asteraceae	*Ursinia anthemoides*	(L.) Poir.	subsp.	versicolor	LC	Indigenous
Asteraceae	*Euryops lateriflorus*	(L.f.) DC.			LC	Indigenous
Boraginaceae	*Anchusa capensis*	Thunb.			LC	Indigenous
Brassicaceae	*Heliophila seselifolia*	Burch. ex DC.			LC	Indigenous
Brassicaceae	*Heliophila seselifolia*	Burch. ex DC.	var.	seselifolia	NE	Indigenous
Brassicaceae	*Heliophila carnosa*	(Thunb.) Steud.			LC	Indigenous
Brassicaceae	*Heliophila suborbicularis*	Al-Shehbaz & Mumm.			LC	Indigenous; Endemic
Brassicaceae	*Heliophila cornuta*	Sond.	var.	squamata	NE	Indigenous
Brassicaceae	*Heliophila crithmifolia*	Willd.			LC	Indigenous
Cephaloziellaceae	*Cylindrocolea sp.*					
Colchicaceae	*Wurmbea variabilis*	B.Nord.			LC	Indigenous; Endemic
Colchicaceae	*Colchicum coloratum*	J.C.Manning & Vinn.	subsp.	burchellii	LC	Indigenous; Endemic
Colchicaceae	*Colchicum hantamense*	(Engl.) J.C.Manning & Vinn.			LC	Indigenous; Endemic
Colchicaceae	*Colchicum eucomoides*	(Jacq.) J.C.Manning & Vinn.			LC	Indigenous; Endemic
Colchicaceae	*Ornithoglossum undulatum*	Sweet			LC	Indigenous
Colchicaceae	*Colchicum sp.*					
Crassulaceae	*Crassula tetragona*	L.	subsp.	connivens	LC	Indigenous; Endemic
Cyperaceae	*Pseudoschoenus inanis*	(Thunb.) Oteng-Yeb.			LC	Indigenous

Cyperaceae	*Ficinia argyropa*	Nees			LC	Indigenous; Endemic
Encalyptaceae	*Encalypta vulgaris*	Hedw.				Indigenous
Fabaceae	*Lotononis venosa*	B.-E.van Wyk			VU	Indigenous; Endemic
Fabaceae	*Wiborgia sericea*	Thunb.			LC	Indigenous; Endemic
Fabaceae	*Lessertia frutescens*	(L.) Goldblatt & J.C.Manning	subsp.	frutescens	LC	Indigenous
Fabaceae	*Lotononis leptoloba*	Bolus			LC	Indigenous; Endemic
Fabaceae	*Lessertia falciformis*	DC.			LC	Indigenous
Fabaceae	*Wiborgia sp.*					
Geraniaceae	*Pelargonium leipoldtii*	R.Knuth			LC	Indigenous; Endemic
Geraniaceae	*Pelargonium luteopetalum*	E.M.Marais				Indigenous; Endemic
Grimmiaceae	*Grimmia pulvinata*	(Hedw.) Sm.				Indigenous
Hyacinthaceae	*Lachenalia juncifolia*	Baker				Indigenous; Endemic
Hyacinthaceae	*Lachenalia longituba*	(A.M.van der Merwe) J.C.Manning & Goldblatt			VU	Indigenous; Endemic
Hyacinthaceae	*Ornithogalum sp.*					
Hyacinthaceae	*Lachenalia violacea*	Jacq.				Indigenous; Endemic
Hyacinthaceae	*Lachenalia canaliculata*	G.D.Duncan			LC	Indigenous; Endemic
Hyacinthaceae	*Lachenalia comptonii*	W.F.Barker			LC	Indigenous; Endemic
Hyacinthaceae	*Albuca sp.*					
Hyacinthaceae	*Ornithogalum hispidum*	Hornem.	subsp.	hispidum	LC	Indigenous
Hyacinthaceae	*Lachenalia sp.*					
Hyacinthaceae	*Drimia capensis*	(Burm.f.) Wijnands			LC	Indigenous; Endemic
Hypoxidaceae	*Spiloxene sp.*					
Hypoxidaceae	*Pauridia capensis*	(L.) Snijman & Kocyan			LC	Indigenous; Endemic
Iridaceae	*Romulea atrandra*	G.J.Lewis	var.	atrandra	LC	Indigenous; Endemic
Iridaceae	*Ixia marginifolia*	Salisb. ex G.J.Lewis			LC	Indigenous; Endemic
Iridaceae	*Babiana cuneata*	J.C.Manning & Goldblatt			LC	Indigenous; Endemic
Iridaceae	*Romulea eburnea*	J.C.Manning & Goldblatt			VU	Indigenous; Endemic
Iridaceae	*Moraea amabilis*	Diels			LC	Indigenous
Iridaceae	*Romulea diversiformis*	M.P.de Vos			LC	Indigenous; Endemic
Iridaceae	*Gladiolus ceresianus*	L.Bolus			LC	Indigenous; Endemic
Iridaceae	*Hesperantha pilosa*	(L.f.) Ker Gawl.			LC	Indigenous; Endemic
Iridaceae	*Gladiolus uysiae*	L.Bolus ex G.J.Lewis			LC	Indigenous; Endemic
Iridaceae	*Moraea cookii*	(L.Bolus) Goldblatt			LC	Indigenous
Iridaceae	*Lapeirousia montana*	Klatt			LC	Indigenous; Endemic

Iridaceae	*Moraea ciliata*	(L.f.) Ker Gawl.			LC	Indigenous; Endemic
Iridaceae	*Ixia trifolia*	G.J.Lewis			LC	Indigenous; Endemic
Iridaceae	*Hesperantha humilis*	Baker			LC	Indigenous; Endemic
Iridaceae	*Geissorhiza heterostyla*	L.Bolus			LC	Indigenous; Endemic
Iridaceae	*Ixia mollis*	Goldblatt & J.C.Manning			VU	Indigenous; Endemic
Iridaceae	*Ixia sp.*					
Iridaceae	*Romulea hirta*	Schltr.			LC	Indigenous; Endemic
Iridaceae	*Moraea pritzeliana*	Diels			LC	Indigenous; Endemic
Iridaceae	*Romulea austinii*	E.Phillips			LC	Indigenous; Endemic
Iridaceae	*Gladiolus splendens*	(Sweet) Herb.			LC	Indigenous; Endemic
Iridaceae	*Hesperantha cucullata*	Klatt			LC	Indigenous; Endemic
Iridaceae	*Syringodea unifolia*	Goldblatt				Indigenous; Endemic
Iridaceae	*Moraea cuspidata*	Goldblatt & J.C.Manning			LC	Indigenous
Iridaceae	*Hesperantha bachmannii*	Baker			LC	Indigenous; Endemic
Iridaceae	*Moraea flava*	Goldblatt & J.C.Manning				Indigenous; Endemic
Iridaceae	*Ixia linearifolia*	Goldblatt & J.C.Manning			LC	Indigenous; Endemic
Iridaceae	*Ixia lacerata*	Goldblatt & J.C.Manning			LC	Indigenous; Endemic
Iridaceae	*Hesperantha marlothii*	R.C.Foster			LC	Indigenous; Endemic
Iridaceae	*Romulea tortuosa*	(Licht. ex Roem. & Schult.) Baker	subsp.	aurea	LC	Indigenous; Endemic
Iridaceae	*Ixia namaquana*	L.Bolus			LC	Indigenous; Endemic
Iridaceae	*Geissorhiza karooica*	Goldblatt			NT	Indigenous; Endemic
Malvaceae	*Anisodontea triloba*	(Thunb.) Bates			LC	Indigenous; Endemic
Malvaceae	*Hermannia filifolia*	L.f.	var.	grandicalyx	NE	Indigenous; Endemic
Malvaceae	*Anisodontea anomala*	(Link & Otto) Bates			LC	Indigenous; Endemic
Molluginaceae	*Pharnaceum aurantium*	(DC.) Druce			LC	Indigenous
Orchidaceae	*Holothrix aspera*	(Lindl.) Rchb.f.			LC	Indigenous; Endemic
Orchidaceae	*Pterygodium schelpei*	H.P.Linder			LC	Indigenous; Endemic
Orchidaceae	*Disperis purpurata*	Rchb.f.				Indigenous
Orchidaceae	*Pterygodium deflexum*	Bolus			LC	Indigenous; Endemic
Orchidaceae	*Pterygodium volucris*	(L.f.) Sw.			LC	Indigenous; Endemic
Orchidaceae	*Disperis purpurata*	Rchb.f.	subsp.	purpurata	LC	Indigenous; Endemic
Orchidaceae	*Pterygodium hallii*	(Schelpe) Kurzweil & H.P.Linder			LC	Indigenous; Endemic
Orchidaceae	*Pterygodium crispum*	(Thunb.) Schltr.			LC	Indigenous; Endemic

Orchidaceae	*Pterygodium pentherianum*	Schltr.			LC	Indigenous; Endemic
Oxalidaceae	*Oxalis obtusa*	Jacq.			LC	Indigenous
Oxalidaceae	*Oxalis melanosticta*	Sond.				Indigenous
Oxalidaceae	*Oxalis palmifrons*	T.M.Salter			LC	Indigenous; Endemic
Poaceae	*Poa bulbosa*	L.			LC	Indigenous
Poaceae	*Ehrharta calycina*	Sm.			LC	Indigenous
Polygalaceae	*Polygala scabra*	L.			LC	Indigenous
Pottiaceae	*Triquetrella tristicha*	(Mull.Hal.) Mull.Hal.				Indigenous
Pteridaceae	*Pellaea rufa*	A.F.Tryon			LC	Indigenous; Endemic
Pteridaceae	*Cheilanthes deltoidea*	Kunze	subsp.	deltoidea	LC	Indigenous
Pteridaceae	*Cheilanthes induta*	Kunze			LC	Indigenous; Endemic
Rubiaceae	*Nenax cinerea*	(Thunb.) Puff			LC	Indigenous
Rubiaceae	*Nenax microphylla*	(Sond.) T.M.Salter			LC	Indigenous
Scrophulariaceae	*Diascia macrophylla*	(Thunb.) Spreng.			LC	Indigenous; Endemic
Scrophulariaceae	*Hebenstretia robusta*	E.Mey.			LC	Indigenous; Endemic
Scrophulariaceae	*Manulea pusilla*	E.Mey. ex Benth.			LC	Indigenous; Endemic
Scrophulariaceae	*Nemesia azurea*	Diels			LC	Indigenous; Endemic
Scrophulariaceae	*Diascia cardiosepala*	Hiern			LC	Indigenous; Endemic
Scrophulariaceae	*Selago glabrata*	Choisy			LC	Indigenous; Endemic
Scrophulariaceae	*Nemesia sp.*					
Scrophulariaceae	*Selago divaricata*	L.f.			LC	Indigenous
Scrophulariaceae	*Aptosimum indivisum*	Burch. ex Benth.			LC	Indigenous
Scrophulariaceae	*Zaluzianskya bella*	Hilliard			LC	Indigenous; Endemic
Scrophulariaceae	*Diascia hexensis*	K.E.Steiner			LC	Indigenous; Endemic
Scrophulariaceae	*Selago gloiodes*	Hilliard			LC	Indigenous; Endemic
Scrophulariaceae	*Polycarena aurea*	Benth.			LC	Indigenous; Endemic
Scrophulariaceae	*Zaluzianskya sp.*					
Scrophulariaceae	*Zaluzianskya mirabilis*	Hilliard			LC	Indigenous; Endemic
Scrophulariaceae	*Diascia parviflora*	Benth.			LC	Indigenous; Endemic
Scrophulariaceae	*Alonsoa unilabiata*	(L.f.) Steud.			LC	Indigenous; Endemic
Scrophulariaceae	*Diascia sp.*					
Scrophulariaceae	*Diascia sacculata*	Benth.			LC	Indigenous; Endemic
Sphaerocarpaceae	*Sphaerocarpos stipitatus*	Bisch. ex Lindenb.				Indigenous
Targioniaceae	*Targionia hypophylla*	L.				Indigenous

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Amietia fuscigula	Common River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Cacosternum karooicum	Karoo Caco	DD	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Tomopterna delalandii	Cape Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Vandijkophrynus gariepensis	Karoo toad	LC	LC
Vandijkophrynus gariepensis gariepensis	Karoo Toad	Not listed	Not listed
Xenopus laevis	Common Platanna	LC	LC

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Agama atra	Southern Rock Agama	LC	LC
Agama hispida	Southern Spiny Agama	LC	LC
Bradypodion gutturale	Little Karoo Dwarf Chameleon	Unlisted	LC
Chamaeleo namaquensis	Namaqua Chameleon	LC	LC
Cordylus minor	Western Dwarf Girdled Lizard	Unlisted	LC
Hemicordylus capensis	Cape Cliff Lizard	LC	LC
Karusasaurus polyzonus	Southern Karusa Lizard	LC	LC
Pseudocordylus microlepidotus namaquensis	Nuweveldberg Crag Lizard	LC	LC
Aspidelaps lubricus lubricus	Cape coral snake	LC	LC
Hemachatus haemachatus	Rinkhals	LC	LC
Naja nigricincta woodi	Black Spitting Cobra	LC	Unlisted
Naja nivea	Cape Cobra	LC	Unlisted
Chondrodactylus angulifer	Common Giant Gecko	LC	LC
Chondrodactylus bibronii	Bibron's Gecko	LC	Unlisted
Pachydactylus capensis	Cape Gecko	LC	Unlisted
Pachydactylus formosus	Southern Rough Gecko	LC	LC
Pachydactylus geitje	Ocellated Gecko	LC	LC
Pachydactylus kladaroderma	Thin-skinned Gecko	LC	LC
Pachydactylus maculatus	Spotted Gecko	LC	LC
Pachydactylus mariquensis	Common Banded Gecko	LC	LC
Pachydactylus oculatus	Golden Spotted Gecko	LC	LC
Pachydactylus purcelli	Purcell's Gecko	LC	Unlisted
Pachydactylus weberi	Weber's Gecko	LC	LC
Cordylosaurus subtessellatus	Dwarf Plated Lizard	LC	LC
Tetradactylus tetradactylus	Cape Long-tailed Seps	LC	LC
Nucras tessellata	Western Sandveld Lizard	LC	Unlisted
Pedioplanis burchelli	Burchell's Sand Lizard	LC	LC
Pedioplanis laticeps	Karoo Sand Lizard	LC	LC
Pedioplanis lineoocellata pulchella	Common sand lizard	LC	LC
Boaedon capensis	Brown House Snake	LC	LC
Homoroselaps lacteus	Spotted Harlequin Snake	LC	LC
Lamprophis guttatus	Spotted Rock Snake	LC	LC
Lycodonomorphus rufulus	Brown Water Snake	LC	Unlisted
Prosymna sundevallii	Sundevall's Shovel-snout	LC	LC
Psammophis crucifer	Cross-marked Grass Snake	LC	LC
Psammophis notostictus	Karoo Sand Snake	LC	Unlisted

Pseudaspis cana	Mole Snake	LC	Unlisted
Namibiana gracilior	Slender Thread Snake	LC	LC
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis sulcata sulcata	Westren Rock Skink	LC	Unlisted
Trachylepis variegata	Variegated Skink	LC	Unlisted
Chersina angulata	Angulate Tortoise	LC	LC
Chersobius boulengeri	Karoo padloper	LC	Unlisted
Homopus areolatus	Parrot-beaked Dwarf Tortoise	LC	LC
Homopus femoralis	Greater Dwarf Tortoise	LC	LC
Psammobates tentorius verroxii	Tent Tortoise	NT	NT
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Bitis arietans arietans	Puff Adder	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Chamaeleo namaquensis	Namaqua Chameleon	LC	LC
Chondrodactylus angulifer	Common Giant Gecko	LC	LC
Acontias lineatus	Striped Dwarf Legless Skink	LC	LC
Lamprophis fiskii	Fisk's Snake	LC	LC

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Aethomys granti	Grant's rock mouse	Unlisted	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Aonyx capensis	Cape Clawless Otter	NT	NT
Atilax paludinosus	Water Mongoose	LC	LC
Bunolagus monticularis	Riverine Rabbit	EN	CR
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Crocidura cyanea	Reddish-grey Musk Shrew	LC	LC
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Desmodillus auricularis	Short-tailed Gerbil	LC	LC
Elephantulus edwardii	Cape elephant shrew	Unlisted	LC
Elephantulus rupestris	Western rock sengi	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Genetta tigrina	Cape Genet	LC	LC
Gerbillurus paeba	Hairy-footed Gerbil	LC	LC
Graphiurus ocularis	Spectacular Dormouse	NT	LC
Herpestes pulverulentus	Cape Grey Mongoose	LC	LC
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus capensis	Cape Hare	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Macroscelides proboscideus	Karoo Round-eared Sengi	LC	LC
Malacothrix typica	Gerbil Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC
Mus minutoides	Pygmy Mouse	LC	LC
Mus musculus	House Mouse	Unlisted	LC
Myotis tricolor	Temminck's Hairy Bat	LC	LC
Neoromicia capensis	Cape Serotine Bat	LC	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC
Oreotragus oreotragus	Klipspringer	LC	LC
Orycteropus afer	Aardvark	LC	LC

Otocyon megalotis	Bat-eared Fox	LC	LC
Otomys unisulcatus	Karoo Bush Rat	LC	LC
Panthera pardus	Leopard	VU	VU
Papio ursinus	Chacma Baboon	LC	LC
Parotomys brantsii	Brants' Whistling Rat	LC	LC
Pelea capreolus	Grey Rhebok	NT	NT
Petromyscus collinus	Pygmy Rock Mouse	LC	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Procavia capensis	Rock Hyrax	LC	LC
Pronolagus saundersiae	Natal Red Rock Rabbit	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus capensis	Cape Horseshoe Bat	LC	LC
Rousettus aegyptiacus	Egyptian Fruit Bat	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Suricata suricatta	Suricate	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC
Vulpes chama	Cape Fox	LC	LC

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Accipiter rufiventris	Sparrowhawk, Rufous-breasted	Unlisted	LC
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Afrotis afra	Korhaan, Southern Black	VU	VU
Alopochen aegyptiaca	Goose, Egyptian	LC	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anthoscopus minutus	Penduline-tit, Cape	Unlisted	LC
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Anthus nicholsoni	Nicholson's pipit	Unlisted	Unlisted
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus barbatus	Swift, African Black	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Aquila verreauxii	Eagle, Verreaux's	VU	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Batis pririt	Batis, Pririt	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Buteo buteo	Buzzard, Common (Steppe)	Unlisted	LC
Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calendulauda albescens	Lark, Karoo	Unlisted	LC
Calidris minuta	Stint, Little	LC	LC
Cecropis cucullata	Swallow, Greater Striped	Unlisted	LC
Cercotrichas coryphoeus	Scrub-robin, Karoo	Unlisted	LC
Certhilauda subcoronata	Lark, Karoo Long-billed	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Cinnyris chalybeus	Sunbird, Southern Double-collared	Unlisted	LC
Cinnyris fuscus	Sunbird, Dusky	Unlisted	LC
Circaetus pectoralis	Snake-eagle, Black-chested	Unlisted	LC
Circus maurus	Harrier, Black	EN	VU

Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola subruficapilla	Cisticola, Grey-backed	Unlisted	LC
Colius colius	Mousebird, White-backed	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Coracias garrulus	Roller, European	NT	LC
Corvus albicollis	Raven, White-necked	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Crithagra albogularis	White-throated Canary	LC	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Curruca layardi	Warbler, Layards	Unlisted	LC
Curruca subcoerulea	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emarginata schlegelii	Chat, Karoo	Unlisted	LC
Emarginata sinuata	Chat, Sickle-winged	Unlisted	LC
Emarginata tractrac	Chat, Tractrac	LC	LC
Emberiza capensis	Bunting, Cape	Unlisted	LC
Emberiza impetuani	Bunting, Lark-like	Unlisted	LC
Eremomela gregalis	Eremomela, Karoo	Unlisted	LC
Eremomela icteropygialis	Eremomela, Yellow-bellied	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Eupodotis vigorsii	Korhaan, Karoo	NT	LC
Euryptila subcinnamomea	Warbler, Cinnamon-breasted	Unlisted	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Galerida magnirostris	Lark, Large-billed	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Geocolaptes olivaceus	Woodpecker, Ground	Unlisted	NT
Hieraaetus pennatus	Eagle, Booted	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Lamprotornis bicolor	Starling, Pied	Unlisted	LC
Laniarius ferrugineus	Boubou, Southern	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Malcorus pectoralis	Warbler, Rufous-eared	Unlisted	LC

Melaenornis silens	Flycatcher, Fiscal	Unlisted	LC
Melaniparus afer	Tit, Grey	Unlisted	Unlisted
Melierax canorus	Goshawk, Southern Pale Chanting	Unlisted	LC
Microcarbo africanus	Cormorant, Reed	Unlisted	LC
Mirafra apiata	Lark, Cape Clapper	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Myrmecocichla monticola	Wheatear, Mountain	Unlisted	LC
Nectarinia famosa	Sunbird, Malachite	Unlisted	LC
Neotis ludwigii	Bustard, Ludwig's	EN	EN
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe familiaris	Chat, Familiar	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Onychognathus morio	Starling, Red-winged	Unlisted	LC
Onychognathus nabouroup	Starling, Pale-winged	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Phalacrocorax lucidus	Cormorant, White-breasted	Unlisted	LC
Phoenicopterus roseus	Flamingo, Greater	NT	LC
Phragmacia substriata	Warbler, Namaqua	Unlisted	Unlisted
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Podiceps nigricollis	Grebe, Black-necked	Unlisted	LC
Polemaetus bellicosus	Eagle, Martial	EN	VU
Prinia maculosa	Prinia, Karoo	Unlisted	LC
Pternistis capensis	Spurfowl, Cape	Unlisted	LC
Pterocles namaqua	Sandgrouse, Namaqua	Unlisted	LC
Ptyonoprogne fuligula	Martin, Rock	LC	LC
Pycnonotus capensis	Bulbul, Cape	Unlisted	LC
Pycnonotus nigricans	Bulbul, African Red-eyed	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila afra	Francolin, Grey-winged	Unlisted	LC
Scopus umbretta	Hamerkop	Unlisted	LC
Serinus alario	Canary, Black-headed	Unlisted	LC
Serinus canicollis	Canary, Cape	Unlisted	LC

Spatula smithii	Shoveler, Cape	LC	LC
Spilopelia senegalensis	Dove, Laughing	Unlisted	LC
Stenostira scita	Flycatcher, Fairy	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Sturnus vulgaris	Starling, Common	Unlisted	LC
Sylvietta rufescens	Crombec, Long-billed	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tachymarptis melba	Swift, Alpine	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Tricholaema leucomelas	Barbet, Acacia Pied	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC

9.6 Appendix F – Birds and Power lines