Proposed Development of the Grid connection and associated Infrastructure for the Emoyeni Wind Energy Facilities – Terrestrial Biodiversity and Avifauna Assessment

Western and Northern Cape, South Africa

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CLIENT

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Reference	**Emoyeni WEFs – Grid Infrastructure**
Submitted to	
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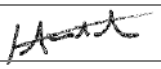
Report Writer / Reviewer	Andrew Husted  Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

List of Abbreviations

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

SS	Substation
SWSA	Strategic Water Source Area
VU	Vulnerable
WEF	Wind Energy Facility
WP	Well Protected

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1 Introduction

1.1 Background

Eskom Holding SOC Ltd is proposing the development of a 132kV powerline, three 132kV on-site substations, new access/service tracks and watercourse crossing points associated with the authorised Umsinde Emoyeni, Ishwati Emoyeni and Khangela Emoyeni Wind Energy Facilities.

A Basic Assessment (BAR) process will be undertaken for the project in support of the application for authorisation. The proposed project includes the following (Figure 1-1 and Figure 1-2):

- The establishment of a 132 kV collector substation (switching station) within the authorised Umsinde Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100 m X 80 m (~0.8ha) to be located within an assessment footprint that encompasses a 300 m radius.
- The establishment of a 132 kV collector substation (switching station) within the authorised Khangela Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100 m X 80 m (~0.8ha) to be located within an assessment footprint that encompasses a 300 m radius.
- The establishment of a 132 kV collector substation (switching station) within the authorised Ishwati Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 120 m X 100 m (~1.2 ha) with an assessment footprint that encompasses a 300 m radius.
- The establishment of a 132 kV powerline within a 400 m wide corridor that will extend from the Khangela switching station to the Ishwati switching station (~36 km), and then onward for ~25 km to the Eskom Gamma Substation. In addition, a further length of 132kV powerline (within a 400 m wide corridor) will extend from the Umsinde switching station to the Khangela switching station for ~8 km OR it may connect directly into the Khangela-Ishwati powerline at the Khangela switching station. An extended powerline development corridor of approximately 1.91 km^2 wide has been assessed in the vicinity of the Gamma Substation, that will enable the 132 kV powerline to connect to either the south face of the Gamma Substation yard or approach from the east. The 132 kV Powerline from Umsinde to Khangela, and from Khangela to Ishwati and onward to Gamma Substation will be a single- or double-circuit powerline, with a single set of pylons structures with a maximum height of 35 m Access/service tracks (jeep track) up to 7 m wide and associated watercourse crossings will be associated with the powerline, and will be located within the assessed powerline corridor.
- The establishment of a new access road approximately 14 km long from the existing public road from Richmond to the authorised Ishwati Emoyeni on-site substation site. The

proposed new access road will be unsealed and up to 12 m wide during construction, but will be reduced to a maximum of 6 m width during operation.

The following alternatives are proposed for the powerline access tracks:

	Preferred Alternative		Alternative 1		Alternative 2	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
Start (on-site substation at Umsinde Emoyeni WEF site)	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E
Point 2	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E
Point 3	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E
Start (on-site substation at Khangela Emoyeni WEF site)	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E
Point 4	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E
Point 5	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E
Point 6	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E
Point 7	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E
Point 8	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E
Point 9	31°43'29.18"S	23°45'1.23"E	31°44'1.56"S	23°42'34.93"E	31°44'1.56"S	23°42'34.93"E
Point 10	31°42'48.88"S	23°40'11.59"E	31°43'6.86"S	23°42'18.16"E	31°42'48.88"S	23°40'11.59"E
Point X (only applicable to Alternative 1)			31°42'48.88"S	23°40'11.59"E		
Point 11 (Ishwati Collector Sub)	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E
Point 12	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E
Point 13	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E
Point 14	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E
Point 15	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E
End (Extended 1,91km² development corridor to (Gamma Substation)	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E

	Preferred Alternative		Alternative 1		Alternative 2	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
Preferred Alternative from the east						
End (Extended 1,91km²development corridor to Gamma Substation) Preferred Alternative from the south	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E

Figure 1-1 Project layout and components

Preferred Alternative = Red (From Umsinde on-site switching station to Khangela on-site switching station to the Ishwati onsite switching station to the Gamma Substation)

Alternative 1 = Red +Light Blue + Red (From Umsinde on-site switching station to Khangela on-site substation to the Ishwati onsite substation to the Gamma Substation)

Alternative 2 = Red +Light blue + Green + Red (From Umsinde on-site switching station to Khangela on-site substation to the Ishwati onsite substation to the Gamma Substation)

The update of the report considered:

- The establishment of an access road within a 100 m corridor (50 m on either side) connecting the Ishwati switching station to an unnamed dirt road 28.6 km North from Murraysburg.

The Environmental Assessment Practitioner (EAP) has been appointed to undertake various environmental assessments required for the proposed developments. The Biodiversity Company was contracted to undertake specialist studies required to inform on the environmental assessments. This report is a component of the specialist assessments and comprises the Terrestrial (Fauna and Flora), and Avifauna Assessment which is a requirement of the environmental impact assessment process.

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

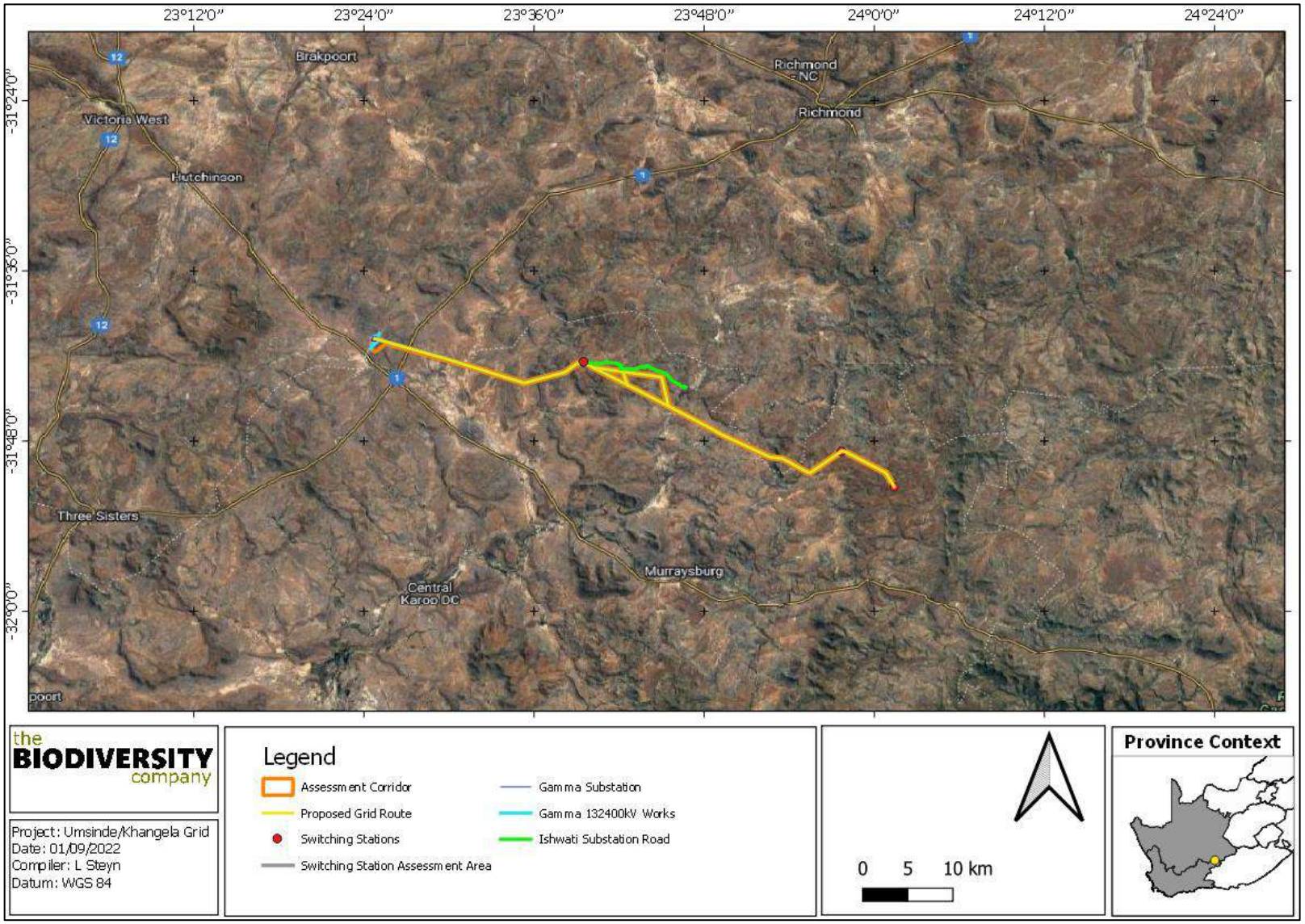


Figure 1-2 Map illustrating the location of the project area

1.2 Scope of Work

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

- Desktop assessment to identify the ecologically important features within the landscape comprising of terrestrial features;
- Desktop assessment to identify possible Species of Conservation Concern (SCC) that occur within the landscape;

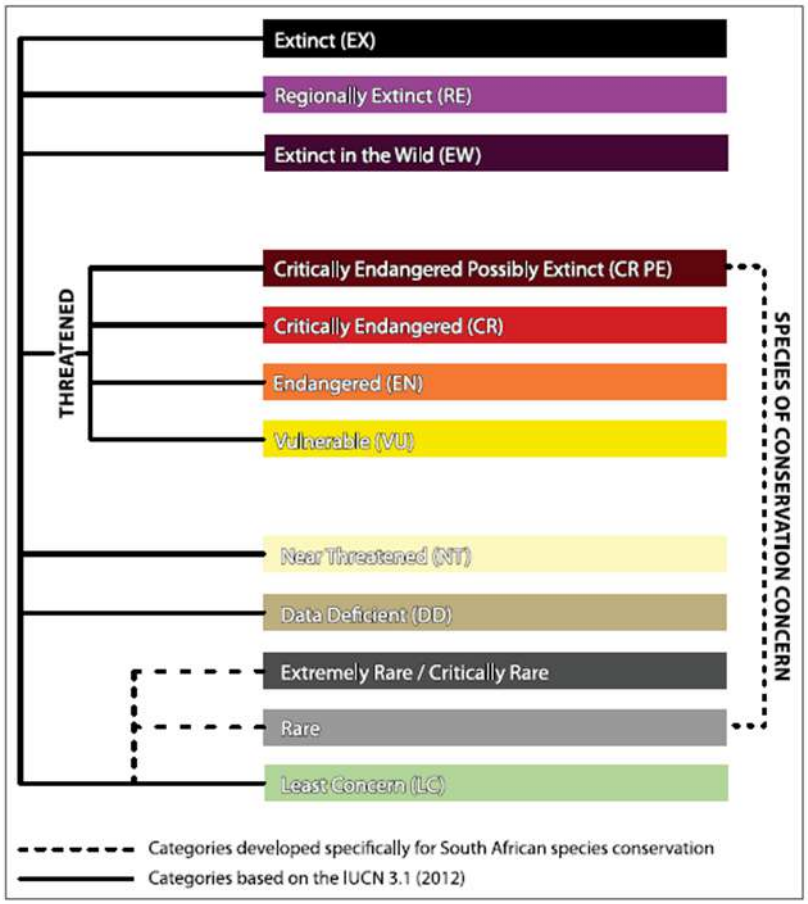


Figure 1-3 The different categories of Species of Conservation Concern modified from the IUCN's extinction risk categories. Source: SANBI (2020)

- Field survey to record flora and fauna (including avifauna) species, especially Species of Conservation Concern (SCC);
- Determination of the Site Ecological Importance (SEI), also commonly referred to as sensitivity;
- A biodiversity impact assessment; and
- The prescription of mitigation measures for identified risks, where necessary.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The GPS used for the assessment is accurate to 5 metres and therefore any spatial features may be offset by this distance;
- The buffer areas defined by the client were designated as the Project Area of Influence (PAOI);
- The fieldwork component of the assessment comprised of two wet-season surveys. The surveys were conducted over six days (the 28th of March to the 2nd of April 2022), and the second over 10 days (the 18th to the 27th of April 2022);
- Field work for the update for the Ishwati road was conducted during the dry season (2nd August to 3rd August 2022);
- A full avifauna assessment was not included in the update survey for the road, therefore the maps and information in the report only pertains to the original scope of the assessment;
- The updated (August 2022) field work only focussed on the access road and did not consider the rest of the infrastructure or gridlines; and
- The site was largely inaccessible by road in a 4x4 vehicle. All areas of the grid accessible by 4x4 vehicle and on foot were assessed. Where the line could not be accessed, representative samples of the surrounding vegetation were taken which could be extrapolated to the grid sites. All vegetation types were sampled across the full length of the line.

1.4 Key Legislative Requirements

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

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

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)

	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	Northern Cape Nature Conservation act no. 9 of 2009
	Northern Cape Planning and Development Act no. 7 of 1998
	Cape Nature and Environmental Conservation Ordinance 19 of 1974
	Western Cape Biosphere Reserves Act 6 of 2011

2 Methods

2.1 Desktop Assessment

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

2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al,* 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components

of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:

- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
- South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DFFE, 2022a) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (DFFE, 2022b) – 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.
- Northern Cape Critical Biodiversity Areas (2016): The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.
    - The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity

features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.

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

- Western Cape Biodiversity Spatial Plan (WCBSP): The WCBSP has been developed by CapeNature Scientific Services Land Use Team in order to identify the priority biodiversity areas and ecological infrastructure that must be conserved to meet the provincial biodiversity mandate (Pool-Stanvliet *et.al*. 2017). The plan includes land use guidelines along with biodiversity priority areas, covering terrestrial, freshwater, coastal and marine areas. The plan identified areas as Critical Biodiversity Areas (CBAs) which cannot be lost if conservation goals are to be met, and Ecological Support Areas (ESAs) (Table 5-1), which are required to support the functioning of ecosystems and CBAs (Pool-Stanvliet *et.al.* 2017).
- 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.

2.1.2 Desktop Flora Assessment

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

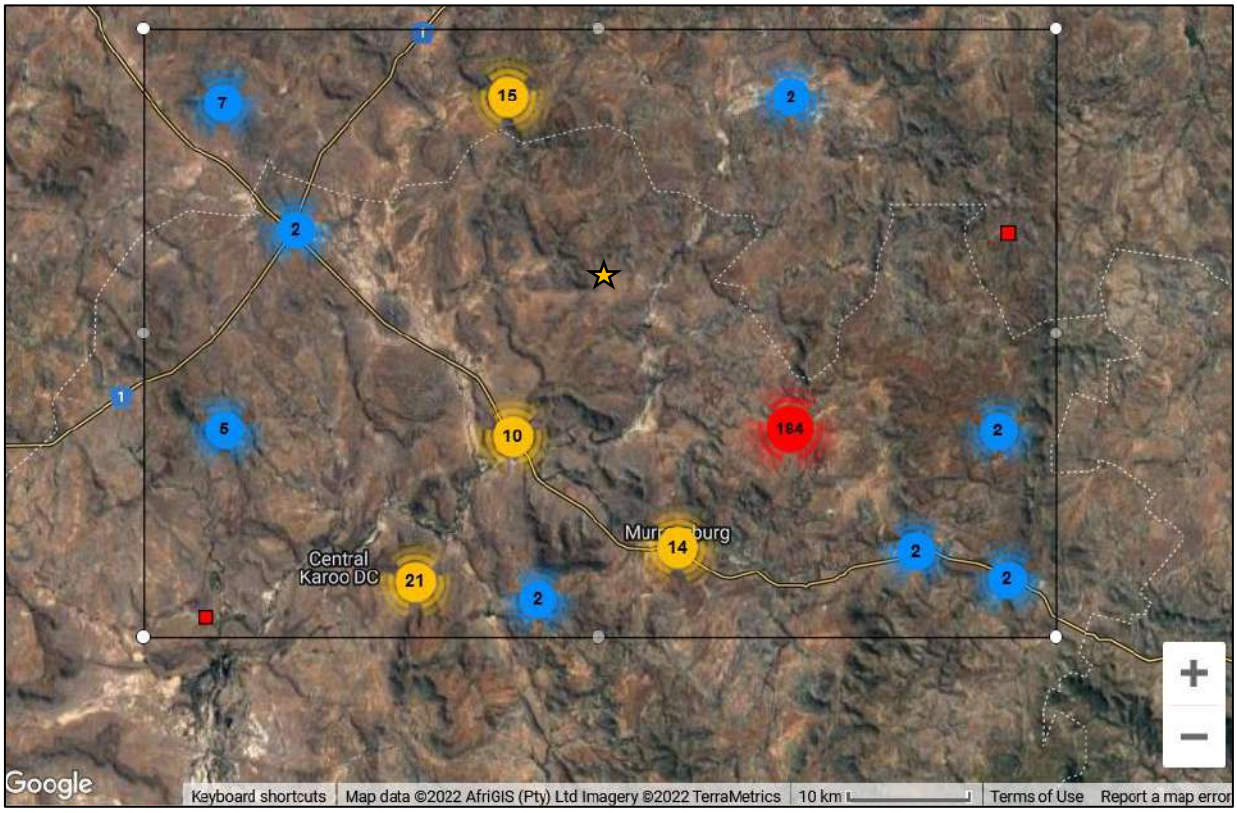


Figure 2-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. (☆ indicates the approximate centre of the proposed line).***

2.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the FrogMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022a) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares (Figure 2-2);
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the ReptileMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022b) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares;
- Compiling an expected avifauna list from the Southern African Bird Atlas Project 2 (SABAP2) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares and their associated pentads; and
- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the MammalMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022c.) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares.

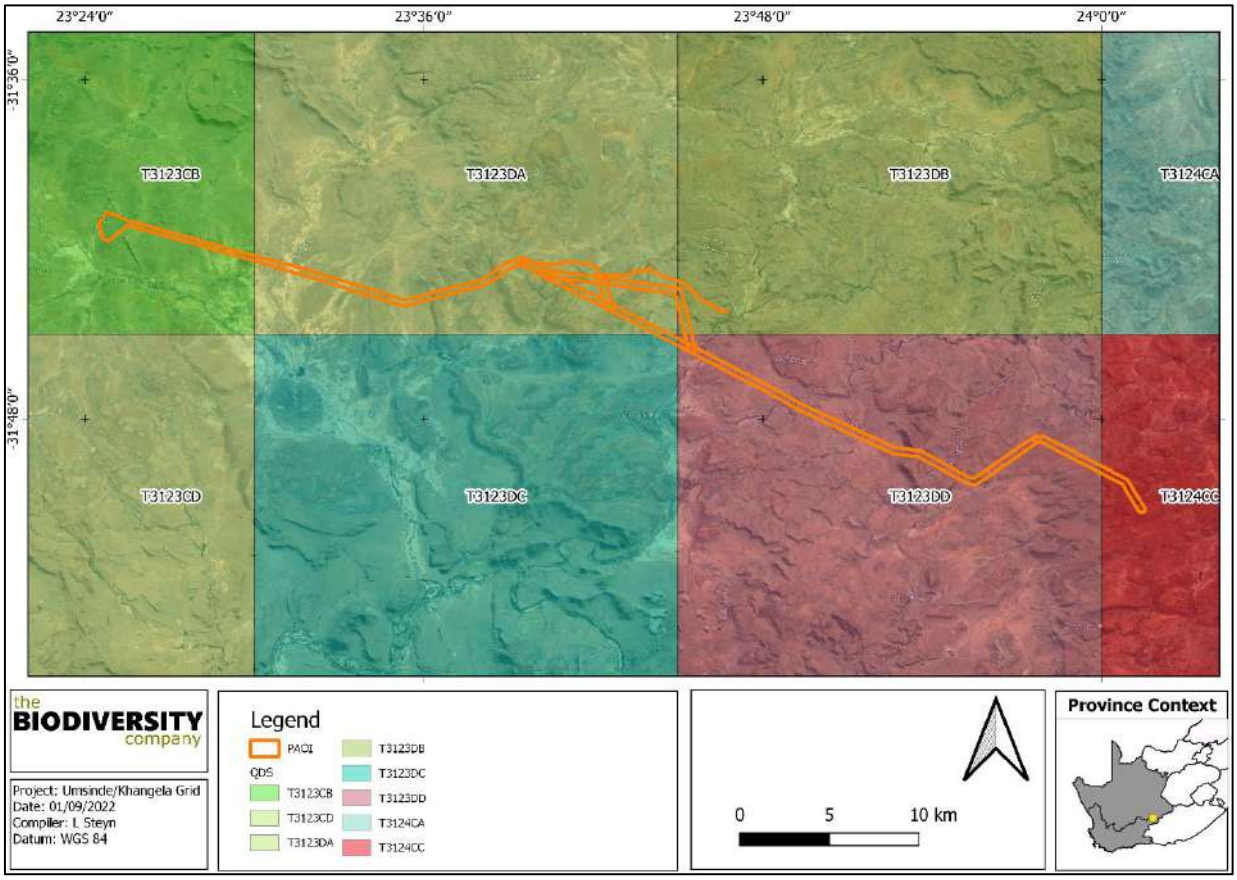


Figure 2-2 Map illustrating the extent of the Quarter Degree Squares (QDS) used to determine the likely faunal species occurring within and surrounding the study area.

2.2 Field Assessment

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

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

Survey Number	Season	Date/s	Comments
1	Wet (Summer)	28 March – 2 April 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the PAOI and the footprint of the proposed development. Vegetation and habitat units were also identified. This included the presence of avifauna and associated sensitive flight paths, nests and species.
2	Wet (Summer)	18th April – 27th April 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the PAOI and footprint of the proposed development. Vegetation and habitat units were also identified. This included the presence of avifauna and associated sensitive flight paths, nests and species.
3	Dry (Winter)	2nd August to 3rd August 2022	Survey to determine the presence of flora and fauna of the proposed Ishwati substation access road (100 m wide assessment corridor), as well as likelihood of occurrence within the PAOI and footprint of the proposed development. Vegetation and habitat units were also identified.

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

2.2.1 Flora Assessment

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

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

- Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al,* 2015);
- Karoo: South African Wild Flower Guide 6. (Shearing 2008);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);
- Field Guide to Succulents in Southern Africa (Smith *et al,* 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at https://www.inaturalist.org/home (the project specific data can be found at https://www.inaturalist.org/projects/kangela, where a full up-to-date species list of all photographed species resides).

2.2.2 Faunal Assessment

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

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

Diagnostic features of the individuals that were captured were photographed at site and released.

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

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al,* 2014);

- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Roberts Bird Guide; A comprehensive field guide to over 950 bird species in southern Africa 1st Edition (Chittenden, 2007);
- Roberts Birds of Southern Africa mobile app;
- Stuarts' Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi (Stuart and Stuart, 2015); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).

2.2.2.1 Avifauna Assessment

The field survey was undertaken during 28 March – 2 April 2022 and 18th April – 27th April 2022 for the grid infrastructure. Effort was made to cover all the different habitat types within the limits of time and access. Areas surrounding the project area were also surveyed, this included areas on the river and some of the nearby ridges (Figure 2-3).

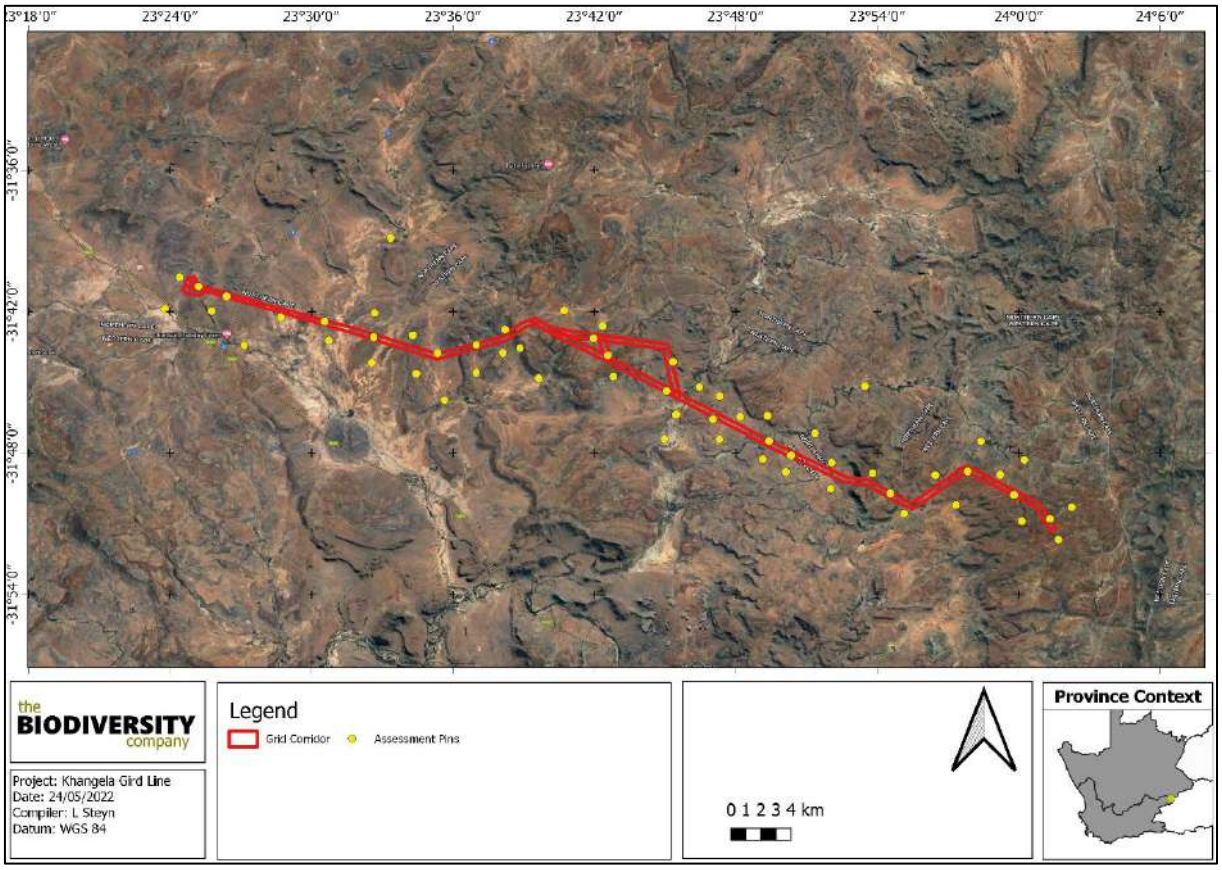


Figure 2-3 Map illustrating the field survey area and point count locations

Sampling consisted of standardized point counts as well as random diurnal incidental surveys and vantage point surveys. Standardized point counts (following Buckland *et al.* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. Each point count was run over a 10 min period. The horizontal detection limit was set at 200 m. At each point the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour

(perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, river scanning and road cruising.

2.2.2.1.1 Data analysis

Point count data was arranged into a matrix with point count samples in rows and species in columns. The table formed the basis of the various subsequent statistical analyses. This data was first used to distinguish similarities/differences in the species composition between the identified avifaunal habitats, the matrix was converted into a Bray-Curtis dissimilarity matrix. The data was subject to fourth root transformation to downscale the contribution of very abundant species while upscaling the influence of less abundant species. However, the effect was negligible and ultimately the raw data proved more informative. Thirdly, raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Lastly, present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon/within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

2.3 Site Ecological Importance (SEI)

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

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

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 2-2 and Table 2-3, respectively.

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

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global 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.

Conservation Importance	Fulfilling Criteria
	If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

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

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

Functional Integrity	Fulfilling Criteria
	Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

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

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

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

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

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

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

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

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

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

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

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

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

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

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

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

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

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Irrelevant – Does not occur within a threatened ecosystem	3.1.1.1
Ecosystem Protection Level	Relevant – Located within a Poorly Protected ecosystem	3.1.1.2

Desktop Information Considered	Relevant/Irrelevant	Section
Protected Areas	Irrelevant – Does not overlap, it is however adjacent to the Mountain Zebra Camdeboo Protected Environment and within its 500m buffer	3.1.1.3
National Protected Area Expansion Strategy	Irrelevant – Does not overlap any NPAES areas	3.1.1.3
Important Bird and Biodiversity Areas	Irrelevant – Does not overlap any IBA	-
Critical Biodiversity Area	Relevant – Intersects CBA 1, CBA 2	3.1.1.4
South African Inventory of Inland Aquatic Ecosystems	Relevant - The regulatory area overlaps with depressions. The assessment area overlap with CR and EN rivers.	3.1.1.5
National Freshwater Ecosystem Priority Areas	Relevant- The assessment area overlaps with FEPA rivers, upstream management areas and fish support areas.	3.1.1.5
Strategic Water Source Areas	Irrelevant – The project area does not occur within a SWSA	3.1.1.5
Freshwater Ecosystem Priority Areas	Relevant – Within 500 m of a wetland	3.1.1.5
Coordinated Avifaunal Road Count	Irrelevant – closest is 29 km from the project area	-

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 does not overlap with any threatened ecosystems.

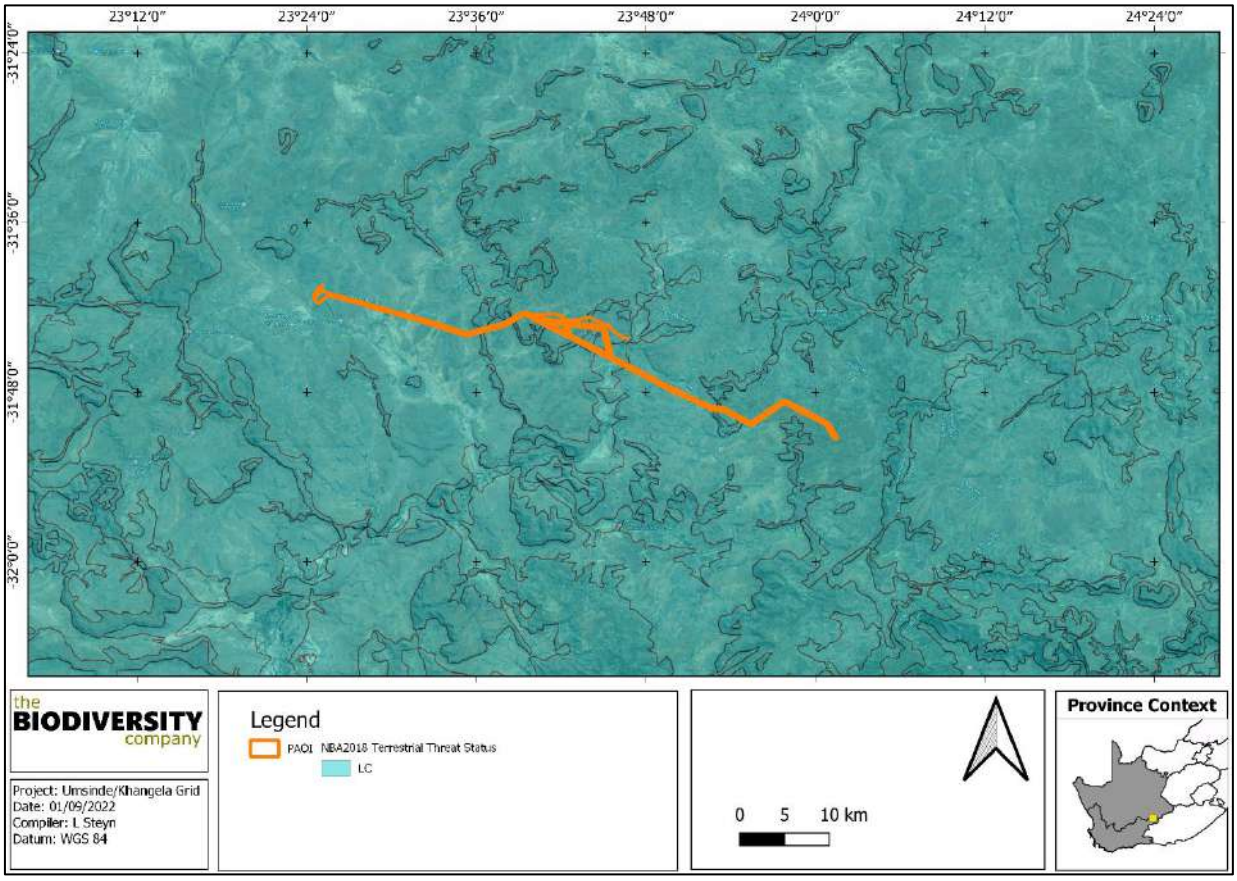


Figure 3-1 Map illustrating the ecosystem threat status associated with the assessment area

3.1.1.2 Ecosystem Protection Level

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

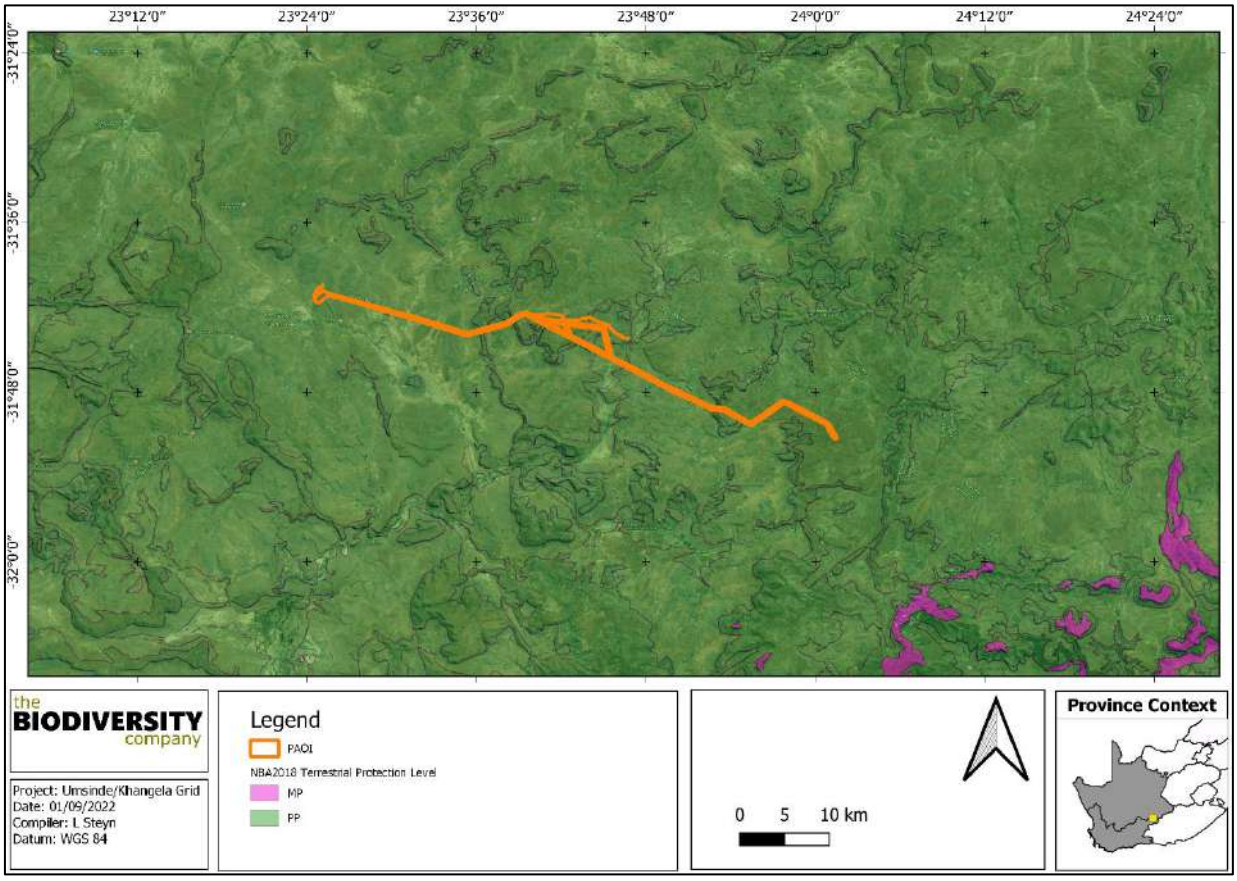


Figure 3-2 Map illustrating the ecosystem protection level associated with the assessment area

3.1.1.3 Protected Areas

According to the protected area spatial datasets from SAPAD (DFFE, 2022a), the proposed development does not occur within any protected area (Figure 3-3). It is however adjacent to the Mountain Zebra Camdeboo Protected environment and within the 500 m protected areas buffer. The proposed development is not located within any focus area for the National Protected Area Expansion Strategy (NPAES) (Figure 3-3) or IBA (Figure 3-4).

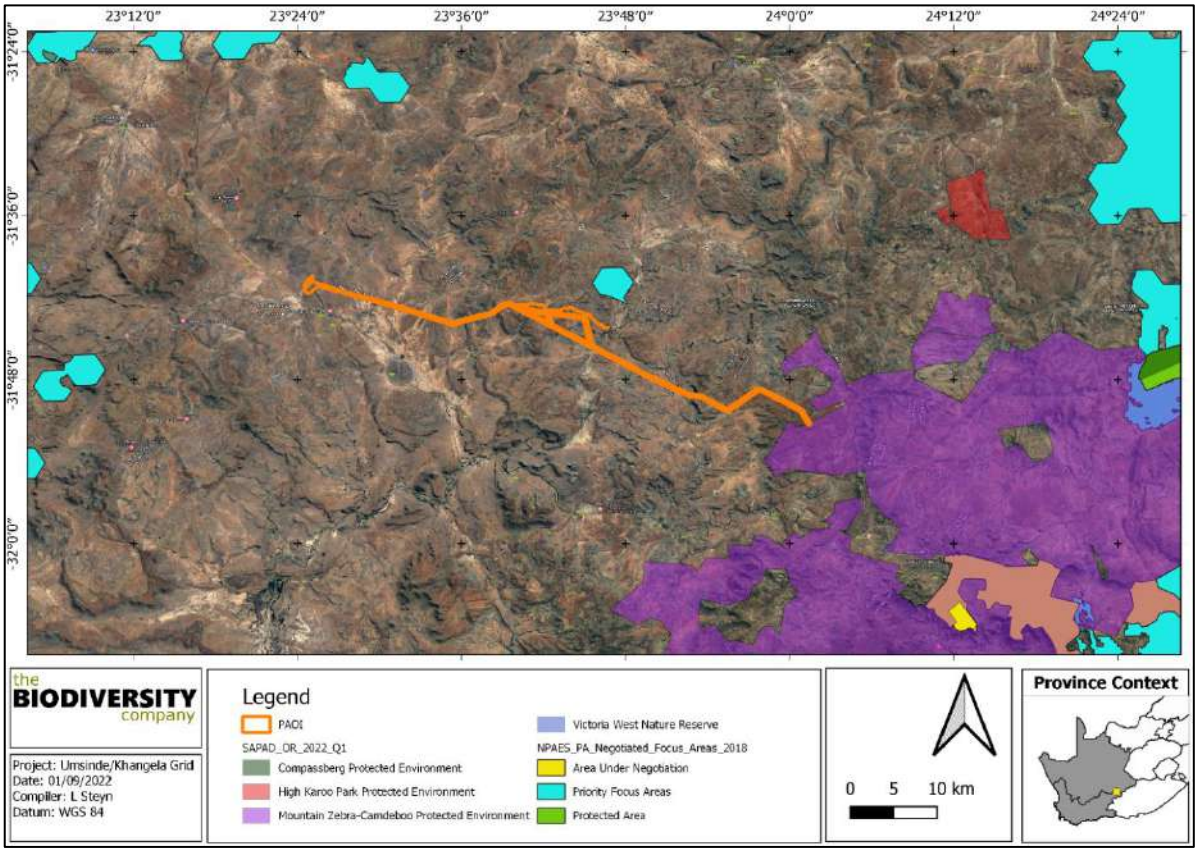


Figure 3-3 Map illustrating the location of protected areas proximal to the assessment area

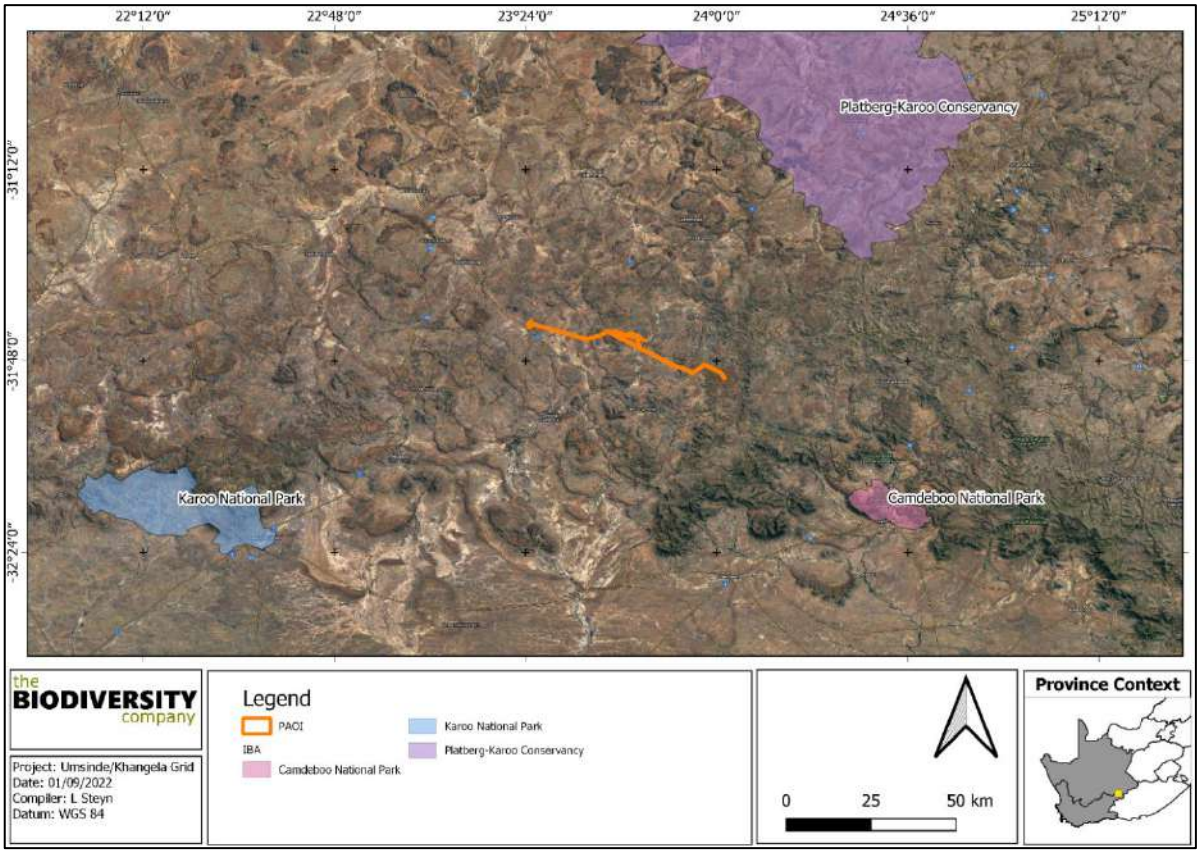


Figure 3-4 Map illustrating the location of Important Bird and Biodiversity Areas (IBAs) proximal to the assessment area

3.1.1.4 Biodiversity Sector Plan

3.1.1.4.1 Northern Cape

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

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

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

Figure 3-5 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with a CBA 1 and CBA 2 area.

3.1.1.4.2 Western Cape

The WCBSP has been developed by CapeNature Scientific Services Land Use Team in order to identify the priority biodiversity areas and ecological infrastructure that must be conserved to meet the provincial biodiversity mandate (Pool-Stanvliet *et.al.* 2017). The plan includes land use guidelines along with biodiversity priority areas, covering terrestrial, freshwater, coastal and marine areas. The plan identified areas as Critical Biodiversity Areas (CBAs) which cannot be lost if conservation goals are to be met, and Ecological Support Areas (ESAs) (Table 5-1), which are required to support the functioning of ecosystems and CBAs (Pool-Stanvliet *et.al.* 2017).

The line traverses both CBA1 and CBA2 areas (Figure 3-6). Both CBA1 and CBA2 land use guidelines are to maintain in a natural state, with little to no biodiversity loss permitted. Only low-impact, biodiversity sensitive land uses are considered appropriate in these areas, subject to appropriate mitigation.

Table 3-2 Subcategories of CBA and ESA for the WCBSP*.

Map Category	Definition	Desired Management Objective
Protected Area	Areas that are proclaimed as protected areas under national or provincial legislation.	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.
Critical Biodiversity Area 1	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low impact, biodiversity-sensitive land uses are appropriate.

Map Category	Definition	Desired Management Objective
Critical Biodiversity Area 2	Areas in degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a functional, natural or near-natural state, with no further loss of habitat. These areas should be rehabilitated.
Ecological Support Area 1	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.
Ecological Support Area 2	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs and CBAs, and are often vital for delivering ecosystem services.	Restore and/or manage to minimise impact on ecological infrastructure functioning, especially soil and water-related services.

*Adapted from Table 3.2, pg. 55 (Pool-Stanvliet *et. al.*, 2017)

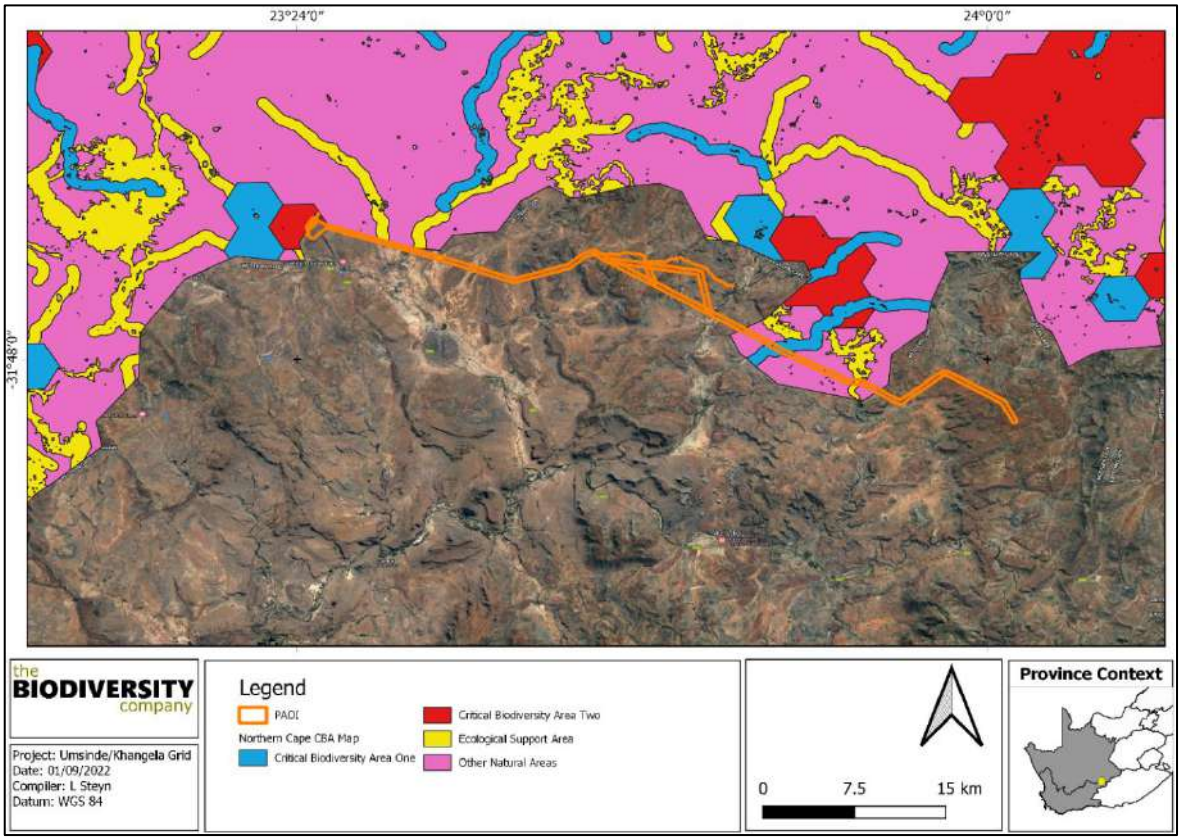


Figure 3-5 ***Map illustrating the location of Biodiversity Spatial Plan featuresproximal to the assessment area – Northern Cape***

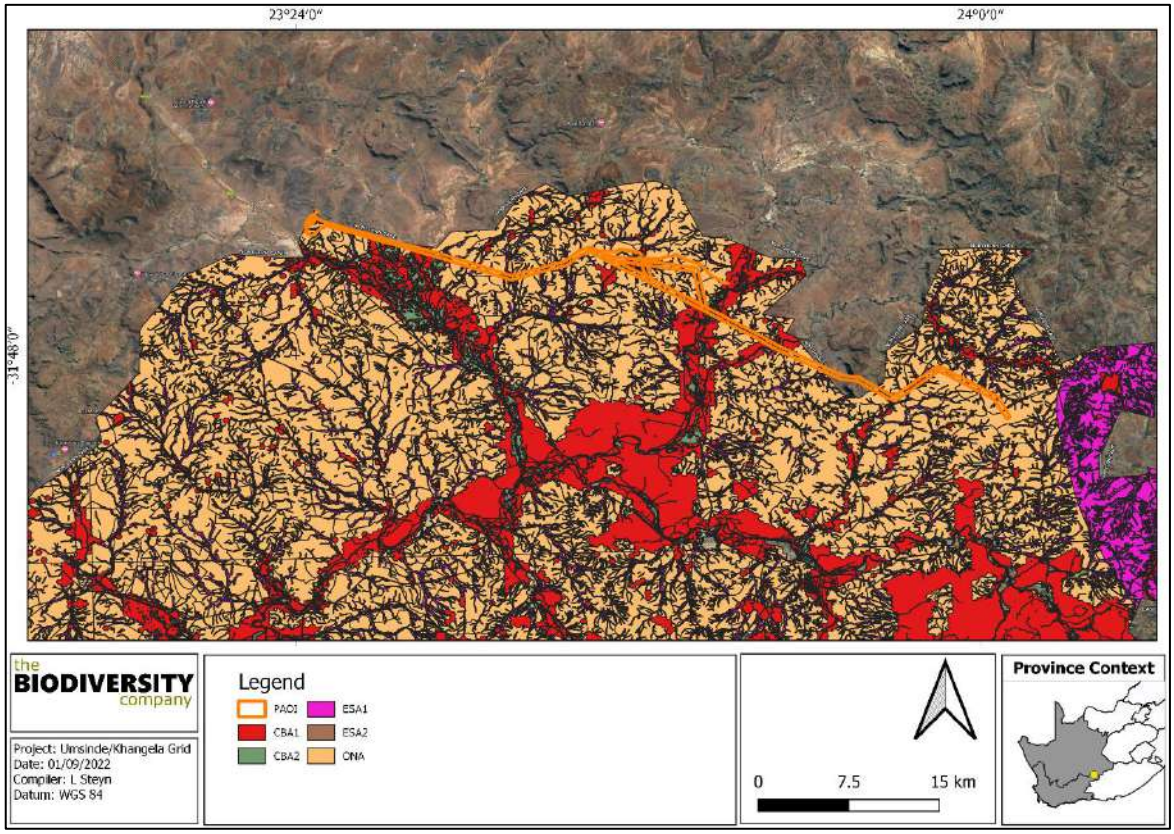


Figure 3-6 ***Map illustrating the location of Biodiversity Spatial Plan featuresproximal to the assessment area – Western Cape***

3.1.1.5 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT. Critically Endangered, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019) (Figure 3-8). The assessment area overlap with CR and EN rivers.

The National Freshwater Ecosystem Priority Areas (NFEPAs) (Driver *et al*., 2011) spatial data has been incorporated in the above mentioned SAIIAE spatial data set. They are included here as the database is intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.,* 2011). The NFEPA spatial layer indicates that the wetlands are not classified as a Ramsar site (Figure 3-7). The assessment area overlaps with FEPA rivers, upstream management areas and fish support areas.

The proposed development is not located within a SWSA.

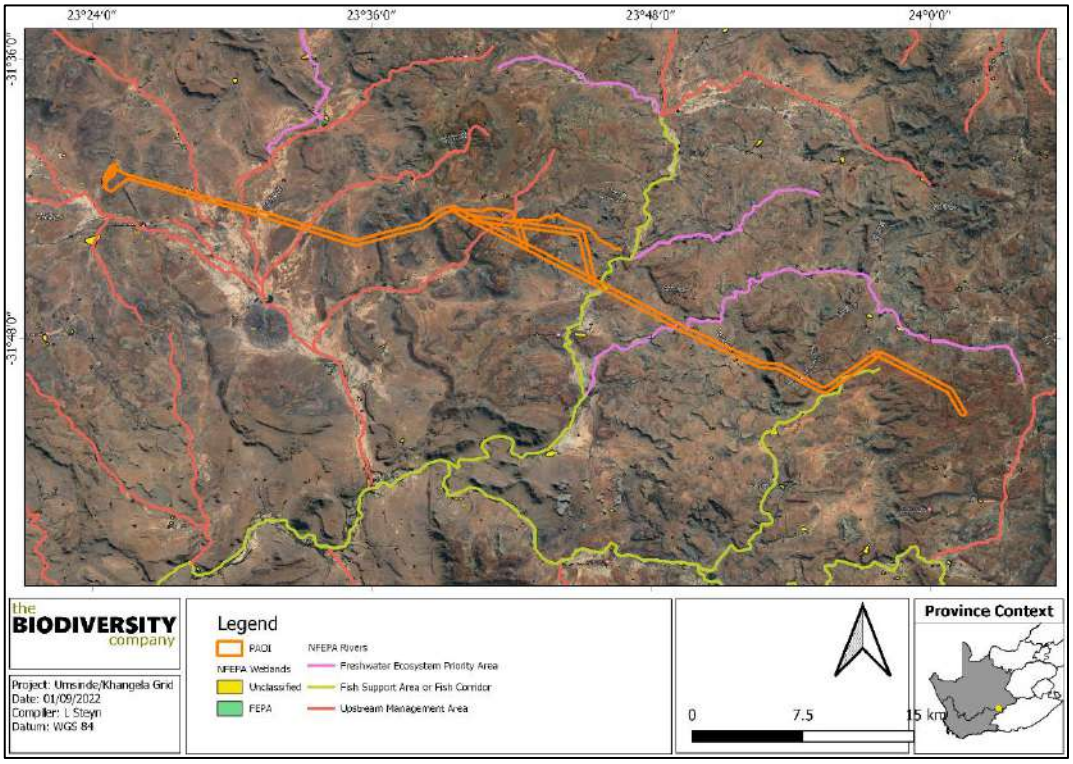


Figure 3-7 Map illustrating the NFEPA wetland and river systems associated with the assessment area

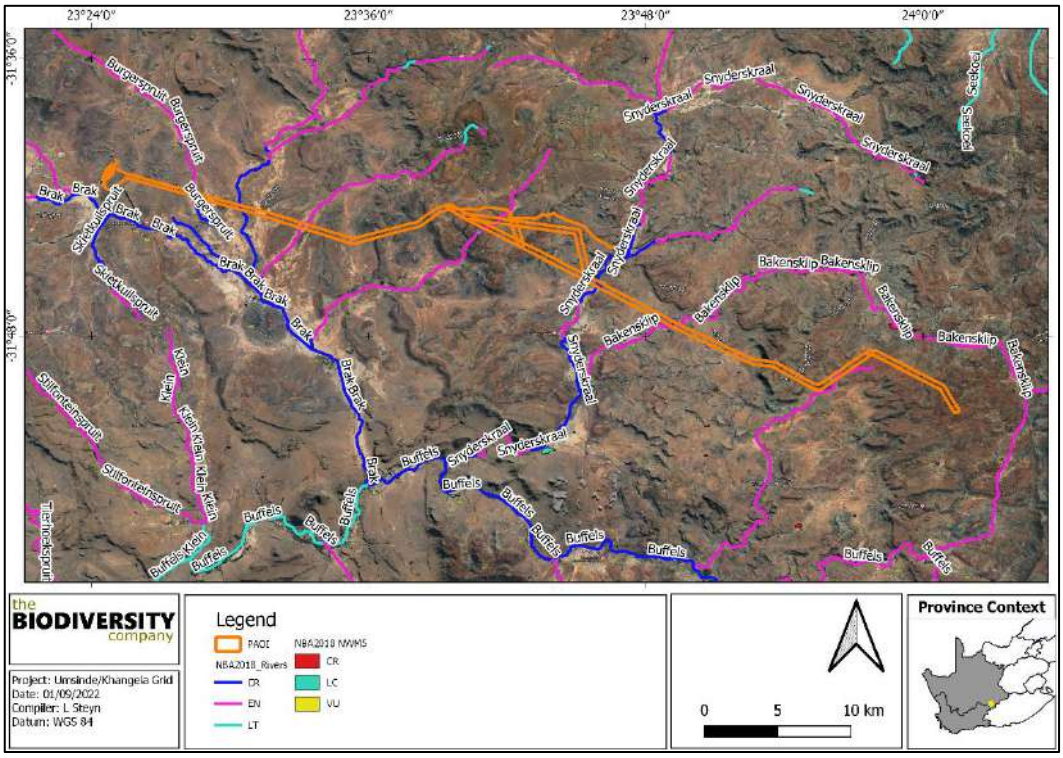


Figure 3-8 The South African Inventory of Inland Aquatic Ecosystems features associated with the assessment area

3.1.2 Flora Assessment

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

3.1.2.1 Vegetation Type

The area falls into the Upper Karoo Vegetation Unit, within the Nama-Karoo Biome, forming the predominant karoo group, accounting for 19.6% of the extent of the entire vegetation map (Mucina & Rutherford, 2006). This vegetation is flanked by six biomes (the Succulent Karoo, Desert, Kalahari, Grassland, Albany Thicket and Fynbos and has a continental-type climate with highly variable rainfall and extreme temperatures (Mucina & Rutherford 2006). On a fine-scale vegetation type, the proposed development overlaps with three vegetation types, the Eastern Upper Karoo, Southern Karoo riviere and the Upper Karoo Hardeveld (Figure 3-9).

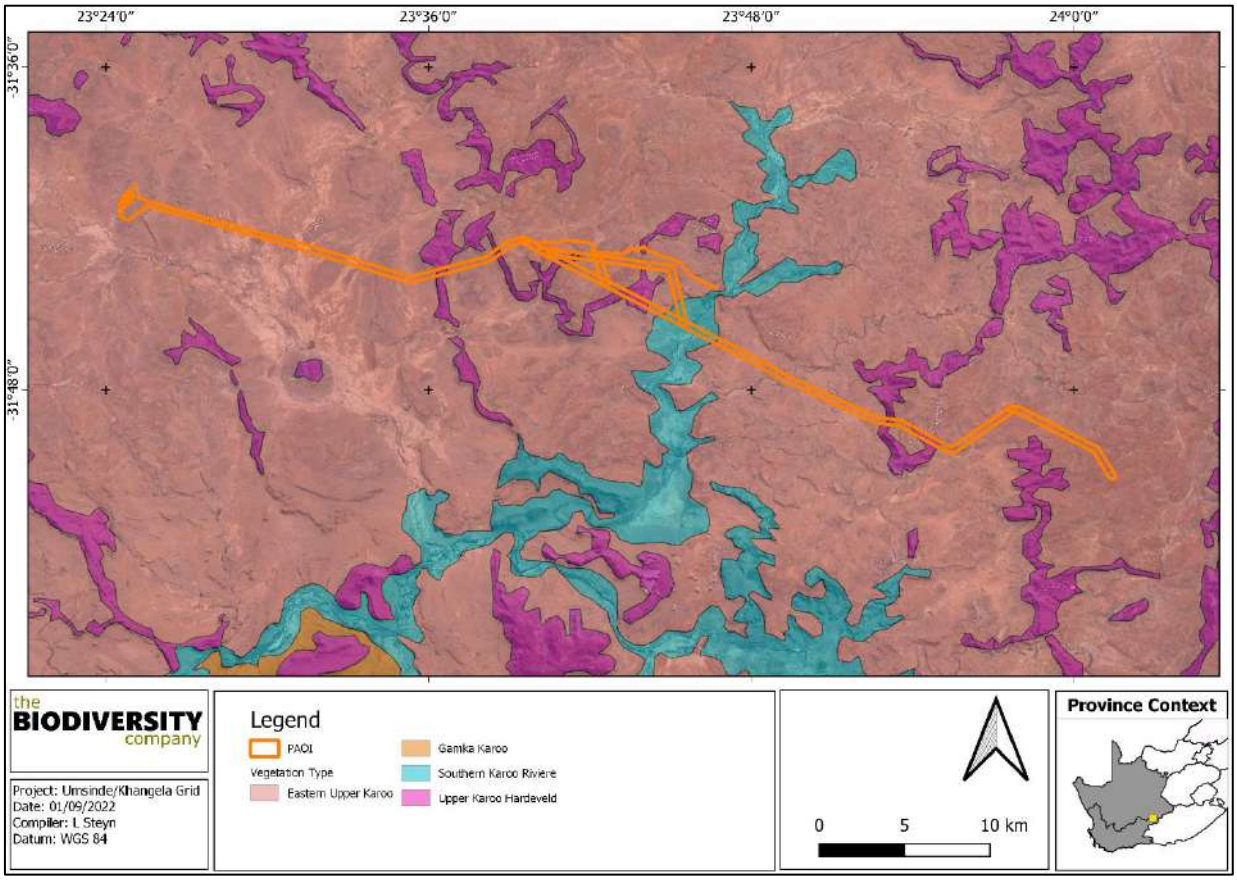


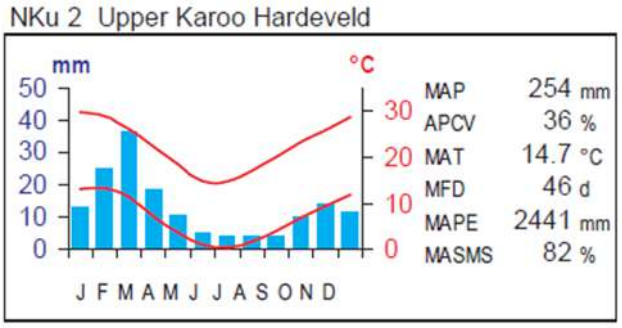
Figure 3-9 ***Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland***

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

i. Topography and Structure – Steep slopes of koppies, butts, mesas and parts of the Great Escarpment covered with large boulders and stones.

ii. Geology and Soils – Primitive, skeletal soils in rocky areas developing over sedimentary rocks such as mudstones and arenites of the Adelaide Subgroup of the Karoo Supergroup and to a lesser extent also the Ecca Group (Waterford and Volksrust Formations) as well as Jurassic dolerite sills and dykes and subsummit positions of mesas and butts with dolerite boulder slopes. Almost entirely Ib land type.

iii. Climate – In the western part of its area this unit experiences the same climate as the Western Upper Karoo. In the eastern part the climate is very close to that of Karoo Escarpment. The MAP ranges from about 150 mm in the northwest to 350 mm along some grassland margins on the Great Escarpment and in the east. Water concentrates between rocks as a result of rainfall runoff. Incidence of frost is relatively high, but ranging widely from <30 days per year at lower altitudes to >80 days at highest altitudes.



Source: Mucina and Rutherford (2006)

Important Taxa (d= dominant species) –

Tall Shrubs: *Lycium cinereum* (d), *Rhigozum obovatum* (d), *Cadaba aphylla*, *Diospyros austro-africana*, *Ehretia rigida* subsp. *rigida*, *Lycium oxycarpum*, *Melianthus comosus*, *Searsia burchellii*.

Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *Euryops lateriflorus* (d), *Felicia muricata* (d), *Limeum aethiopicum* (d), *Pteronia glauca* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *A. spinescens*, *Asparagus mucronatus*, *A. retrofractus*, *A. striatus*, *A. suaveolens*, *Eriocephalus spinescens*, *Euryops annae*, *E. candollei, E. empetrifolium, E. nodosus, Felicia filifolia* subsp. *filifolia*, *Garuleum latifolium*, *Helichrysum lucilioides*, *H. zeyheri*, *Hermannia filifolia* var. *filifolia*, *H. multiflora*, *H. pulchella*, *H. vestita*, *Indigofera sessilifolia*, *Jamesbrittenia atropurpurea*, *Lessertia frutescens*, *Melolobium candicans*, *M. microphyllum*, *Microloma armatum*, *Monechma incanum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pelargonium abrotanifolium*, *P. ramosissimum*, *Pentzia globosa*, *P. spinescens*, *Plinthus karooicus*, *Polygala seminuda*, *Pteronia adenocarpa*, *P. sordida*, *Rosenia humilis*, *Selago albida*, *Solanum capense*, *Sutera halimifolia*, *Tetragonia arbuscula*, *Wahlenbergia tenella*.

Succulent Shrubs: *Aloe broomii*, *Drosanthemum lique*, *Faucaria bosscheana*, *Kleinia longiflora*, *Pachypodium succulentum*, *Trichodiadema barbatum*, *Zygophyllum flexuosum*.

Semiparasitic Shrub: *Thesium lineatum* (d).

Herbs: *Troglophyton capillaceum* subsp. *capillaceum*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana*, *Lepidium africanum* subsp. *africanum*, *Leysera tenella*, *Pelargonium minimum*, *Sutera pinnatifida*, *Tribulus terrestris*.

Geophytic Herbs: *Albuca setosa*, *Androcymbium albomarginatum*, *Asplenium cordatum*, *Boophone disticha*, *Cheilanthes bergiana*, *Drimia intricata*, *Oxalis depressa*,

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cenchrus ciliaris* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtusa* (d), *Cynodon incompletus*, *Digitaria eriantha*, *Ehrharta calycina*, *Enneapogon scaber*, *E. scoparius*, *Eragrostis curvula*, *E. nindensis, E. procumbens*, *Fingerhuthia africana*, *Heteropogon contortus*, *Merxmuellera disticha*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*.

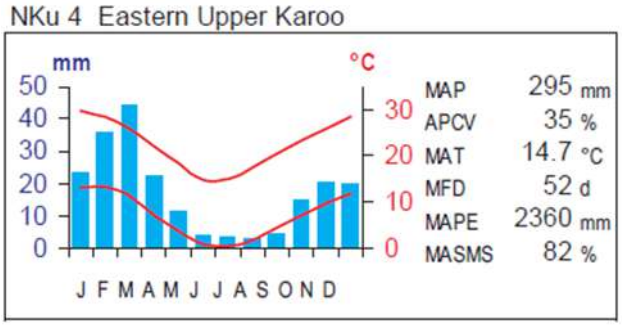
Conservation – Least threatened. Target 21%. Only about 3% statutorily conserved in Karoo National Park and Karoo Nature Reserve. Small percentage also protected in private reserves such as Rupert Game Farm. Erosion is moderate (64%) and high (2%).

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

i. Topography and Structure – Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast).

ii. Geology and Soils – Mudstones and sandstones of the Beaufort Group (incl. both Adelaide and Tarkastad Subgroups) supporting duplex soils with prismacutanic and/or pedocutanic diagnostic horizons dominant (Da land type) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types). In places, less prominent Jurassic dolerites (Karoo Dolerite Suite) are also found.

iii. Climate – Mudstones and sandstones of the Beaufort Group (incl. both Adelaide and Tarkastad Subgroups) supporting duplex soils with prismacutanic and/or pedocutanic diagnostic horizons dominant (Da land type) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types). In places, less prominent Jurassic dolerites (Karoo Dolerite Suite) are also found.



Source: Mucina and Rutherford (2006)

Important Taxa –

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

Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*.

Succulent Shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*.

Geophytic Herbs: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*.

Succulent Herbs: *Psilocaulon coriarium*, *Tridentea jucunda, T. virescens.*

Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.

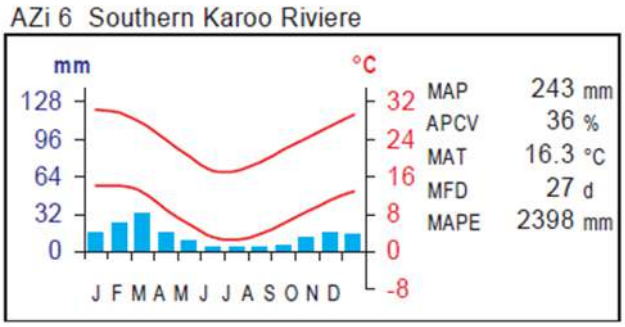
Conservation – Least threatened. Target 21%. Statutorily conserved in Mountain Zebra and Karoo National Parks as well as in Oviston, Commando Drift, Rolfontein and Gariep Dam Nature Reserves. About 2% of the unit has been transformed, largely due to building of dams (Gariep, Grassridge, Killowen, Kommandodrift, Kriegerspoort, Lake Arthur, Modderpoort, Schuil Hoek, Vanderkloof, Victoria West, Wonderboom and Zoetvlei). *Medicago laciniata* is a common and widespread alien plant. Erosion is moderate (60%) and high (38%). Veld managers perceive much of the Eastern Upper Karoo to be experiencing changes in species composition requiring high-priority action

The **Southern Karoo Riviere** is described as follows:

i. Topography and Structure – Narrow riverine flats supporting a complex of *Vachellia karroo* or *Tamarix usneoides* thickets (up to 5 m tall), and fringed by tall *Salsola*-dominated shrubland (up to 1.5 m high), especially on heavier (and salt-laden) soils on very broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region.

ii. Geology and Soils – Recent sandy-clayey alluvial deposits rich in salt occurring on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup) that support soils typical of Ia land type. Torrential convectional rains in summer cause sudden flood surges which remodel the riverbed and adjacent alluvium.

iii. Climate – Transitional, bimodal (equinoctial) rainfall patterns with peaks in March (major) and November (minor). Climate is subarid on the whole, with overall MAP of 243 mm (range from 165 mm in the Gamka Karoo basin to 430 mm in the vicinity of Bedford). Overall warm-temperate regime, with MAT of 16.3°C, ranging from 14.6°C (Upper Karoo) to 18.3ºC (upper reaches of Sundays River). Frost occurs frequently in winter. See also climate diagram for AZi 6 Southern Karoo Riviere (Figure 13.2).



Source: Mucina and Rutherford (2006)

Important Taxa –

Riparian thickets Small Trees: *Vachellia karroo* (d), *Searsia lancea* (d).

Tall Shrubs: *Diospyros lycioides* (d), *Tamarix usneoides* (d), *Cadaba aphylla*, *Euclea undulata*, *Grewia robusta*, *Gymnosporia buxifolia*, *Melianthus comosus*.

Low Shrub: *Asparagus striatus*.

Succulent Shrubs: *Lycium cinereum* (d), *Amphiglossa callunoides*, *Lycium hirsutum*, *L. oxycarpum*.

Rocky slopes of river canals

Graminoid: *Stipagrostis namaquensis* (d).

Alluvial shrublands & herblands

Low Shrubs: *Ballota africana*, *Bassia salsoloides*, *Carissa haematocarpa*, *Pentzia incana*. Succulent Shrubs: *Malephora uitenhagensis* (d), *Salsola aphylla* (d), *S. arborea* (d), *Drosanthemum lique*, *Salsola geminiflora*, *S. gemmifera*. Graminoids: *Cynodon incompletus* (d), *Cenchrus ciliaris*, *Cyperus marginatus*.

Reed beds Megagraminoid: *Phragmites australis* (d).

Conservation – Least threatened. Target 24%. Only about 1.5% statutorily conserved in the Karoo National Park as well as in the Aberdeen, Bosberg, Commando Drift, Gamkapoort and Karoo Nature Reserves and in about 10 private reserves, mainly set up for game farming. Some 12% transformed for cultivation and building of dams, including Beaufort West, Beervlei, De Hoop, Floriskraal, Kommandodrift, Lake Arthur, Leeu-Gamka, Mentz and Vanryneveldspas Dams. Frequent disturbance (floods, concentrated grazing pressure), and associated input of nutrients, increase vulnerability of these habitats to invasion of alien woody species such as *Agave americana*, *Opuntia* species, *Prosopis* species, *Salix babylonica* and *Schinus molle*, and forbs including *Atriplex eardleyae*, *A. lindleyi* subsp*. inflata*, *Cirsium vulgare*, *Salsola kali* and *Schkuhria pinnata.*

3.1.2.2 Expected Flora Species

The POSA database indicates that 192 species of indigenous plants are expected to occur within the development area and surrounding landscape. Appendix B provides the list of species and their respective conservation status and endemism. The POSA database and the screening tool indicates that 5 threatened species are expected to occur within the assessment area and are provided in Table 3-3 below.

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

Table 3-3 Threatened flora species that are expected to occur within the assessment area associated with proposed project area. EN = Endangered, NT = Near Threatened and VU = Vulnerable

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence

Cyperaceae	*Isolepis expallescens*	VU	Endemic	Known from three locations in damp areas along stream channels.	Moderate
Aizoaceae	*Hereroa concava*	VU	Endemic	Plants occur sheltered among shrubs on flats and plateaus with shale outcrops	Low
Malvaceae	*Antisodontea malvastroides*	Rare	Endemic	Occurs in arid grassland on summit plateaus and escarpments.	Low
Apocynaceae	*Tridentea virescens*	Rare	Not endemic	Stony ground or hard loam in floodplains.	Moderate
	Sensitive species 945				

3.1.3 Faunal Assessment

3.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and Frog Map database, 21 amphibian species are expected to occur within the assessment area (Appendix C). No species are regarded as threatened.

3.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and Reptile Map database, 32 reptile species are expected to occur within the assessment area (Appendix D). Two species are regarded as threatened (Table 3-4).

Table 3-4 Threatened reptile species that are expected to occur within the assessment area of the proposed development. NT = Near Threatened

Family	Scientific Name	Common Name	Conservation Status Regional	Likelihood of Occurrence
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	NT	High
Lamprophiidae	*Macrelaps microlepidotus*	Natal Black Snake	NT	Moderate

Psammobates tentorius tentorius (Karoo Tent Tortoise) is widespread and fairly common but the populations of this reptile are scattered and few and declining at approximately 10-20% on average over three generations (Hofmeyr *et al*. 2018). Impacts include overgrazing, destructive or illegal mining and unsustainable land use.

Macrelaps microlepidotus (Natal Black Snake) is a semi-fossorial species with an affinity for forests, where it tends to frequent moist leaf litter and humic soil. In coastal bush, it is associated with damp localities near water (IUCN, 2017). The likelihood of occurrence is rated as moderate as some patches of suitable habitat can be found in the project area.

3.1.3.3 Mammals

The IUCN Red List Spatial Data lists 44 indigenous mammal species that could be expected to occur within the assessment area (Appendix E). Three of these expected species are regarded as threatened (Table 3-5).

Table 3-5 ***Mammal species of conservation concern that may occur within the assessment area associated with the proposed project area. NT= Near Threatened, VU = Vulnerable and LC = Least Concern***

Family	Scientific name	Common name	Conservation Status	Likelihood of occurrence
Chrysochloridae	*Amblysomus corriae*	Fynbos Golden Mole	NT	Low
Felidae	*Felis nigripes*	Black-footed Cat	VU	High
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	CR	Moderate

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

Amblysomus corriae (Fynbos Golden Mole) was recorded last in December of 1989 with 4 records in the GDS 3123DD (Animal Demography Virtual Museum records: https://vmus.adu.org.za/vm_sp_list.php) and is considered unlikely to be re-recorded in the area.

Bunolagus monticularis (Riverine Rabbit) which is critically endangered (CR) is identified as a possible species occurring in the region by the Screening Tool. This species is endemic to semi-arid central Karoo regions of South Africa, where they inhabit dense riparian growth along seasonal rivers. Significant threats from ongoing habitat degradation and fragmentation due to detrimental land-use practices and habitat transformation for amongst others energy development has led to their decline. Although there is suitable habitat in the area, the Grid infrastructure avoids riparian areas, with low impacts expected to occur to any populations of this species should it occur in the region. Moreover, this species has been recorded more than 50km away, and not within or close to the site boundaries (Figure 3-10).

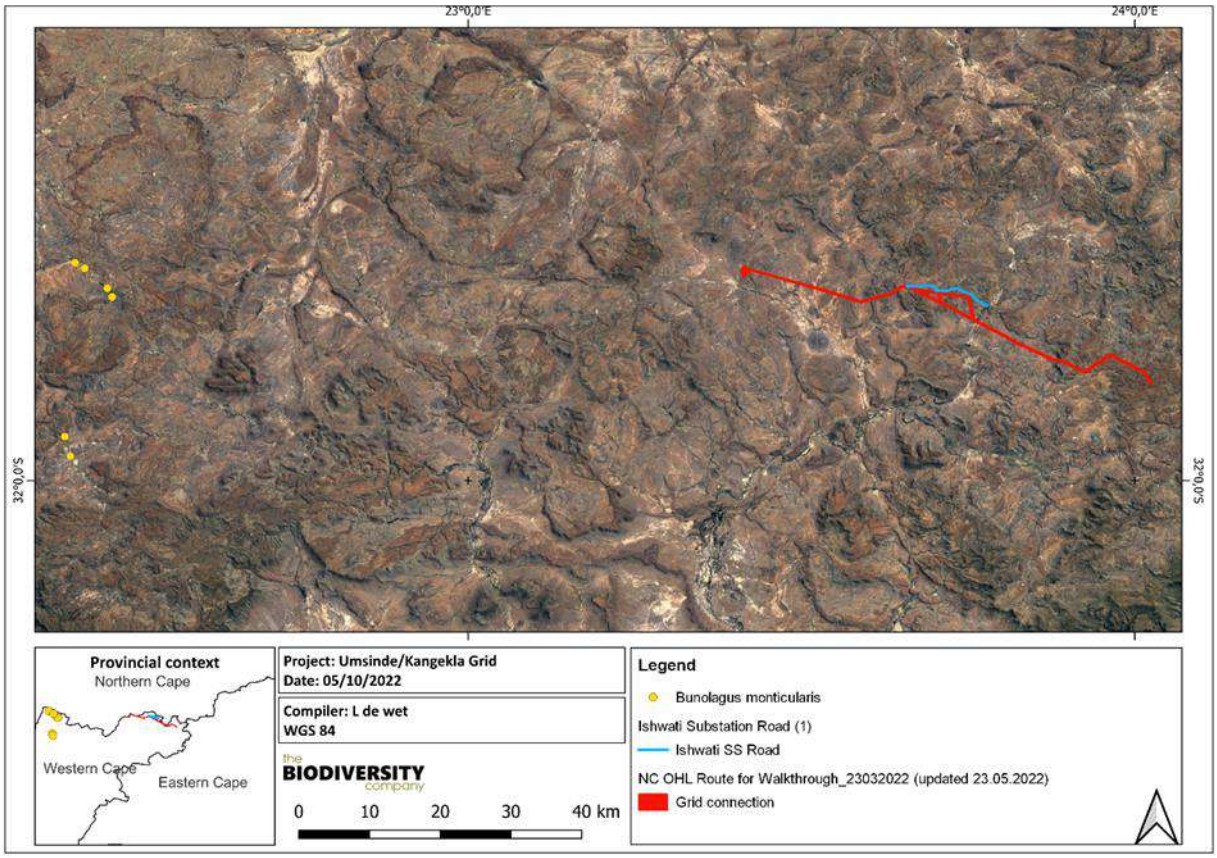


Figure 3-10 Bunolagus monticularis (Riverine Rabbit) records in relation to the project site.

3.1.3.4 Avifauna

The SABAP2 Data lists 221 avifauna species that could be expected to occur within the area (Appendix B). Seventeen (17) of these expected species are regarded as threatened (Table 3-6). One of the species has a low likelihood of occurrence due to a lack of suitable habitat and food sources in the project area or based on the range restrictions of the species.

Table 3-6 Threatened avifauna species that are expected to occur within the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Anthus crenatus	Pipit, African Rock	NT	NT	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Confirmed
Ardeotis kori	Bustard, Kori	NT	NT	Confirmed
Ciconia microscelis	Stork, Woolly-necked	Unlisted	NT	Low
Ciconia nigra	Stork, Black	VU	LC	Moderate
Circus macrourus	Harrier, Pallid	NT	NT	Low
Circus maurus	Harrier, Black	EN	EN	High
Coracias garrulus	Roller, European	NT	LC	High
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	Confirmed
Falco biarmicus	Falcon, Lanner	VU	LC	Confirmed

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Geocolaptes olivaceus	Woodpecker, Ground	Unlisted	NT	High
Grus paradisea	Crane, Blue	NT	VU	Confirmed
Neotis ludwigii	Bustard, Ludwig's	EN	EN	Confirmed
Phoenicopterus roseus	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	EN	Confirmed
Sagittarius serpentarius	Secretarybird	VU	EN	Confirmed
Terathopius ecaudatus	Bateleur, Bateleur	EN	EN	Low

Anthus crenatus (African Rock Pipit) is endemic to South Africa and Lesotho (IUCN, 2017). They are classed as near threatened after undergoing a decline in habitat of 34% in the last 10 years (IUCN, 2017). The species is associated with rocky habitats that has abundant shrub and grassy areas. Suitable rocky habitat can be found in the project area, therefore the species has a high likelihood of occurring.

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). Numerous Verreauxs Eagles and their nests were recorded.

Ardeotis kori (Kori Bustard) is listed as NT both on a regional and global scale. It occurs in flat, arid, mostly open country such as grassland, karoo, bushveld, thornveld, scrubland and savanna but also including modified habitats such as wheat fields and firebreaks. Collisions with high voltage power lines are a major threat to this species in the Karoo of South Africa (IUCN, 2007). This species was confirmed in the assessment.

Ciconia microscelis (Woolly-necked Stork) is categorised as NT on a global scale. A major threat to this species in South East Asia is hunting, it also threatened by severe habitat loss and fragmentation, particularly that of lowland forests with tall trees used for nesting although much suitable habitat remains that is not inhabited. This species has a low reporting rate in the pentads, and the assessment area is also outside of the species' main range in South Africa, as such it was given a low likelihood of occurrence.

Ciconia nigra (Black Stork) is native to South Africa, and inhabits old, undisturbed, open forests. They are known to forage in shallow streams, pools, marshes swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands, especially where there are stands of reeds or long grass (IUCN, 2017). It is unlikely that this species would breed in the project area due to the lack of forested areas, however some suitable foraging habitat remains in the form of the open grasslands and riparian areas, and as such the likelihood of occurrence is rated as moderate.

Circus macrourus (Pallid Harrier) is listed as NT on a regional and global scale, and overwinters in semi-desert, scrub, savanna and wetlands. The species is migratory, with most birds wintering in sub-Saharan Africa or south-east Asia (IUCN, 2017). The species is most likely only to use the area as a migratory route or a temporary overwintering location from August to March. This species has a low reporting rate in the pentads, it is also outside of the main range in South Africa, as such it was given a low likelihood of occurrence. *Circus maurus* (Black Harrier) is

listed as EN on a local and international basis and is restricted to southern Africa, where it is mainly found in the fynbos and Karoo of the Western and Eastern Cape. It is also found in the grasslands of Free State, Lesotho and KwaZulu-Natal. Harriers breed close to coastal and upland marshes, damp sites, near vleis or streams with tall shrubs or reeds. South-facing slopes are preferred in mountain areas where temperatures are cooler, and vegetation is taller (IUCN, 2017). During the non-breeding season, they will also be found in dry grassland areas further north and they also visit coastal river floodplains in Namibia. The likelihood of occurrence is rated as high.

Coracias garrulus (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 high chance of this species occurring in the project area as they prefer to forage in open areas.

Eupodotis vigorsii (Karoo Korhaan) is listed as NT on a regional scale and as least concern (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 km^2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). Numerous Karoo Korhaans were recorded throughout the project area.

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals, but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins. Lanner Falcons were recorded in the project area.

Geocolaptes olivaceus (Ground Woodpecker) is categorised as NT on a global scale. It occurs on rocky slopes, mostly in areas dominated by grass and shrubs; including road cuttings or derelict buildings (Hockey *et al.* 2005). It is mainly sedentary but there is some suggestion that it could be an altitudinal migrant, and individuals may wander away from mountainous areas in the non-breeding season. Afforestation may be a threat to the species and this species has also been considered to be potentially under threat from climate change, and temperatures in South Africa have been reported to be rising. Due to the rocky habitat the likelihood of occurrence in the project area is rated as high.

Grus paradiseus (Blue Crane) is listed as NT on a regional scale and as VU on a global scale. This species has declined, largely owing to direct poisoning, power-line collisions and loss of its grassland breeding habitat owing to afforestation, mining, agriculture and development (IUCN, 2017). This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short. This species was recorded in the project area.

Neotis ludwigii (Ludwig's Bustard) is listed as EN both locally and internationally. 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. The main reason for the decline in the numbers are ascribed to the collisions with power lines. This species was recorded in the project area.

Phoenicopterus roseus (Greater Flamingo) is listed as NT on a regional scale only. This species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote

breeding sites from terrestrial predators and the soft muddy material for nest building (IUCN, 2017). Due to the absence of its preferred habitat within the project area the likelihood of occurrence is rated as low.

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and EN 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 recorded in the project area.

Sagittarius serpentarius (Secretarybird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). This species was recorded in the project area.

Terathopius ecaudatus (Bateleur) is categorised as EN on a regional scale and on an international scale. This species prefers open grassland and savanna, it is not found in thick forested areas. This species has a low reporting rate in the pentads, it is also outside of the main range in South Africa, as such it was given a low likelihood of occurrence.

3.1.3.4.1 Literature review of previous avifauna assessments

ARCUS (2015) conducted a 12 month bird survey between October 2013 and October 2014 for the proposed Umsinde Emoyeni & Khangela Wind Energy Facilities (WEFs). A combined total of 181 species was recorded in their assessment over four seasons. Their assessment included 29 priority species (priority species in the context of wind farm developments) and 28 South African endemic or near endemic species. A total of 13 Regional Red Data species were also observed (Table 3-7).

Table 3-7 Red data species and priority species recorded by ARCUS 2015

Species	Threat status	Priority species
Blue Crane	NT	P
Karoo Korhaan	NT	P
Verreaux's Eagle	VU	P
Northern Black Korhaan		P
African Rock Pipit	NT	P
Jackal Buzzard		P
Pale Chanting Goshawk		P
Steppe Buzzard		P
African Fish Eagle		P
Southern Black Korhaan	VU	P
Secretarybird	VU	P
African Harrier-hawk		P
Black Harrier	EN	P
Black-chested Snake Eagle		P

Black-shouldered Kite		P
Booted Eagle		P
Cape Eagle-Owl		P
Greater Flamingo	NT	P
Greater Kestrel		P
Grey-winged Francolin		P
Steppe Buzzard		P
Lanner Falcon	VU	P
Lesser Kestrel		P
Ludwig's Bustard	EN	P
Martial Eagle		
Sparrowhawk, Rufous-breasted		P
Double-banded Courser	NT	
Kori Bustard	NT	

During the same assessment a nest survey were also conducted, and the nests of seven species were recorded (Table 3-8).

Table 3-8 Nests recorded by ARCUS (2015) in the project area

Species	Number of nests	Location
Verreaux's Eagle	21	Five are situated within the WEF site boundary
Martial Eagle	1	Nest outside the WEF site approximately 3.2 km west from the site boundary
Jackal Buzzard	7	Five of which are situated within the WEF site;
Rock Kestrel	22	Seven of which are situated within the WEF site
Rufous-breasted Sparrowhawk	1	Situated within the WEF site
Pale Chanting Goshawk	1	Nest situated within the WEF site
Peregrine Falcon	1	Nest situated approximately 3.5 km south of the site boundary

In the ARCUS 2015 report the risk of collisions and electrocutions were rated as followed (Table 3-9).

Table 3-9 Main risks relevant to powerlines identified by ARCUS (2015)

Feature	Impact	Pre mitigations	Post mitigations	Mitigations recommended
WEF Phase 1 or 2 Operational Phase	Electrocutions	High	**Medium**	Any overhead power lines must be of a design that minimizes electrocution risk by using adequately insulated 'bird friendly' monopole structures, with clearances between live components of 2 m or greater
	Collisions with powerlines	High	**Medium**	• New lines must be close to existing lines as far as possible. • Site walk down must be done prior to development and to determine areas for bird diverters.

				• Bird diverters must be installed as per the instructions of the specialists following the site walk through. • A carcass search programme for birds during the first two years of operation, in line with the South African monitoring guidelines (Jenkins et al., 2015) must be conducted. This program must include monitoring of overhead power lines.
Grid Connection Phase 1 &2	Electrocutions	Medium	**Medium**	• Grid line design must minimizes electrocution risk by using adequately insulated 'bird friendly' monopole structures, with clearances between live components of 2 m or greater. • An operational monitoring plan must be set up and must adhere to the South African monitoring guidelines (Jenkins et al, 2015) • Any mortalities should be reported to the Endangered Wildlife Trust (EWT).
	Collisions with powerlines	High	**Medium**	• New lines must be close to existing lines as far as possible. • Site walk down must be done prior to development and to determine areas for bird diverters. • Bird diverters must be installed as per the instructions of the specialists following the site walk through. which • **Bird diverters may** include modified BFDs fitted with solar powered LED lights on certain spans. • An operational monitoring plan must be set up and must adhere to the South African • monitoring guidelines (Jenkins et al, 2015) • Any mortalities should be reported • to the Endangered Wildlife Trust (EWT).

In the originally authorised avifaunal impact assessment studies (Arcus, 2018) two key species were found to be most at risk, Blue Crane and Verreauxs Eagle. Table 3-10 is a summary of the impact ratings that they found during their assessment. These ratings were not changed in the Arcus, 2020 amendments for Khangela Emoyeni (ARCUS, 2020a) and Umsinde Emoyeni (ARCUS, 2020b)

Table 3-10 Impacts identified for Khangela Emoyeni and Umsinde Emoyeni WEFs (including powerlines) as per Arcus 2020a&b

Phase Impact Significance Without Mitigation Significance with Mitigation Significance with mitigation will change due to proposed Amendment (Y/N)	**Phase Impact Significance Without Mitigation Significance with Mitigation Significance with mitigation will change due to proposed Amendment (Y/N)**	**Phase Impact Significance Without Mitigation Significance with Mitigation Significance with mitigation will change due to proposed Amendment (Y/N)**	**Phase Impact Significance Without Mitigation Significance with Mitigation Significance with mitigation will change due to proposed Amendment (Y/N)**	**Phase Impact Significance Without Mitigation Significance with Mitigation Significance with mitigation will change due to proposed Amendment (Y/N)**
Construction	Habitat Destruction	Medium	Low	N
	Disturbance and Displacement	Low	Very Low	N
Operational	Disturbance and Displacement	Medium	Low	N
	Electrocution	Medium	Low	N
	Collisions with Power Lines	High	Medium	N

	Collisions with WTGs	Very High	Medium	N
Decommission	Disturbance and Displacement	Low	Very Low	N
Cumulative Impacts (of the Umsinde Emoyeni Phase 1 and 2 WEF and proposed developments within 50 km)	Electrocution	Very High	Medium	N
	Collisions with Power Lines	Very High	High	N
	Collisions with WTGs	Very High	Very High	Y

3.2 Field Assessment

The following sections provides the results from the field survey for the proposed development that was undertaken during March/April 2022 and updated after the August 2022 road assessment.

3.2.1 Habitat Assessment

Different substate types including soil depth as well as slope, aspect and elevation in addition to flora species and respective species dominance were used to determine different habitat types for the site. Four overall habitat types were defined and include (Figure 3-15):

- Wash areas (which may be degraded through sheet erosion or intact);
- Rocky slopes;
- Dolerite outcrops; and
- Riparian areas.

The main processes and drivers of the changes in the habitats include elevation and erosion, with elevation determining the degree of erosion and deposition of eroded materials. This in turn results in the changes in soil type and depth, resulting in vegetation change. Slope aspect and steepness also play a role in determining the habitat type.

3.2.1.1 Wash areas

An example of a wash area can be seen in Figure 3-11. Wash areas form the dominant habitat or vegetation type of the low-lying flats of the study area. These usually occur on deeper soils as a result of erosion from the rocky slopes and plateaus of the site. Intact areas are dominated by dwarf shrubs with occasional emergent shrubs with clear evidence of water movement between the shrubs. Occasionally, especially with bad land management practices and overgrazing at watering points, these washes may become devoid of vegetation and dominated primarily by the succulent *Psilocaulon coriarium* if vegetation is present. Intact vegetation is dominated by *Pentzia incana, Pentzia globosa, Monechma incanum, Roepera morgsana, Roepera lichtensteinii, Aristida congesta, Enneapogon sp., Hermannia coccocarpa, Eriocephalus ericoides, Lycium spp, Aptosimum indivisum, Lacmucina lineata* and *Selago geniculata* among others.

3.2.1.2 Rocky Slopes

Rocky slopes occur on a large portion of the site, with similar vegetation occurring on the rocky plateaus above the rocky slopes and lowland washes of the site (Figure 3-12). These areas tend to be very rocky with very shallow soils. Here, plant diversity tends to be higher, with a range in the vegetation structure depending on slopes aspect with wetter slopes hosting a larger

number of taller shrubs. Succulent species tend to make use of rocky slopes. Dominant species can vary between talker shrubs on wetter slopes and dwarf shrubs on drier slopes. Dominant species include, but are not restricted to *Searsia burchelli, Rhigozum obovatum, Jamesbrittenia spp, Pentzia incana,* and *Pentzia globosa.* Indicator species include *Whalenbergia nodosa, Nemesia fruticans* and *Jamesbrittenia atropurpurea*.

3.2.1.3 Dolerite Outcrops

Dolerite outcrops are distinctive area of large, stacked boulders creating an extremely rocky substate (Figure 3-13) in which a large variety of species grow. Here a higher number of geophytic species are found with species such as *Boophone disticha, Romulea tortuosa* and *Moraea sp*. occurring. Many succulent species are also found here including *Aloe broomii* and *Aloe claviflora* as well as various mesemb species. Commonly found species include, but are not limited to the fern *Cheilanthes eckloniana*, which grows in between boulders, *Solanum tomentosum, Monsonia crassicaulis,* and *Euryops latiflorus*. The number of SCC recorded in this habitat type mean that it is highly sensitive and should be avoided where possible.

3.2.1.4 Riparian areas

Riparian areas are found where there are channelled water flows which may be perennial or seasonal in nature (Figure 3-14). These areas are distinctive in that they are dominated by comparatively tall shrubs, most of which are *Vachellia karoo*, but also commonly include species such as *Searsii burchellii, Searsia pyroised, Searsia pallens, Gomphocarpus fruticosus,* and *Leucosidea sericea*. Also occurring are *Diospyrus lycioides* and *Diospyrus austro-africana*. Grasses occurring here include *Cenchrus ciliaris* and *Themeda triandra* among others. In deeper streams reeds and sedges may be found.

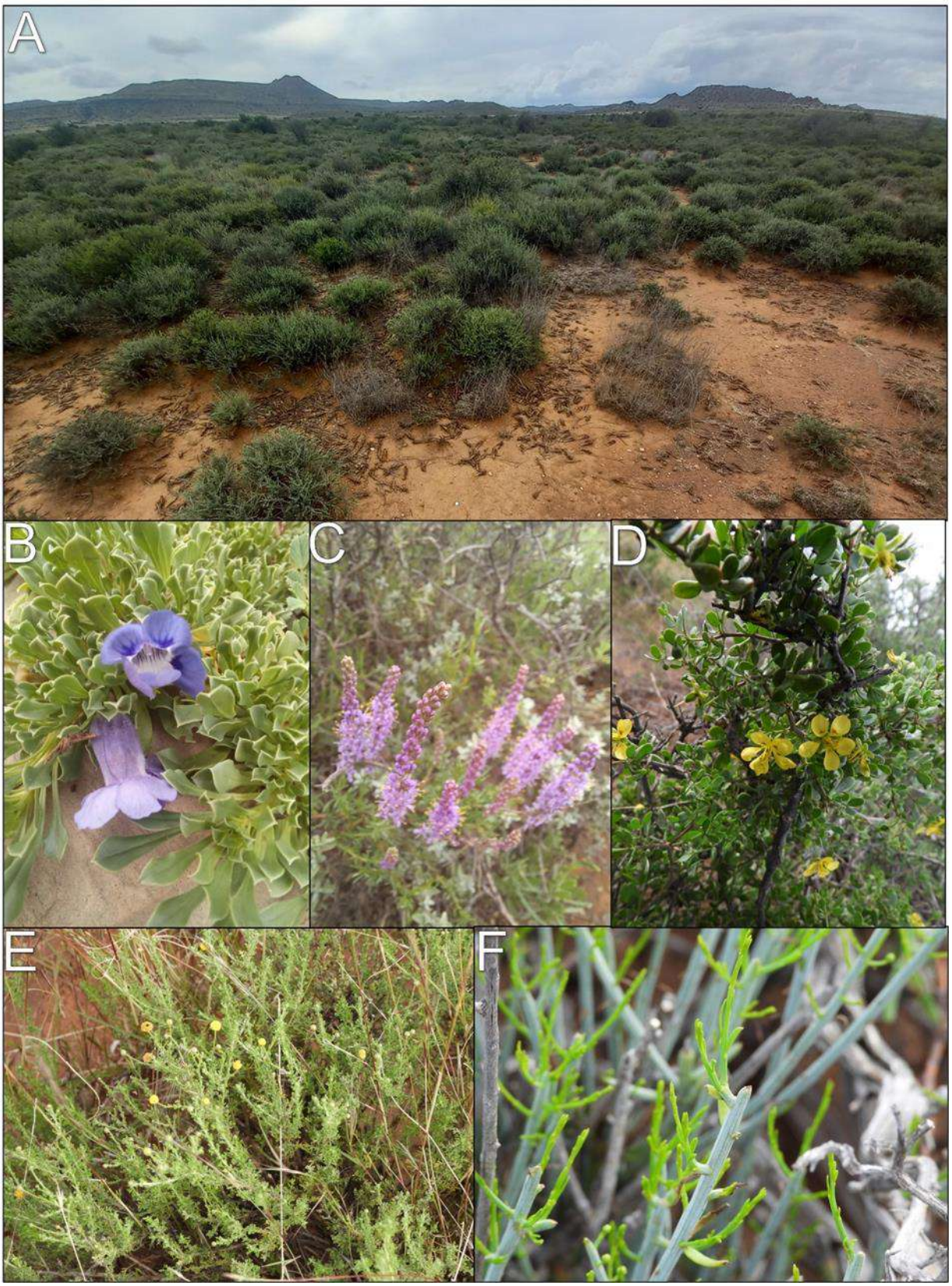


Figure 3-11 ***Vegetation and species typical of wash areas of the study site. A: intact wash areas dominated by dwarf karroid shrubs. B: Aptosimim indivisum, C: Selago geniculata, D: Reopera morgsana, E: Pentzia incana and F: Lacmucina lineata.***

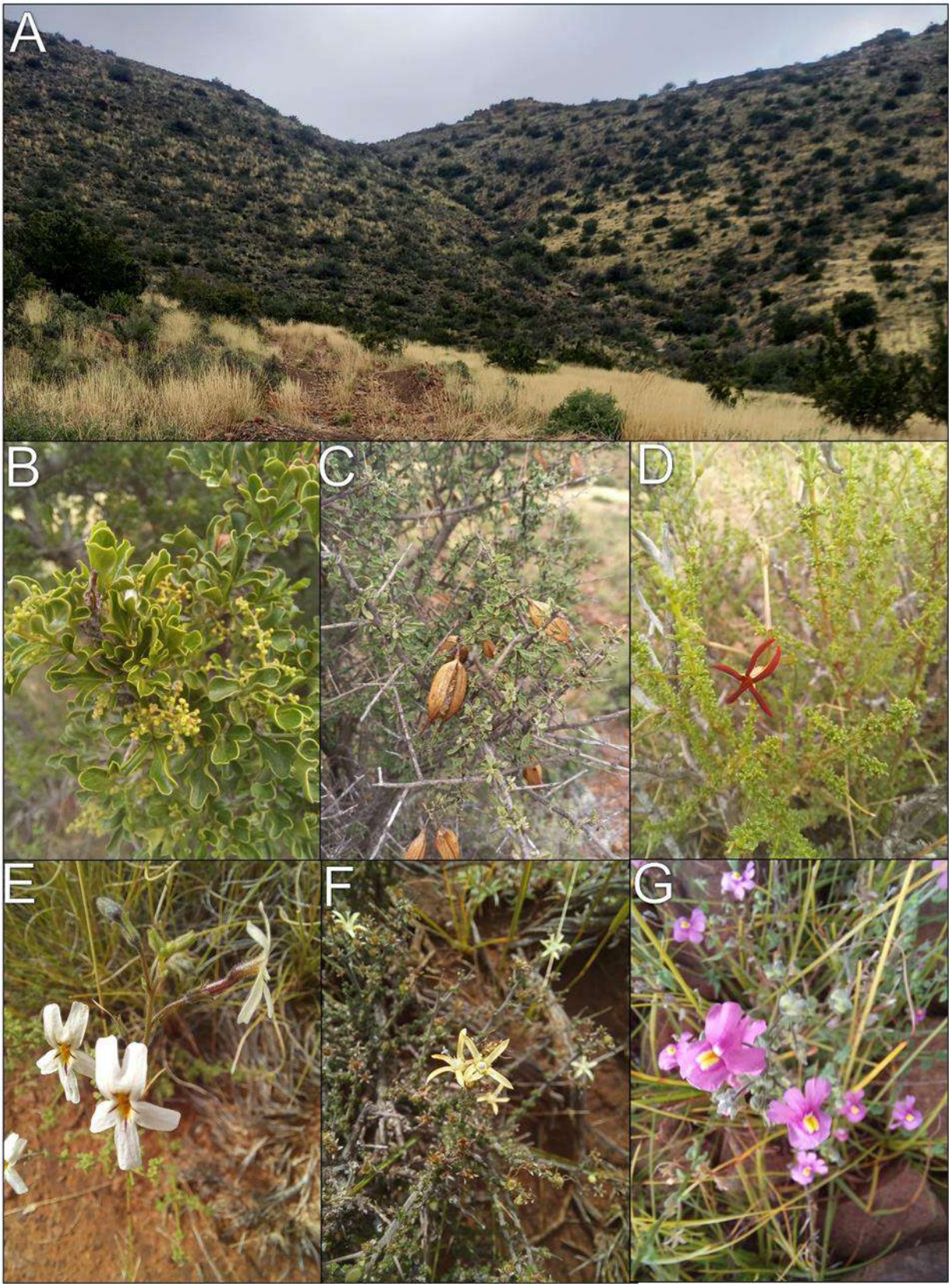


Figure 3-12 ***Vegetation and species typical of rocky slopes of the study site. A: rocky sloep habitat. B: Searsia burchelii, C: Rhigozum obovatum, D: Jamesbrittenia atropurpurea, E: Jamesbrittenia pinnatifida. F: Wahlenbergia nodosa. And G: Nemsia fruticans.***

Figure 3-13 ***Vegetation and species typical of dolerite outcrops of the study site. A: Dolerite Outcrop habitat. B: Cheilanthes eckloniana C: Solanum tomentosum, D: Monsonia crassicaulis, E: Aloe claviflora and, F: Euryops latiflorus.***

Figure 3-14 ***Vegetation and species typical of Riparian areas of the study site. A: Riparian habitat. B: Vachellia karroo, C: Diospyros lycioides, D: Searsia pallens, E: Leucosidea sericea, and F: Gomphocarpus fruticosus.***

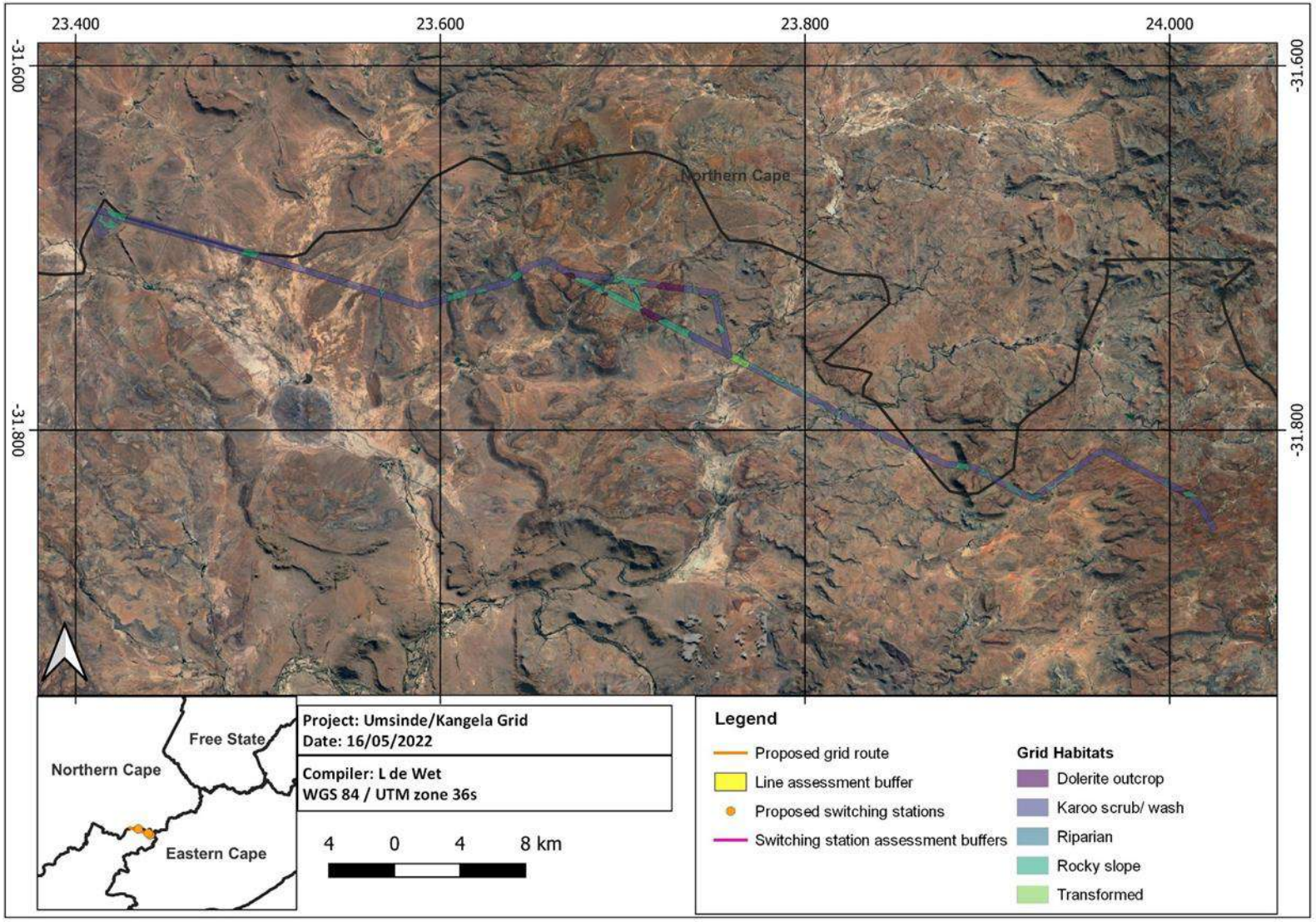


Figure 3-15 Map of the habitats within the survey buffer area.

3.2.1.5 Ishwati Access Road habitats

Karoo Scrub

Karoo Scrub is dominated by grasses (most notably *Aristida congesta*) with a scattered woody plant layer consisting of tree or shrub species such as *Searsia burchellii, Vachellia karroo* and *Lycium cinereum*. Other frequently recorded plant species in the Open Bushveld included *Albuca setosa*, *Dimorphotheca cuneata*, *Lasiopogon muscoides, Moraea pallida* and *Ruschia spinosa.*

Rocky Outcrops

Rocky Outcrops were hills with exposed igneous rocks dominated by grasses with some scattered woody plants. Recorded plant species unique to the Rocky Outcrops included *Boophone disticha, Chasmatophyllum musculinum* and *Cheilanthes eckloniana*.

Riparian Zone

Riparian Zone consists of plant species mostly found in or near water bodies, most notably sedges such as *Cyperus laevigatus*.

Degraded

This habitat has been disturbed by the trampling of livestock (cattle and sheep), resulting in large areas of bare ground and scattered rocks. Degraded areas were most likely either Open Bushveld or Grassland before the disturbance, because the same plant species that occur in those two habitats also occur here but in much smaller numbers. *Massonia* sp. has been recorded only in the Degraded habitat.

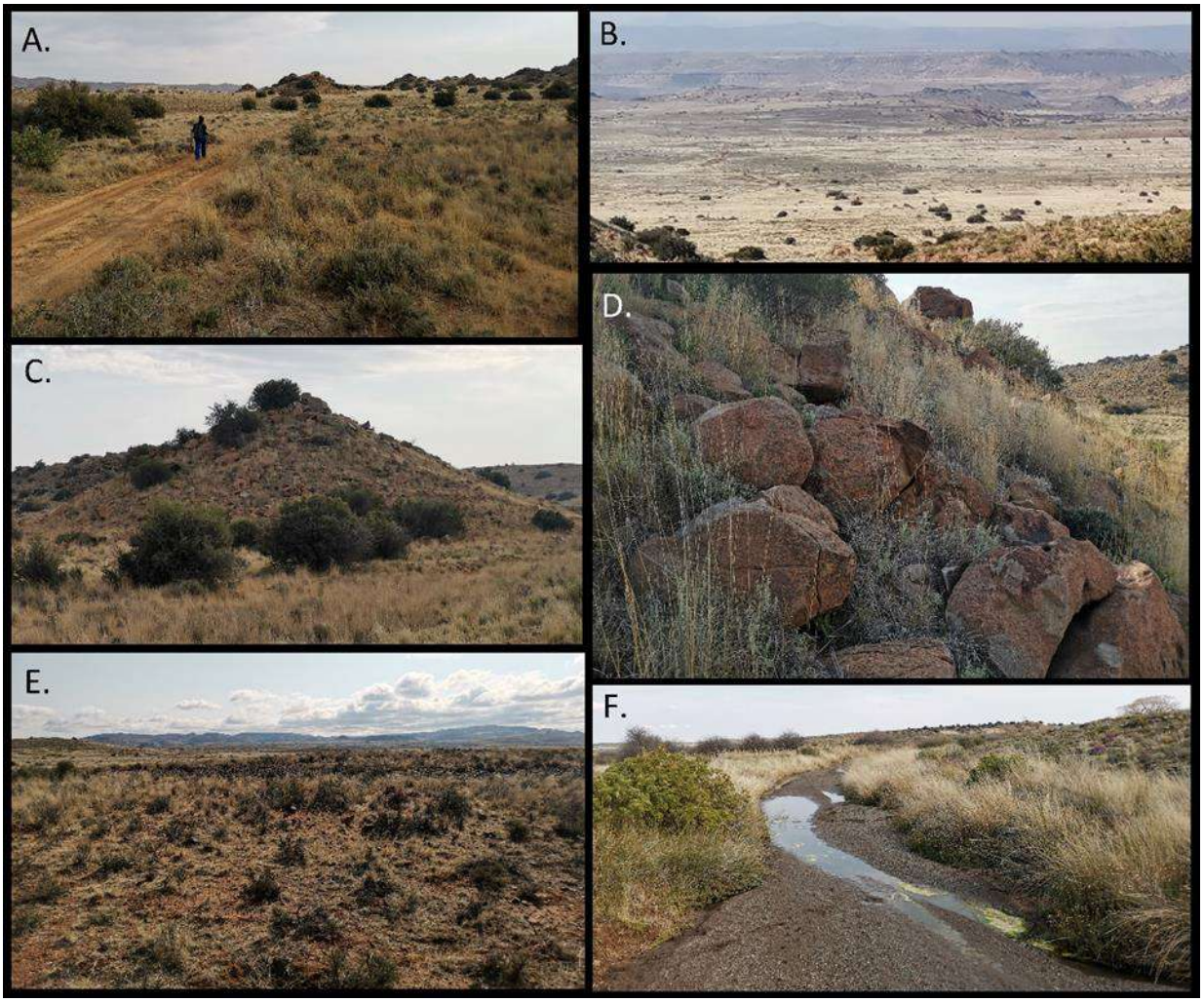


Figure 3-16 ***Photographs illustrating the habitats identified during the assessment of the Ishwati road: A–B) Karoo Scrub, C-D) Rocky Outcrops, E) Degraded and F) Riparian Zone.***

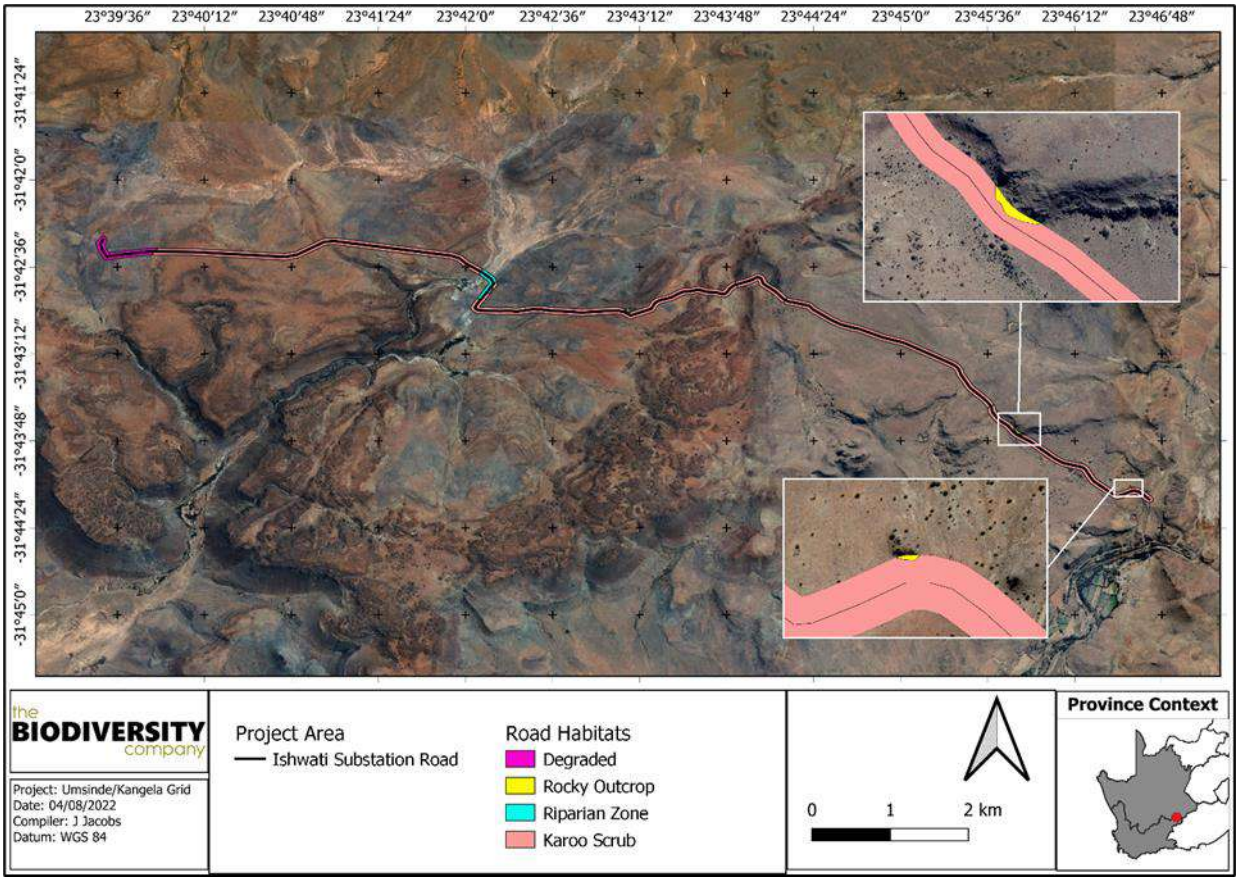


Figure 3-17 Habitats at the proposed access road assessment corridor

3.2.2 Flora Assessment

This section is divided into three sections:

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

3.2.2.1 Indigenous Flora

The list of flora species recorded within the assessment area provided in Table 3-11, with some shown in Figure 3-18. Notably, this is not a complete list of indigenous flora within the area, but only species that were able to be recorded within the survey area within seasonality constraints. A total of 150 species were recorded within the assessment area. Several of the species recorded are indicator taxa of the vegetation types described in section 3.1.2.1 of this report. None of the expected threatened flora species provided in section 3.1.2.2 of this report were recorded within the assessment area during the survey period. Photographs of most species recorded can be found here: https://www.inaturalist.org/projects/kangela and it should be noted that the species list drawn from the site visit may change as identifications are finalised (based on scientific consensus) and as taxonomic nomenclature is refined. This online list (including photographs) will ensure that the list is up to date at all times as well as being fully accessible for reference.

Table 3-11 Flora species recorded within the assessment area and their respective growth form and conservation status. Species in Provincial, TOPS and Protected Trees columns are protected by legislation. EN = Endangered, NT= Near Threatened, VU = Vulnerable, LC = Least Concern and NE = Not Evaluated

Family	Scientific name	Provincial	TOPS	Protected Trees	Red List
Acanthaceae	*Blepharis capensis*				LC
Acanthaceae	*Justicia incana*				LC
Agavaceae	*Agave americana*				NE
Aizoaceae	*Aizoon africanum*	Sch. 4			LC
Aizoaceae	*Chasmatophyllum musculinum*				LC
Aizoaceae	*Delosperma multiflorum*	Sch. 4			LC
Aizoaceae	*Drosanthemum dejagerae*	Sch. 4			DDT
Aizoaceae	*Drosanthemum hispidum*	Sch. 4			LC
Aizoaceae	*Malephora lutea*	Sch. 4			LC
Aizoaceae	*Mesembryanthemum coriarium*	Sch. 4			LC
Aizoaceae	*Ruschia intricata*	Sch. 4			LC
Aizoaceae	*Ruschia spinosa*	Sch. 4			LC
Aizoaceae	*Stomatium duthiae*	Sch. 4			LC
Amaranthaceae	*Amaranthus hibridus*				
Amaranthaceae	*Amaranthus spinosus*				NE
Amaranthaceae	*Atriplex lindleyi*				NE
Amaranthaceae	*Atriplex nummularia* subsp. *nummularia*				
Amaranthaceae	*Salsola kali*				NE
Amaranthaceae	*Salsola* sp.				
Amaryllidaceae	*Boophone disticha*	Sch. 4			LC
Anacardiaceae	*Schinus molle*				
Anacardiaceae	*Searsi burchellii*				LC
Anacardiaceae	*Searsia pallens*				LC
Anacardiaceae	*Searsia pyroides*				LC
Apiaceae	*Berula thunbergii*				LC
Apocynaceae	*Gomphocarpus fruticosus*	Sch. 4			LC
Apocynaceae	*Pachypodium succulentum*	Sch. 4			LC
Asparagaceae	*Asparagus burchellii*				LC
Asparagaceae	*Asparagus capensis* var. *capensis*				LC
Asparagaceae	*Asparagus retrofractus*				LC
Asparagaceae	*Asparagus* sp.1				
Asparagaceae	*Asparagus* sp.2				
Asparagaceae	*Asparagus striatus*				LC
Asparagaceae	*Asparagus suaveolens*				LC
Asparagaceae	*Massonia* sp.				
Asphodelaceae	*Aloe broomii*	Sch. 4			LC

Family	Scientific name	Provincial	TOPS	Protected Trees	Red List
Asphodelaceae	*Aloe claviflora*	Sch. 4			LC
Asphodelaceae	*Bulbine abyssinica*				LC
Asphodelaceae	*Bulbinella elegans*				LC
Asphodelaceae	*Haworthia semiviva*	Sch. 4			LC
Asteraceae	*Amphiglossa tomentosa*				LC
Asteraceae	*Arctotis arctoides*				
Asteraceae	*Artemisia afra*				LC
Asteraceae	*Berkeya* sp.				
Asteraceae	*Chrysocoma ciliata*				LC
Asteraceae	*Dimophotheca cuneata*				LC
Asteraceae	*Dimorphotheca cuneata*				LC
Asteraceae	*Elytropappus rhinocerotis*				LC
Asteraceae	*Eriocephalus africanus*				LC
Asteraceae	*Eriocephalus ericoides*				LC
Asteraceae	*Eriocephalus spinescens*				LC
Asteraceae	*Eriospermum* sp.				
Asteraceae	*Euryops lateriflorus*				LC
Asteraceae	*Felicia filifolia* subsp. *filifolia*				LC
Asteraceae	*Felicia muricata*				LC
Asteraceae	*Gazania krebsiana*				LC
Asteraceae	*Geigera* sp.				
Asteraceae	*Helichrysum zeyheri*				LC
Asteraceae	*Hirpicium alienatum*				LC
Asteraceae	*Hypochaeris radicata*				NE
Asteraceae	*Ifloga* sp.				
Asteraceae	*Lasiopogon muscoides*				LC
Asteraceae	*Oedera genistifolia*				LC
Asteraceae	*Osteospermum sinuatum*				LC
Asteraceae	*Pentzia incana*				LC
Asteraceae	*Pteronia glauca*				LC
Asteraceae	*Rosenia spinescens*				LC
Asteraceae	*Tagetes minuta*				NE
Asteraceae	*Trichocline* sp.				
Asteraceae	*Ursinia nana*				LC
Bignoniaceae	*Rhigozum obovatum*				LC
Bignoniaceae	*Rhigozum trichotomum*				LC
Brassicaceae	*Boscia albitrunca*			x	LC
Cactaceae	*Opuntia ficus-indica*				NE
Cactaceae	*Opuntia robusta*				NE

Family	Scientific name	Provincial	TOPS	Protected Trees	Red List
Campanulaceae	*Whalenbergia nodosa*				LC
Crassulaceae	*Adromischus liebenbergii*				LC
Crassulaceae	*Crassula deltoidea*				LC
Crassulaceae	*Tylecodon ventricosus*				LC
Cucurbitaceae	*Cucumis myriocarpus*				LC
Cyperaceae	*Pseudoschoenus inanis*				LC
Cyperaceae	*Cyperus laevigatus*				LC
Ebenaceae	*Diospyros austro-africana*				LC
Ebenaceae	*Diospyros lycioides subsp. lycioides*				LC
Euphorbiaceae	*Euphorbia caput-medusae*				LC
Fabaceae	*Indigofera alternans*				LC
Fabaceae	*Lessertia frutescens*				LC
Fabaceae	*Lessertia* sp.				
Fabaceae	*Lotononis pungens*				LC
Fabaceae	*Vachellia karoo*				LC
Fabaceae	*Wiborgia sericea*				LC
Geraniaceae	*Monsonia crassicaulis*				LC
Geraniaceae	*Pelargonium minimum*				LC
Hyacinthaceae	*Ledebouria* sp.				
Iridaceae	*Lapeirousia plicata*				LC
Iridaceae	*Moraea pallida*				LC
Iridaceae	*Moraea polystachya*	Sch. 4			LC
Iridaceae	*Moraea* sp.	Sch. 4			
Iridaceae	*Romulea tortuosa*	Sch. 4			LC
Kewaceae	*Kewa salsoloides*				LC
Lamiaceae	*Salvia* sp.				
Lamiaceae	*Salvia verbenaca*				LC
Loranthaceae	*Moquiniella rubra*				LC
Malvaceae	*Hermannia coccocarpa*				LC
Molluginaceae	*Limeum aethiopicum*				LC
Myrtaceae	*Eucalyptus* sp.				
Oxalidaceae	*Oxalis obliquifolia*				LC
Papaveraceae	*Argemone ochroleuca*				NE
Poaceae	*Aristisa congesta*				LC
Poaceae	*Cenchrus ciliaris*				LC
Poaceae	*Ehrharta erecta*				LC
Poaceae	*Enneapogon* sp.				
Poaceae	*Eragrostis capensis*				LC
Poaceae	*Eragrostis curvula*				LC

Family	Scientific name	Provincial	TOPS	Protected Trees	Red List
Poaceae	*Eragrostos lehmanniana*				LC
Poaceae	*Phragmites australis*				LC
Poaceae	*Stipagrostis sp.*				
Poaceae	*Themeda triandra*				LC
Poaceae	*Tragus beteronianus*				LC
Polygalaceae	*Polygala ephedroides*				LC
Pteridaceae	*Cheilanthus eckloniana*				LC
Rhizophoraceae	*Salix mucronata*				LC
Rosaceae	*Leucosidea sericea*				LC
Rubiaceae	*Galium tomentosum*				LC
Salicaceae	*Populus nigra*				NE
Salicaceae	*Salix babylonica*				NE
Santalaceae	*Lacomucinaea lineata*				LC
Santalaceae	*Thesium sp.*				
Santalaceae	*Viscum rotundifolium*				LC
Scrophulariaceae	*Aptosimum indivisum*				LC
Scrophulariaceae	*Aptosimum spinescens*				LC
Scrophulariaceae	*Chaenostoma caeruleum*				LC
Scrophulariaceae	*Chaenostoma caeruleum*				LC
Scrophulariaceae	*Jamesbrittenia atropurpurea*				LC
Scrophulariaceae	*Jamesbrittenia pinnatifida*				LC
Scrophulariaceae	*Nemisia fruticans*				LC
Scrophulariaceae	*Peliostomum leucorrhizum*				LC
Scrophulariaceae	*Selago densiflora*				LC
Scrophulariaceae	*Selago geniculata*				LC
Scrophulariaceae	*Selago geniculata*				LC
Scrophulariaceae	*Selago sp.*				
Scrophulariaceae	*Zaluzianskya* sp.				
Solanaceae	*Datura stramonium*				NE
Solanaceae	*Lycium cinereum*				LC
Solanaceae	*Lycium ferocissimum*				LC
Solanaceae	*Lycium pumilum*				LC
Solanaceae	*Solanum tomentosum*				LC
Zygopyllaceae	*Roepera lichtensteiniana*				LC
Zygopyllaceae	*Roepera morgsana*				LC
Zygopyllaceae	*Tribulus terrestris*				LC

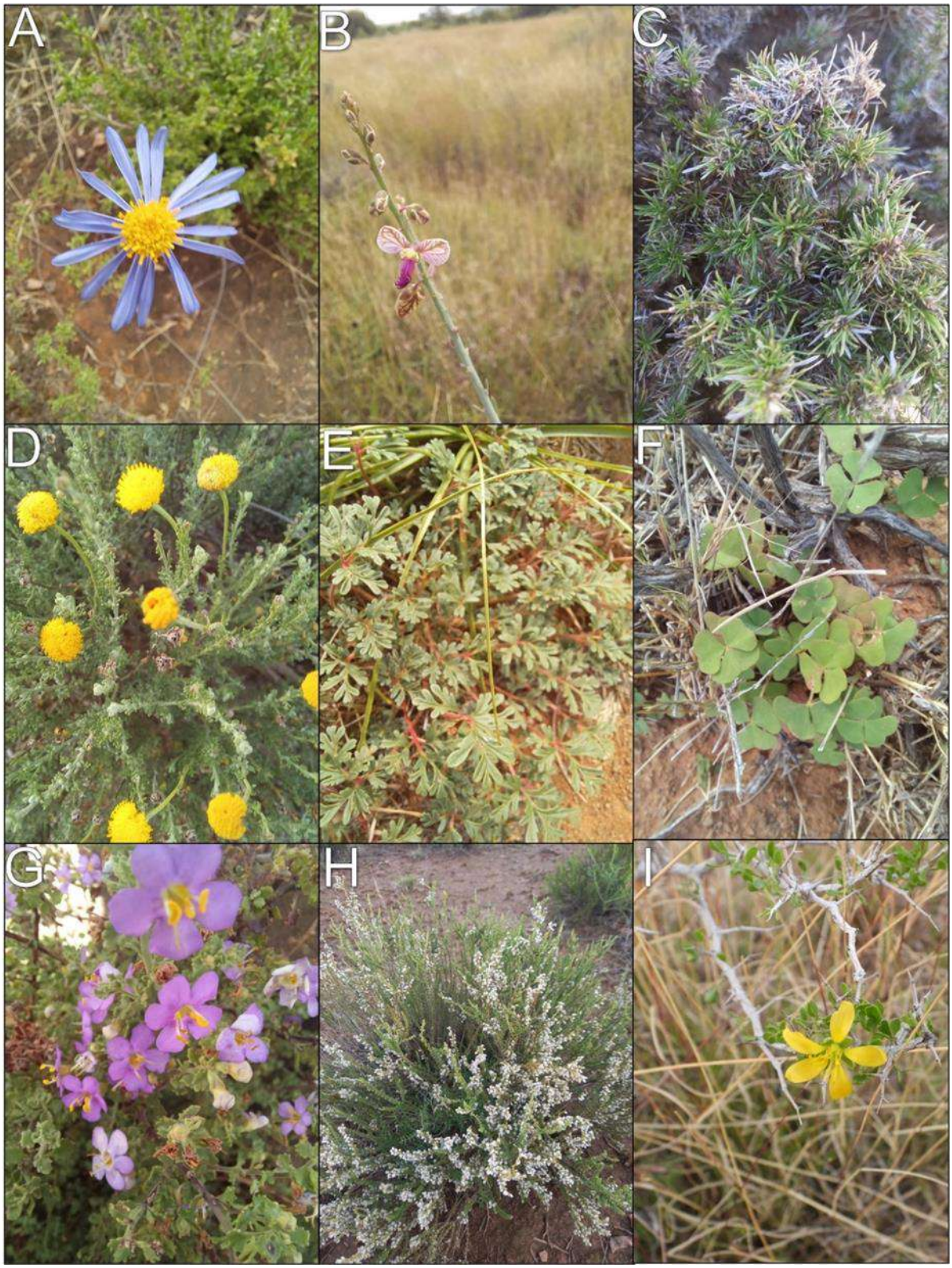


Figure 3-18 ***A portion of some of the common indigenous plant species recorded from the study site. A; Felicia muricata. B: Polygala ephedroides. C: Aptosimum***

spinescence. D: Pentzia globosa. E: Pelargonium minumum. F: Oxalis obliquifolia. G: Heliophila sauvissina. H: Eriocephalus ericoides. I: Roepera morgsana.

3.2.2.2 Species of Conservation Concern (SCC)

The list of SCC have been extracted from the overall species list and are presented in Table 3-12. The species list includes species listed on the following:

- National Protected Tree List (Government Gazette Vol. 593, 21 November 2014, No. 38215);
- Provincial Protected Species List (Nature Conservation Ordinance No. 19 of 1974);
- National Protected Species List or TOPS (R 1187 of 2007); and
- The National Red List for Plants (redlist.sanbi.org).

The SCC recorded for the study site include 20 species in total (though others may occur on site and were not recorded). Some of these species can be seen in Figure 3-19. Of these species:

- 1 (one) is listed on the Red List *Monsonia crassicaulis*, listed as NT);
- 19 (nineteen) are listed on Schedule 4 of the Provincial (Western Cape) Nature Conservation Ordinance);
- 1 (one) (*Boscia albitrunca*) is a listed Protected Tree; and
- 0 (none) are TOPS listed species.

Table 3-12 Flora protected species recorded within the assessment area and their respective growth form and conservation status. Species in bold are protected by legislation. EN = Endangered, NT= Near Threatened, VU = Vulnerable and LC = Least Concern

Family	Scientific name	Provincial	TOPs	National Forest Act	Red List
Aizoaceae	*Aizoon africanum*	Sch. 4			LC
Aizoaceae	*Delosperma multiflorum*	Sch. 4			LC
Aizoaceae	*Drosanthemum hispidum*	Sch. 4			LC
Aizoaceae	*Malephora lutea*	Sch. 4			LC
Aizoaceae	*Mesembryanthemum coriarium*	Sch. 4			LC
Aizoaceae	*Ruschia intricata*	Sch. 4			LC
Aizoaceae	*Ruschia spinosa*	Sch. 4			LC
Aizoaceae	*Stomatium duthiae*	Sch. 4			LC
Amaryllidaceae	*Boophone disticha*	Sch. 4			LC
Apocynaceae	*Gomphocarpus fruticosus*	Sch. 4			LC
Apocynaceae	*Pachypodium succulentum*	Sch. 4			LC
Asphodelaceae	*Aloe broomii*	Sch. 4			LC
Asphodelaceae	*Aloe claviflora*	Sch. 4			LC
Asphodelaceae	*Haworthia semiviva*	Sch. 4			LC
Brassicaceae	*Boscia albitrunca*			x	LC
Iridaceae	*Moraeae polystachya*	Sch. 4			LC
Iridaceae	*Moraeae sp.*	Sch. 4			
Iridaceae	*Romulea tortuosa*	Sch. 4			LC
Geraniaceae	*Monsonia crassicaulis*				NT

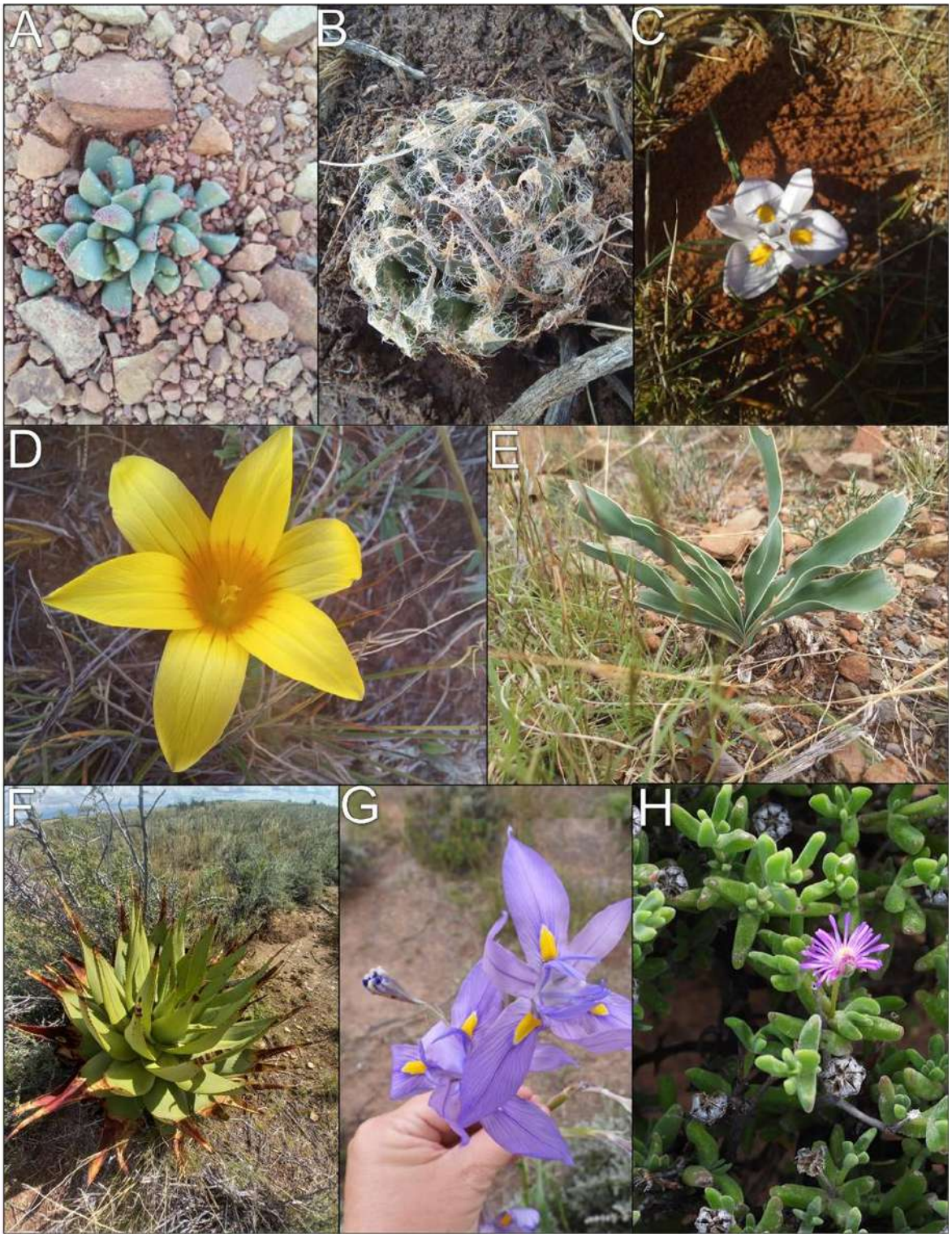


Figure 3-19 ***A portion of some of the SCC recorded from the study site. A; Stomatium duthiae. B Haworthia semiviva. C: Moraea sp. D: Romulea tortuosa. E: Boophone disticha. F: Aloe broomii. G: Moraea polystachya. H: Drosanthemum dejagerae.***

3.2.2.3 Alien Invasive Plants

Alien Invasive Plants (AIPs) 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.

Eleven (11) Invasive Alien Plants were present within the area and are listed in Table 3-13. Some of these IAPs are shown in Figure 3-20.

Table 3-13 Alien plant species, including listed invasives, recorded from the study area

Family	Scientific name	NEM:BA
Agavaceae	*Agave americana*	3
Amaranthaceae	*Atriplex nummularia* subsp. *nummularia*	2
Amaranthaceae	*Salsola kali*	1b
Anacardiaceae	*Schinus molle*	Not listed
Asteraceae	*Tagetes minuta*	Not listed
Cactaceae	*Opuntia ficus-indica*	1b (excluding spineless cultivars)
Cactaceae	*Opuntia robusta*	1a (excluding spineless cultivars)
Papaveraceae	*Argemone ochroleuca*	1b
Myrtaceae	*Eucalyptus* sp.	Not listed in Nama Karoo biome
Salicaceae	*Salix babylonica*	Not listed
Solanaceae	*Datura stramonium*	1b

Considering that the area is a CBA it is recommended that any IAP species that may colonize the area in the future be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act as stated above. This is also pertinent to the development as invasive species are linked to enhanced fire effects and risk (Aslan & Dickson, 2020). The IAP Management Programme must implement the following monitoring framework must be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded (Table 3-14). The monitoring of the area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the wellbeing of indigenous flora and fauna. It is also important to note that while herbicide application has been recommended for control, herbicides should not be applied adjacent to the aquatic ecosystems within the site area and herbicide application should not be used during windy days to prevent drift.

Table 3-14 Proposed monitoring framework for the control of invasive alien plants within the property

Metric	Frequency	Method	Response
How effective are the control methods?	4-6 months after every operation	Survey the cleared areas and look for regrowth. Before and after photographs are effective for this. Observe for non-target effects of herbicide application.	If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application.
Do the infestation levels decrease?	Annually	Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.	If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are decreasing, then continue current control method.
Quantity of herbicides used	During every operation	Keep track of cost and ensure no wastage. Record herbicide usage	Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost.
Does the indigenous vegetation recover in the cleared areas?	Annually	Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective.	If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.
How many jobs were created?	After every operation	Timesheets	Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions

How many person days (PD) were spent per operations?	After every operation	Timesheets	Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)

Figure 3-20 A portion of some of the common alien plant species recorded from the study site. A: Salsola kali, B: Tagetes minuta, C: Salsola nummularia subsp. nummularia, D: Agave americana, E: Opuntia ficus-indica and F: Datura stramonium.

3.2.3 Faunal Assessment

3.2.3.1 Amphibians

Four (4) amphibian species was recorded during the survey periods (Table 3-15 and Figure 3-21). No amphibian species recorded are of conservation concern. The species expected to occur within the assessment area are provided in Appendix B.

Table 3-15 Summary of amphibian species recorded within the assessment area during the survey period. LC = Least Concern

Family	Scientific name	Common name	Conservation Status
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	LC
Pipidae	*Xenopus laevis*	Common Platanna	LC
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	LC
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	LC

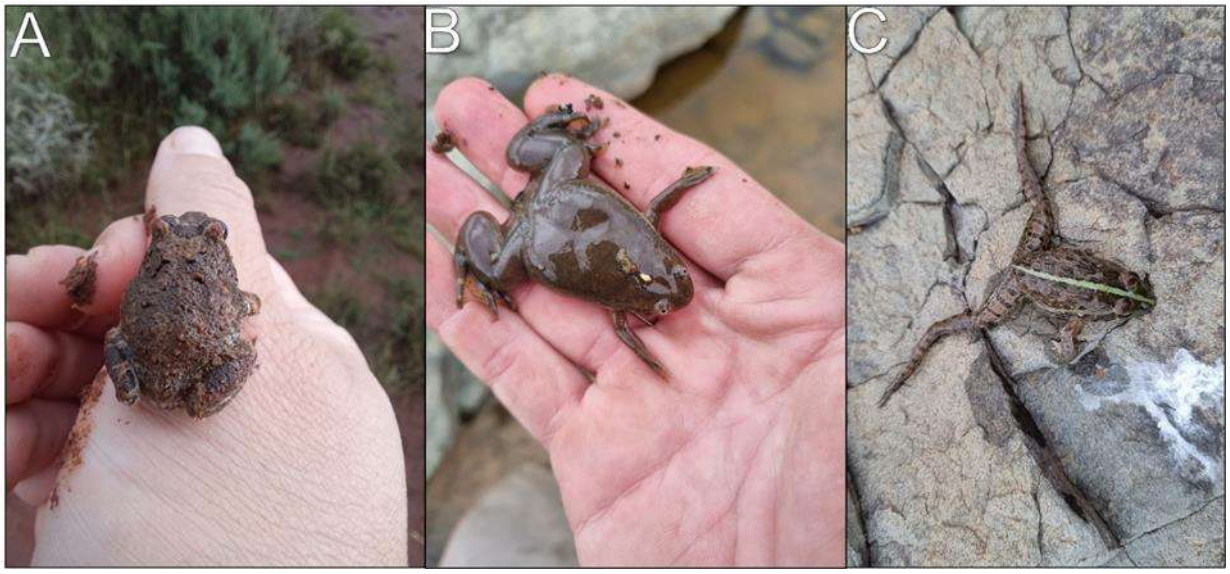


Figure 3-21 Three of the amphibian species recorded from the site. A: Tomopterna tandyi (Tandy's Sand Frog). B: Xenopus laevis (Common Platanna). C: Amietia poyntonii (Poynton's River Frog).

3.2.3.2 Reptiles

Eleven (11) reptile species, representing nine (9) families were recorded within the assessment area during the survey periods (Table 3-16). The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (a true representative sample requires an extensive sampling period over several surveys). The presence of suitable habitat suggests that the area supports a diverse reptile community.

Table 3-16 Summary of reptile species recorded within the assessment area during the survey period. LC = Least Concern NE = Not Evaluated.

Family	Scientific name	Common name	RedList
Agamidae	*Agama aculeata aculeata*	Ground agama	LC
Agamidae	*Agama atra*	Southern Rock Agama	LC
Chamaeleonidae	*Bradypodion ventrale*	Eastern Cape Dwarf Chameleon	LC
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	LC
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	NE
Scincidae	*Trachylepis variegata*	Variegated Skink	LC
Testudinidae	*Chersina agulata*	Angulate tortoise	LC
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	LC
Viperidae	*Bitis aietans*	Puff adder	LC

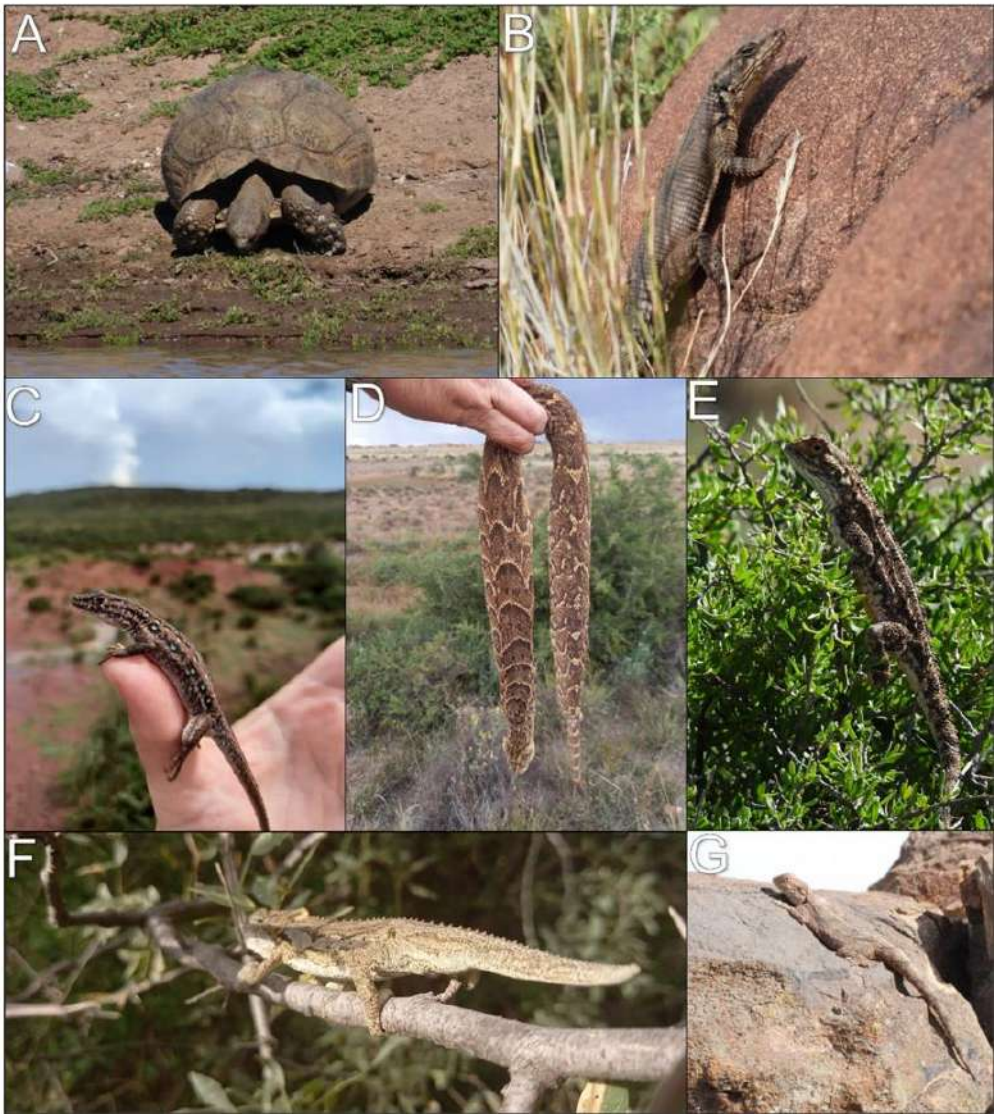


Figure 3-22 A portion of the reptile species recorded from the site. A: Stigmochelys pardalis (Leopard tortoise). B: Karusasaurus polyzonus (Karoo Girdled Lizard). C: Pedioplanis lineoocellata pulchella (Common sand lizard). D: Bitis arietans (Puff

adder). E: Agama aculeata aculeata (Ground agama). F: Bradypodion ventrale (Eastern Cape Dwarf Chameleon). G: Agama atra (Southern Rock Agama).

3.2.3.3 Mammals

A total of nineteen (19) mammal species were recorded within the assessment area during the survey periods (Table 3-17). It is considered highly likely that additional small mammal species would be recorded from the site with extensive sampling. In the area proposed for the access road several rocky outcrops were observed, which provided dens for Cape Rock Hyrax (*Procavia capensis*). The PAOI and surrounding landscape also supports a species rich assemblage of mesocarnivores. Mesocarnivores have strong effects on their prey species, and this especially so in simple ecological communities or in regions where apex predators are lacking (Roemer *et al*, 2009). Consequently, shifts in the population or diversity of the mesocarnivore community may lead to trophic cascade effects. This may result in the population explosion of lower trophic organisms, including groups that reach pest proportions such as rodents. It is thus important to ensure that the impact on these species are limited.

Table 3-17 Mammal species recorded within the assessment area during the survey periods. LC = Least Concern

Family	Scientific name	Common name	Conservation Status
Bovidae	*Antidorcas marsupialis*	Springbok	LC
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC
Bovidae	*Tragelaphus strepsiceros*	Kudu	LC
Canidae	*Canis mesomelas*	Black-backed Jackal	LC
Canidae	*Otocyon megalotis*	Bat-eared Fox	LC
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC
Felidae	*Caracal caracal*	Caracal	LC
Herpestidaae	*Suricata suricata*	Meerkat	LC
Hyaenidae	*Proteles cristatus*	Aardwolf	LC
Hystricidae	*Hystrix africaeaustralis*	Porcupine	LC
Leporidae	*Lepus saxatilis*	Scrub Hare	LC
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	LC
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	LC
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC
Mustelidae	*Mellivora capensis*	Honey Badger	LC
Pedetidae	*Pedetes capensis*	Springhare	LC
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	LC
Sciuridae	*Xerus inauris*	South African Ground Squirrel	LC

Figure 3-23 ***A portion of the mammal species recorded from the site. A: Xerus inauris (Ground squirrel). B: Procavia capensis (Cape Rock Hyrax). C: Ictonyx striatus (Striped Pole Cat). D: Pedetes capensis (Springhare). E Hystrix africaeaustralis (Porcupine). F and G: Cynictis penicillata (Yellow Mongoose).***

3.2.3.4 Avifauna

Ninety-nine (99) bird species were recorded in the first survey. The full list of species recorded, their threat status, guild and location observed is shown in Appendix F. A list of the species incidentally recorded moving between point count locations are provided in Appendix G. Eight of the species recorded were SCCs on a national or international scale (Table 3-18). The Karoo Korhaan were observed in most counts, followed by the Blue Crane. The location of the SCCs that were recorded in and around the project area is shown in

Figure 3-24, while photographic evidence of the species are shown in Figure 3-25.

Table 3-18 Species of conservation concern observed during the survey (VU, Vulnerable; EN, Endangered; NT, Near Threatened; LC, Least Concerned)

Common Name	Scientific Name	Regional (SANBI, 2016)	IUCN (2021)	Total Number of birds	Total Sightings
Blue Crane	*Grus paradisea*	NT	VU	51	17
Karoo Korhaan	*Eupodotis vigorsii*	NT	LC	49	19
Kori Bustard	*Ardeotis kori*	NT	NT	2	2
Ludwig's Bustard	*Neotis ludwigii*	EN	EN	11	6
Martial Eagle	*Polemaetus bellicosus*	EN	EN	1	1
Secretarybird	*Sagittarius serpentarius*	VU	EN	2	1
Verreaux's Eagle	*Aquila verreauxii*	VU	LC	5	3
Lanner Falcon	*Falco biarmicus*	VU	LC	3	2

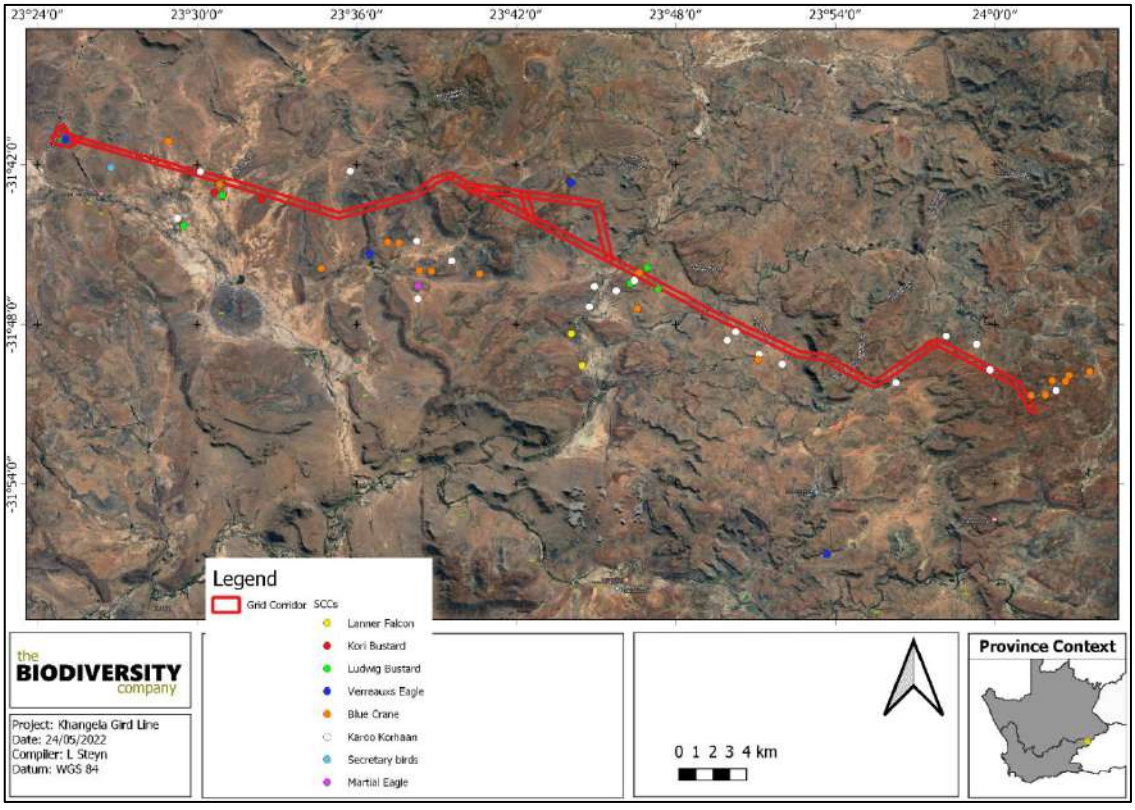


Figure 3-24 The location of the recordings of the species of conservation concern

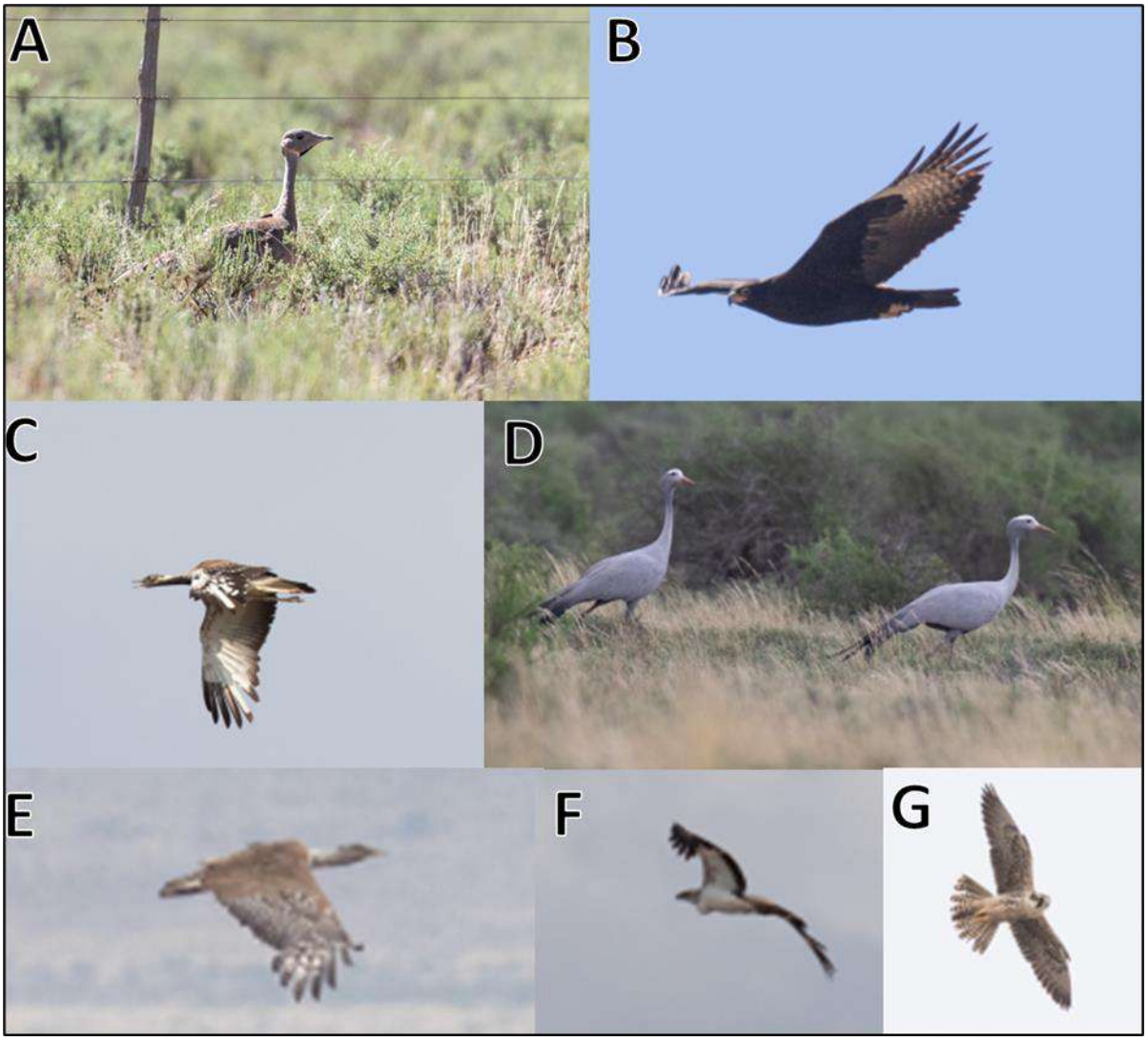


Figure 3-25 Photographs of the recorded species, A Karoo Korhaan, B) Verreauxs Eagle, C) Ludwigs Bustard, D) Blue Crane, E) Kori Bustard, F) Martial Eagle (Juvenile) and G) Lanner Falcon

Blue Crane

Grus paradiseus (Blue Crane) are endemic to Southern Africa occurring mainly in the southern and eastern Mpumalanga Highveld through the Free State, KwaZulu-Natal and the Eastern Cape. Blue cranes are omnivorous with their diet consisting of plant material such as small bulbs, seeds and roots, and animals such as insects (especially grasshoppers), small reptiles, frogs, fish, crustaceans and small mammals (SANBI, 2015). This species has declined, largely owing to direct poisoning, power-line collisions and loss of its grassland breeding habitat owing to afforestation, mining, agriculture and development (IUCN, 2017). This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short. Fifty one of these birds were recorded on 17 occasions.

Ludwig's Bustard

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 powerlines, irrespective of size, 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 powerlines, even if they are marked (Martin and Shaw 2010). Eleven birds were observed on six occasions.

Lanner Falcon

Falco biarmicus (Lanner Falcon) occurs in southern and south-eastern Europe, the Middle East, south-western Asia and much of sub-Saharan Africa, excluding the lowland forests of the DRC and West Africa. Its more common in open grasslands, cleared or open woodlands and agricultural land. The pair is monogamous and roost on cliffs, but may also utilise buildings, pylons and trees for nesting. Nesting season is from late May to early September. Agrochemicals is said to their main threat in South Africa, it is assumed it will be from direct exposure as well as through bio-accumulation from their prey species. Three individuals of this species were recorded on two occasions.

Karoo Korhaan

Eupodotis vigorsii (Karoo Korhaan) is found in dwarf arid shrubland of the Nama Karoo and Succulent Karoo. They are resident and sedentary species which means their movement is restricted to their home range and they do not migrate locally. Thie diets consist mainly of invertebrates, reptiles and plant matter, on which they feed while walking along. The pairs are monogamous and often breed in family groups. Helpers can assist in defending the territory or feeding of the young. They nest on the ground with the main egg-laying season being between June and February. Main threats include habitat degradation due to agricultural practices and ecosystem stresses due to climate change (IUCN, 2022). This species were recorded during 19 point counts and 49 birds in total were recorded.

Kori Bustard

Ardeotis kori (Kori Bustard) is found in Botswana, Zimbabwe, Namibia, southern Angola, South Africa and Mozambique. They inhabit wide open grasslands and lightly wooded savannah. This species is non migratory and will only move out of an area due to scarcity of food. Kori Bustards are omnivores and will eat berries, reptiles and insects. They breed occurs once a year and will last 23-30 days during September - February, the female often just lays the eggs on the ground instead of in a nest. During the assessment two Kori Bustards were recorded during two occasions.

Verreaux's Eagle

Aquila verreauxii (Verreaux's Eagle) lives in hilly and mountainous regions of southern and eastern Africa (extending marginally into Chad), and very locally in West Africa, the Arabian Peninsula and the southern Middle East. They have specific habitat requirements and is rare outside of its particular habitat type. It lives in ridges, which are dry, rocky environments in anything from rocky hills to high mountains amongst cliffs, gorges and inselbergs often surrounded by savanna, thornbush and sub-desert. Two species comprise considerably more than half of (often more than 90% of) the Verreaux's eagle's diet: the Cape hyrax (*Procavia*

capensis) and the yellow-spotted rock hyrax (*Heterohyrax brucei*). A rough estimated average of home range size in Verreaux's eagle is 10.9 km^2, in which the nests are built. Egg laying may occur from April to November. During the assessment one nest was confirmed , while two more were mentioned by two farmers. The nest that was found near the existing Gamma substation in an existing powerline. Five birds were recorded on three occasions.

Secretary bird

Sagittarius serpentarius (Secretary Bird) is endemic to Africa and is usually found in open grasslands and savannah of sub-Saharan Africa. These birds are non-migratory but have been known to fly 32 km a day for food sources. Secretary birds are considered to be opportunistic predators with a wide prey base. Most of their diet is made up of arthropods such as grasshoppers, beetles, wasps, spiders and scorpions. They also feed on small mammals including mice, rats, hedgehogs, hares, mongoose and squirrels. Their diet also include reptiles, small birds, amphibians, eggs and freshwater crabs. They are monogamous and are thought to pair for life. Breeding takes place throughout the year, however, there are peaks in breeding behaviour from August to March. The nest, which is constructed by both sexes, is usually on a big flat-topped tree, such as *Senegalia* or *Vachellia* spp., or other medium-sized trees in grassland areas. Two birds were recorded on one occasion during the assessment.

Martial Eagle

Polemaetus bellicosus (Martial Eagle) is a large eagle native to sub-Saharan Africa. The martial eagle is to some degree adaptable to varied habitats but shows an overall preference for open woods and woodland edges, wooded savannah and thornbush habitats. Martial Eagles can breed during various months of different parts of their range, breeding can thus begin in the wet season, early dry season or late dry season. Nests are built in large trees with a clear flight path to it. One juvenile was recorded in the project area.

3.2.3.4.1 Dominant species

Table 3-19 provide lists of the dominant species for the first survey together with the frequency with which each species appeared in the point count samples. The data shows the Wattled Starling, Lark-like Bunting, Red-billed Quelea and Pied Crow were the most abundant species during the survey. Figure 3-26 shows some of the birds that were recorded during the survey.

Table 3-19 Dominant avifaunal species within the project site during the first survey as defined as those species whose relative abundances cumulatively account for more than 76.7% of the overall abundance shown alongside the frequency with which a species was detected among point counts.

Common Name	Scientific Name	Relative Abundance	Frequency (%)
Wattled Starling	*Creatophora cinerea*	0,197	12,5
Lark-like Bunting	*Emberiza impetuani*	0,091	22,5
Red-billed Quelea	*Quelea quelea*	0,058	10
Pied Crow	*Corvus albus*	0,050	47,5
Black-headed Canary	*Serinus alario*	0,048	7,5
Bokmakierie	*Telophorus zeylonus*	0,045	37,5
Ant-eating Chat	*Myrmecocichla formicivora*	0,035	25
Karoo Korhaan	*Eupodotis vigorsii*	0,035	22,5

Rufous-eared Warbler	*Malcorus pectoralis*	0,033	37,5
Barn Swallow	*Hirundo rustica*	0,025	2,5
Spike-heeled Lark	*Chersomanes albofasciata*	0,025	12,5
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*	0,023	15
Cape Sparrow	*Passer melanurus*	0,020	12,5
Karoo Scrub Robin	*Cercotrichas coryphoeus*	0,018	15
Karoo Long-billed Lark	*Certhilauda subcoronata*	0,018	25
Greater Striped Swallow	*Cecropis cucullata*	0,017	7,5
Helmeted Guineafowl	*Numida meleagris*	0,017	5
Blue Crane	*Grus paradisea*	0,015	12,5

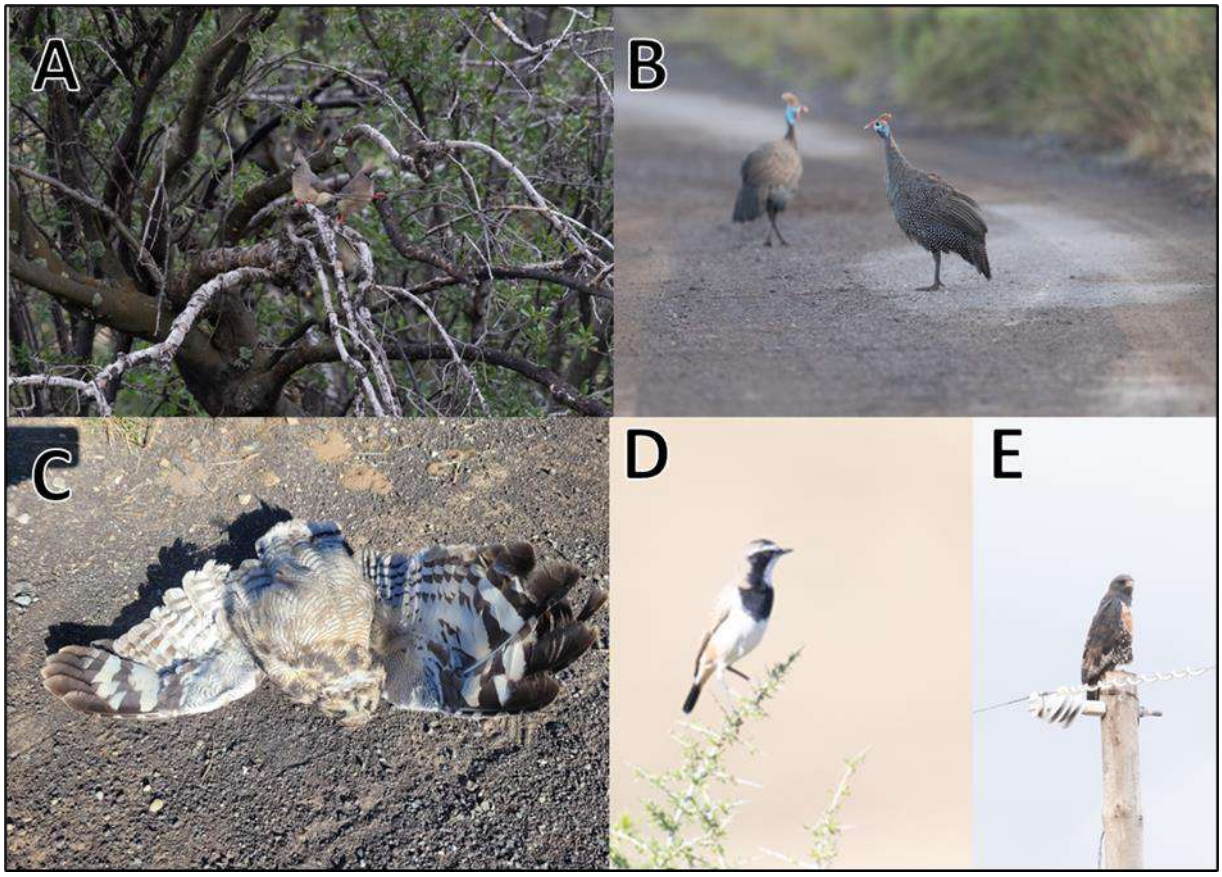


Figure 3-26 Some of the birds recorded in the project site: A) White-backed Mousebird, B) Helmeted Guineafowl, C) Spotted-Eagle Owl, D) Mountain Wheatear, E) Jackal Buzzard

3.2.3.4.2 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD) (41%) (Figure 3-27). Omnivores that do not have a set habitat (OMD) made up the second highest group (26%), followed by granivore species

(GGD) (13%). The feeding groups illustrate the area has a healthy balance of species, which included a number of carnivore species as well as fructivores

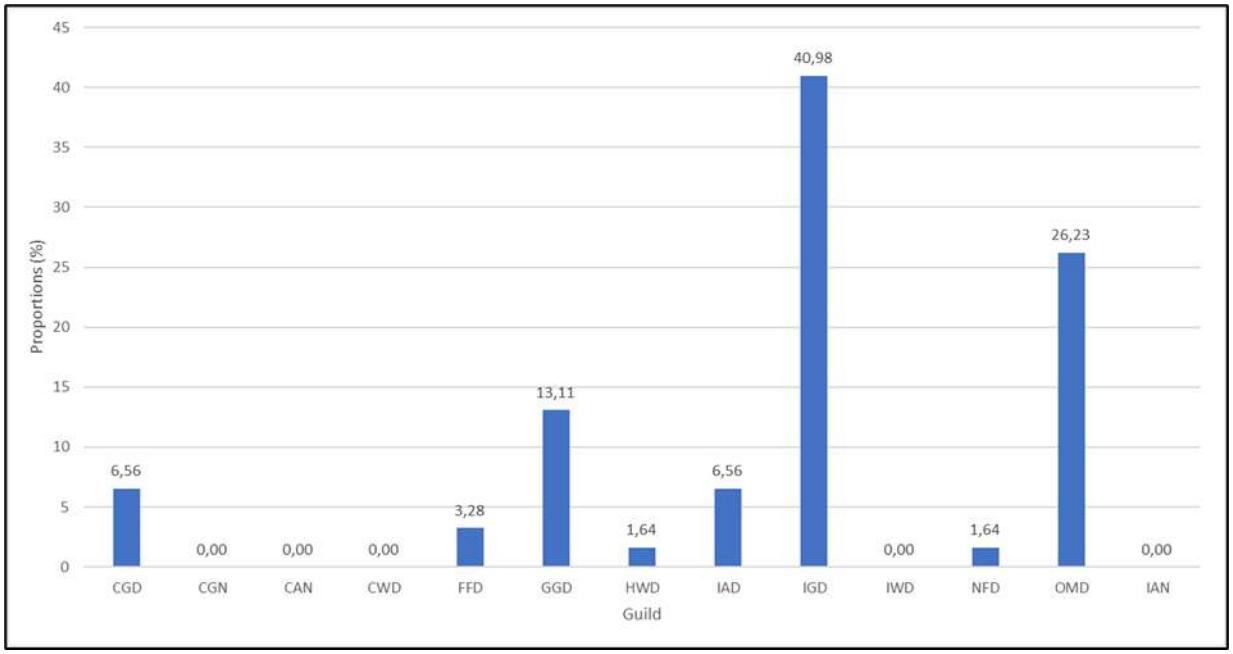


Figure 3-27 ***Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GCD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal.***

3.2.3.4.3 Risk Species

A number of species were found that would be regarded as high risk species (Table 3-20 and Figure 3-28). Risk species are species that would be sensitive to habitat loss, that are regarded as collision prone species and species that would have a high electrocution risk. The powerline poses a collision and electrocution risk to the identified risk species.

Table 3-20 ***At risk species found in the survey.***

Common Name	Scientific Name	Collisions	Electrocution	Habitat Loss	Priority score (Ralston et al., 2017)*
African Harrier-Hawk	*Polyboroides typus*	X	X		95
Amur Falcon	*Falco amurensis*			X	105
Black Sparrowhawk	*Accipiter melanoleucus*	X	X		85
Black-headed Heron	*Ardea melanocephala*	X	X		
Blue Crane	*Grus paradisea*	x	X	X	115
Egyptian Goose	*Alopochen aegyptiaca*	X	X		
Greater Kestrel	*Falco rupicoloides*			X	87
Hadeda (Hadada) Ibis	*Bostrychia hagedash*	X	X		
Hamerkop	*Scopus umbretta*	X			
Helmeted Guineafowl	*Numida meleagris*		X		

Jackal Buzzard	*Buteo rufofuscus*	X	X		125
Karoo Korhaan	*Eupodotis vigorsii*	X	X	X	95
Kori Bustard	*Ardeotis kori*	X	X	X	105
Ludwig's Bustard	*Neotis ludwigii*	X	X	X	115
Martial Eagle	*Polemaetus bellicosus*	X	X	X	130
Northern Black Korhaan	*Afrotis afraoides*	X	X		90
Pied Crow	*Corvus albus*		X		
Rock Kestrel	*Falco rupicolus*			X	
Secretarybird	*Sagittarius serpentarius*		X	X	125
South African Shelduck	*Tadorna cana*	X	X		
Spotted Eagle-Owl	*Bubo africanus*		X		85
Spur-winged Goose	*Plectropterus gambensis*	X	X		
Verreaux's Eagle	*Aquila verreauxii*	X	X	X	145
White-necked Raven	*Corvus albicollis*		X		

**** The priority scores are based on the vulnerability of species to windfarm development.***

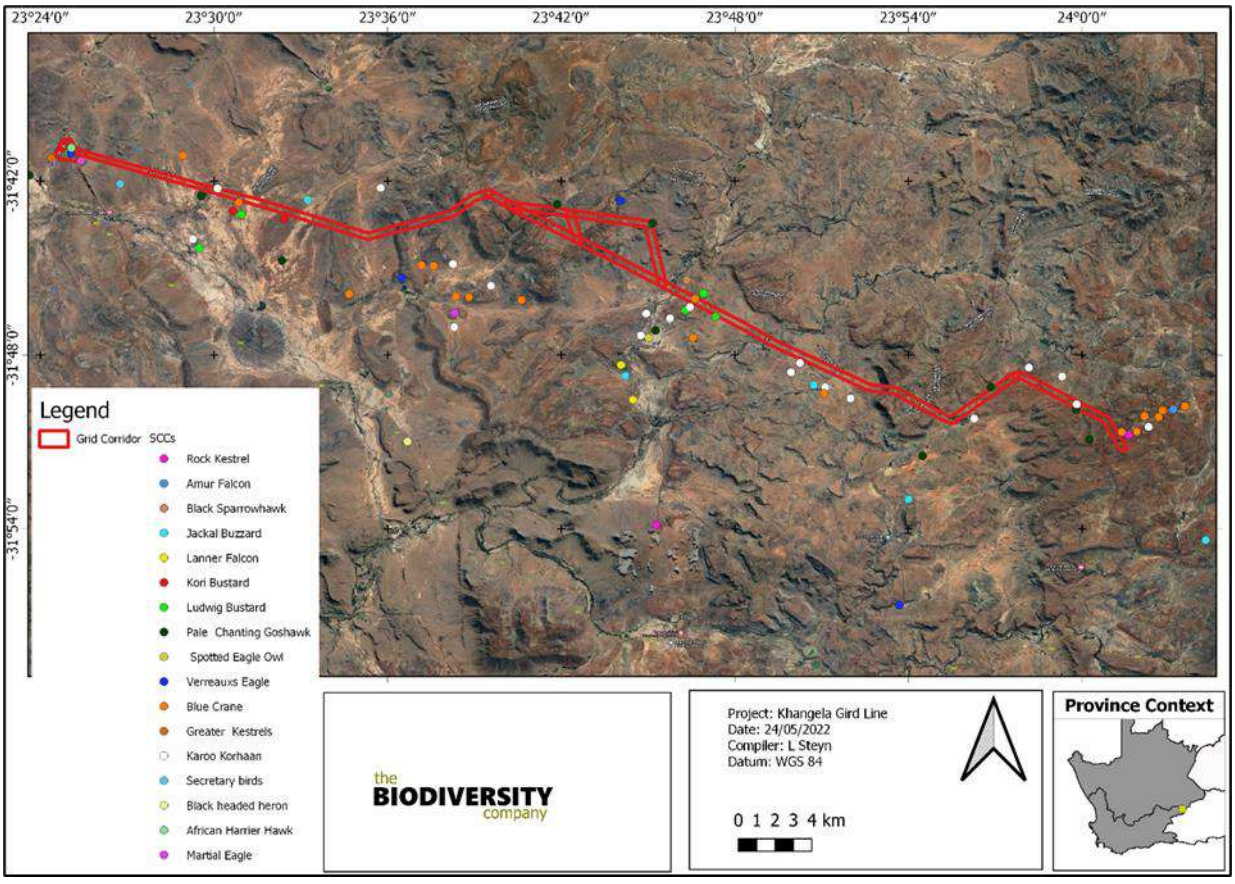


Figure 3-28 Locations of some of the risk species recorded

3.2.3.4.4 Nest and Flight Analysis

Observing and monitoring flight paths and nesting sites are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. There are eight (8) SCC, and twenty-five species that are regarded as priority species for powerline infrastructure. During the field survey recording flight-paths and nesting sites were undertaken for certain species. However, given the limited time available the results of this section must be interpreted with caution, as each species movement is likely to be more extensive and there may have been nesting sites that were not observed. Various flight paths are shown in Figure 3-29. One Verreauxs Eagle (Black Eagle) nest were confirmed during the assessment while two more could possibly be found nearby based on information from local farmers. These areas could not be accessed to confirm the presence. A buffer was not placed around the nest as it was found in an existing powerline, and it is thus assumed that the eagles are habituated to powerline infrastructure to some extent. Mitigation measures to be applied for the development of the 132kV powerline within ~500m of the nest have been proposed in Section 4.9.

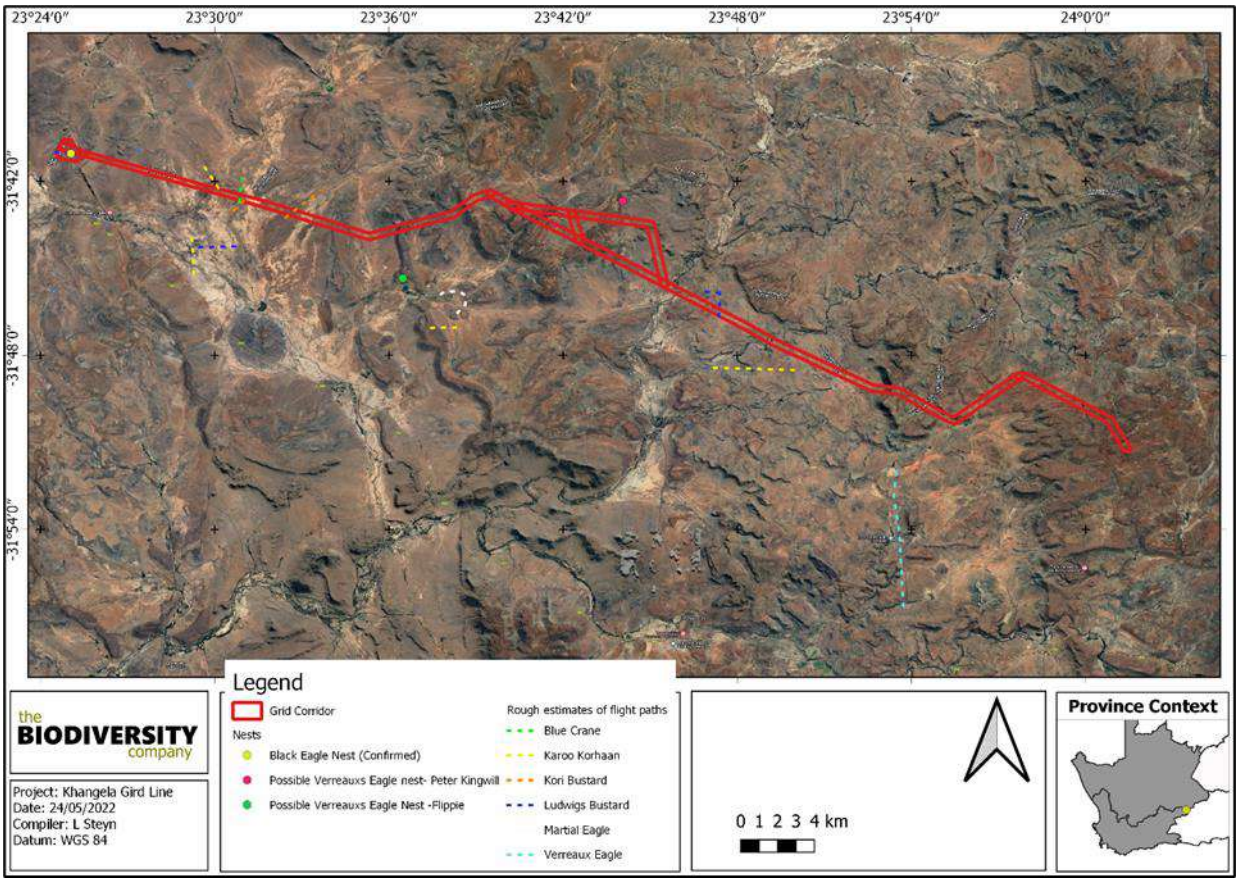


Figure 3-29 Flight paths and nest locations

3.3 Habitat descriptions

Visual representation of the habitats area shown in Figure 3-30, while photographs representing the various habitats are shown in Figure 3-31. Four habitats were identified in the assessment, transformed, Karoo Scrub, Rocky Outcrops and Wash (wetland) areas (Dam and rivers).

3.3.1 Avifauna habitats

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities. Four habitats were identified in the assessment, transformed, Karoo Scrub, Rocky Outcrops and

Wash (wetland) areas (Dam and rivers). These habitats were based on the species compositions in the various areas. The terrestrial habitats describe provides the overall vegetation composition of the habitats and is also relevant to the avifauna. The following is to highlight what species were common in the various habitats.

Transformed habitat are more important for the avifauna community in this instance as a Verreaux's Eagle nest was found close to this area. In the Rocky outcrop habitat Rock Kestrels, Greater striped Swallows, Mountain Wheatears, Grey-backed Cisticola and Bokmakieries were found. Karoo scrub were home to species such as Rufous-eared Warblers, Kori Bustard, Northern Black Korhaan and Large-billed Lark. The water resource areas support all the species in terms of water but species exclusively found here were South African Shelduck and Egyptian Goose.

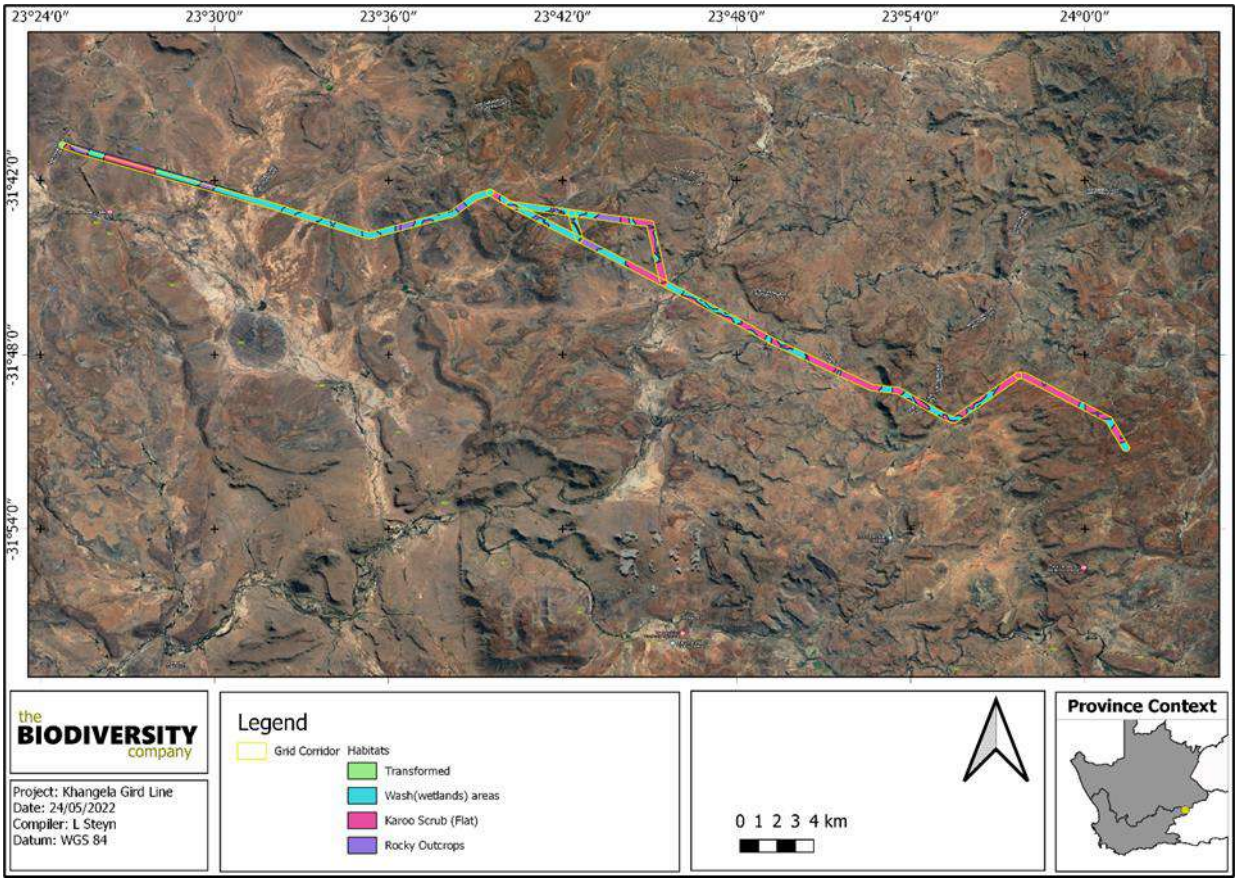


Figure 3-30 The habitats found in the project area

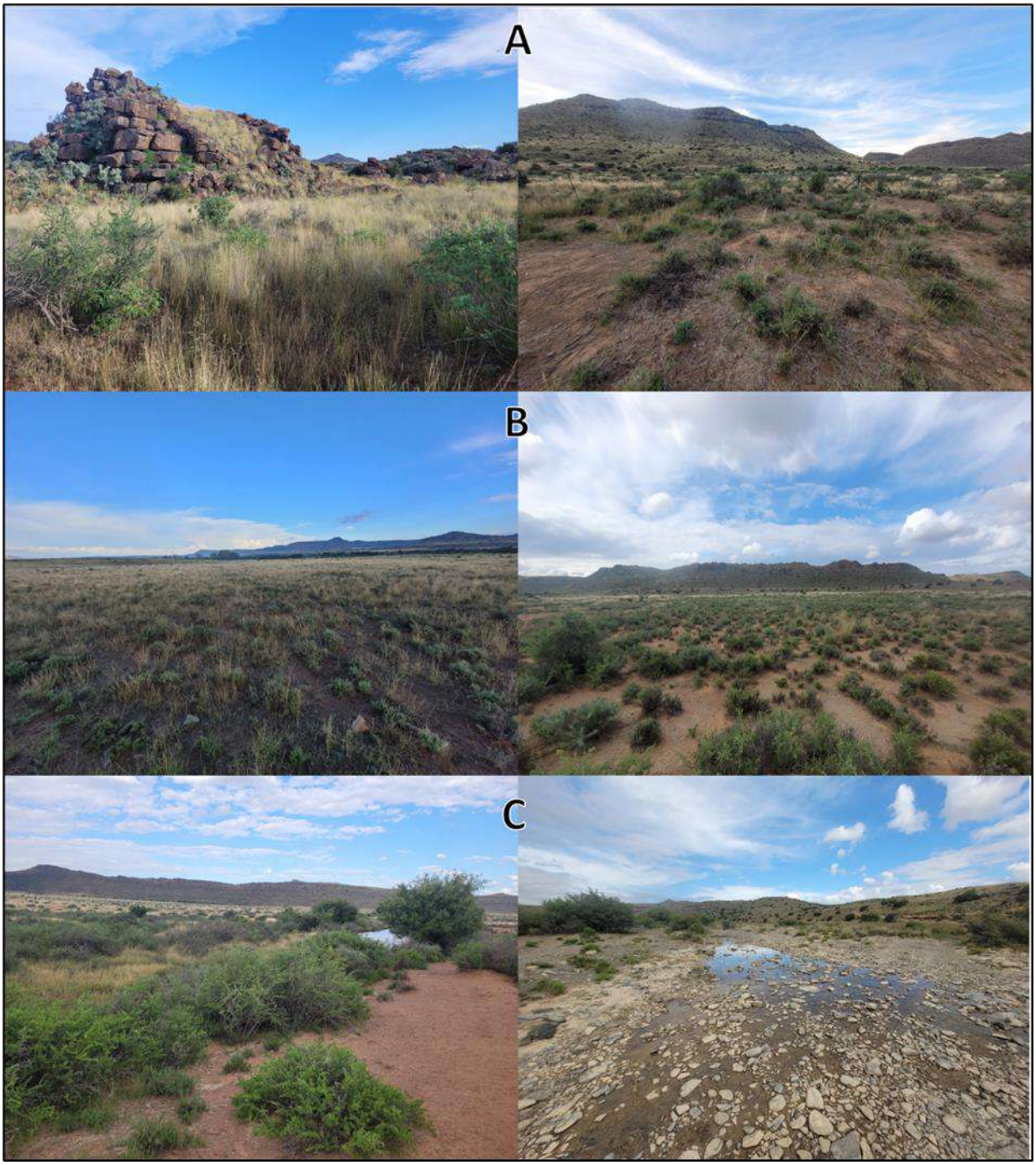


Figure 3-31 Photographs illustrating the habitats identified during the assessments: A) Rocky Outcrops, B) Karoo Scrub, and C) Wetlands and Water Resources

3.4 Site Ecological Importance (SEI)

3.4.1 Terrestrial SEI

The combined Terrestrial Biodiversity Theme Sensitivity for the assessment area was derived to be Very High as indicated in the National Environmental Screening Tool (Figure 3-32), it can be downloaded at (https://screening.environment.gov.za/screeningtool/#/pages/welcome).

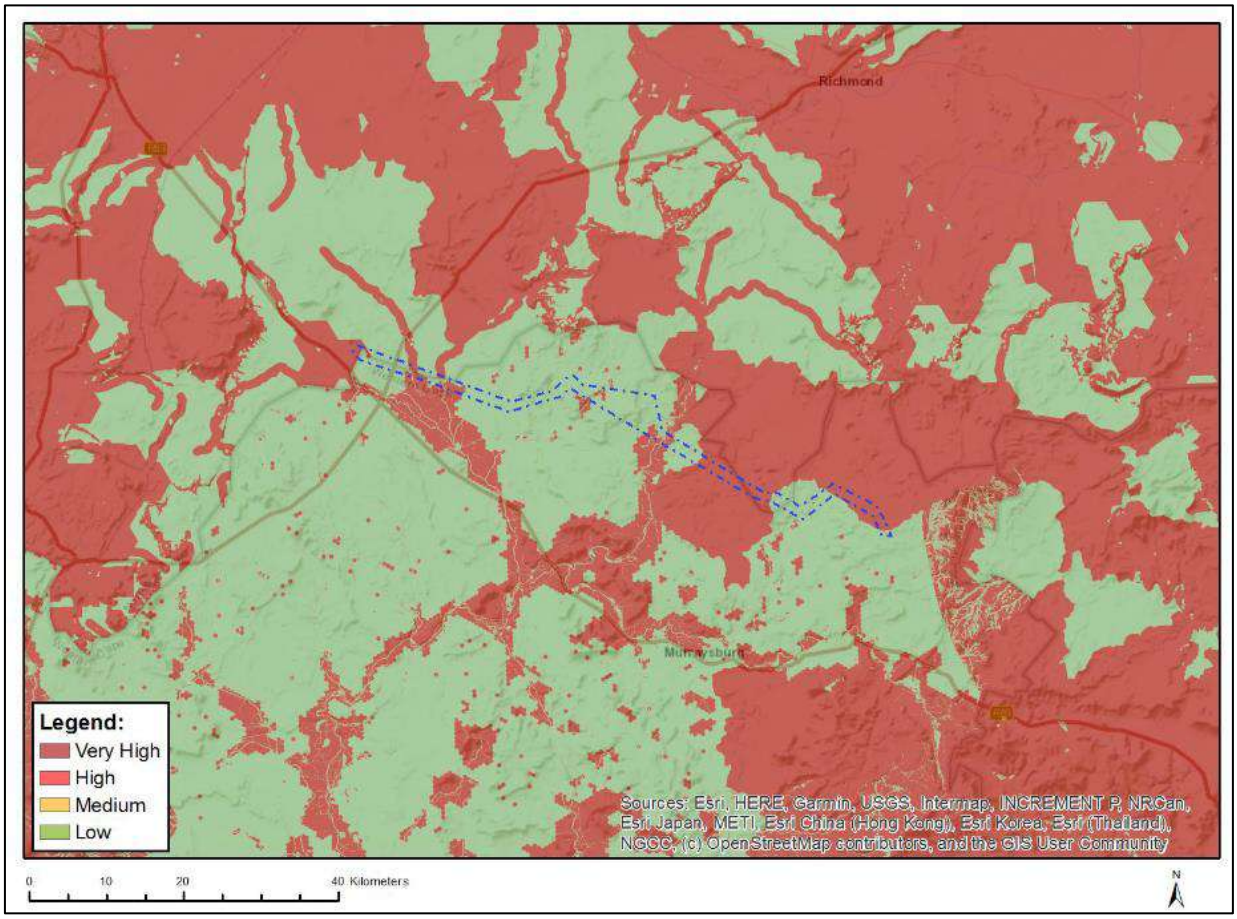


Figure 3-32 Combined Terrestrial Biodiversity Sensitivity of the assessment area

Four (4) different habitat types were delineated within the assessment area (Table 3-21). 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 or SEI. The sensitivities of the habitat types delineated are illustrated in Figure 3-33. The interpretations of the categories can be found in Table 2-7.

Habitats categorised as Transformed consisted of buildings, roads, and cleared areas and were determined to be a 'Very Low' SEI.

Table 3-21 Summary of habitat types delineated within the field assessment area of the proposed development

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**
Karoo scrub (flat)	Medium	High	**Medium**	Medium	**Medium**
Rocky outcrops	High	High	**High**	Low	**Very high**
Wash (wetland) areas	Medium	High	**High**	Medium	**High**

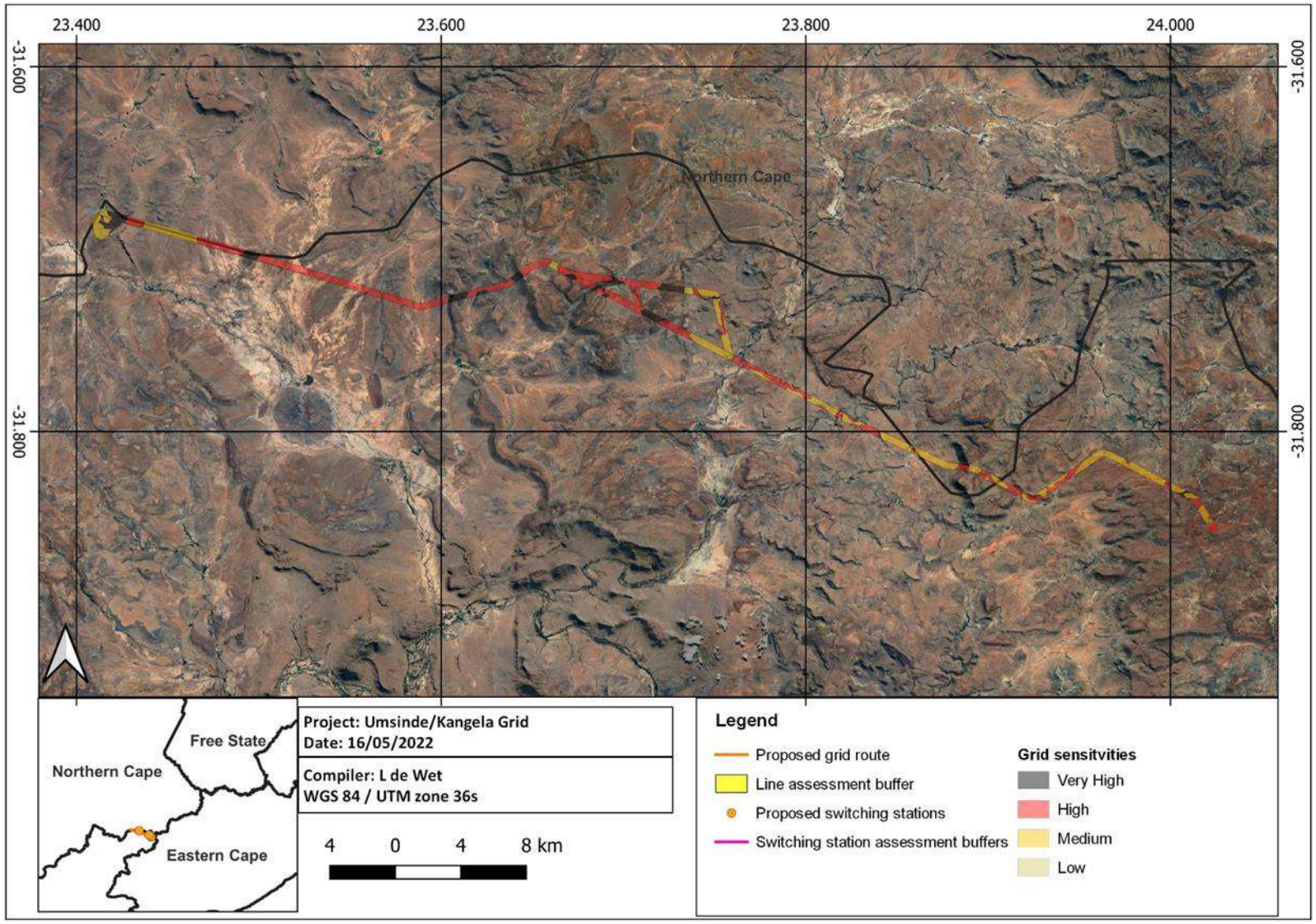


Figure 3-33 Map illustrating Site Ecological Importance (SEI) of the terrestrial habitat types within the assessment area

3.4.1.1 Access Road Habitat SEI

Based on the criteria provided in Section 2.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 3-22). The sensitivities of the delineated habitat types are illustrated in Figure 3-34.

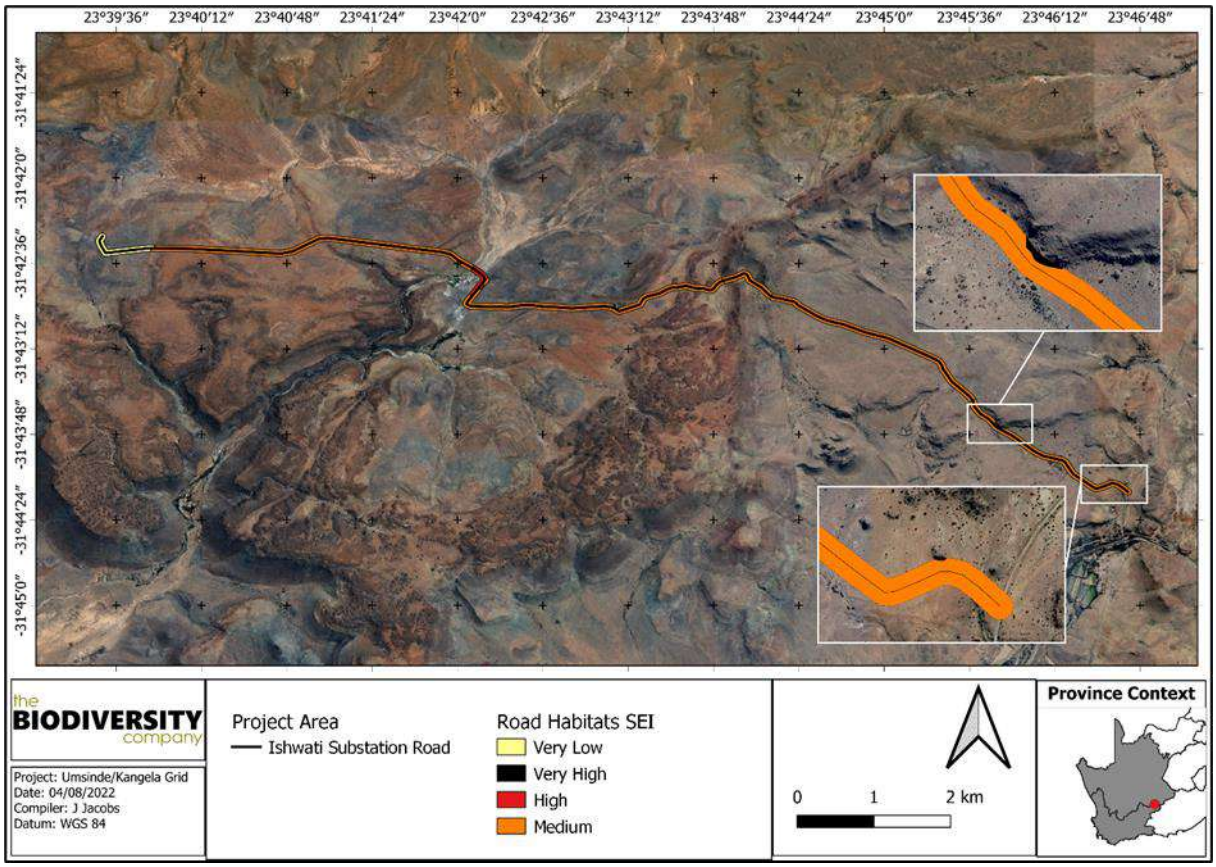


Figure 3-34 Sensitivities of the access road assessment

Interpretation of the SEI in the context of the proposed project is provided in Table 3-22.

Table 3-22 SEI of each habitat identified along the access road

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Degraded	Low	Medium	**Low**	High	**Very low**
Rocky Outcrop	High	High	**High**	Low	**Very high**
Riparian Zone	Medium	High	**Medium**	Very Low	**High**
Karoo Scrub	Medium	High	**Medium**	Medium	**Medium**

3.4.1.2 Ecosystem Processes

The area provides an array of ecosystem services due to its inherent processes from its biotic components as well as its high level of functional integrity. The ecosystem processes and concomitant services observed during the field survey are described below.

The Formicidae species *Messor capensis* influences soil characteristics and plant growth via its tunnelling activity. The major physical change to the soils is the drier mound than inter-mound spaces, as although they permit greater water infiltration, they dry out faster due to less compaction and higher organic content. The chemical properties between mounds and inter-mound spaces also differ significantly, with mounds containing approximately 50% more phosphorous, potassium and nitrogen. This spatial discrepancy in soil physico-chemical properties therefore influences vegetation heterogeneity.

Aardwolf (*Proteles cristatus*) and Bat-eared Fox (*Otocyon megalotis*) both utilise burrows, the activity in the burrows lead to distribution of soil nutrients, they also assist with seed dispersal with seeds becoming entrapped in their fur and then moved to the den areas.

3.4.2 Avifauna SEI

Based on the criteria provided in Section 2.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 3-23). The sensitivities of the habitat types delineated are illustrated in Figure 3-35. The reason for the very high rating in the transformed area is based on the presence of the Verreaux's Eagle Nest.

Table 3-23 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	High	Low	**Medium**	Low	**Very High**
Karoo scrub (flat)	Medium	High	**Medium**	Medium	**Medium**
Rocky outcrops	High	High	**High**	Low	**Very high**
Wash (wetland) areas	High	High	**High**	Medium	**High**

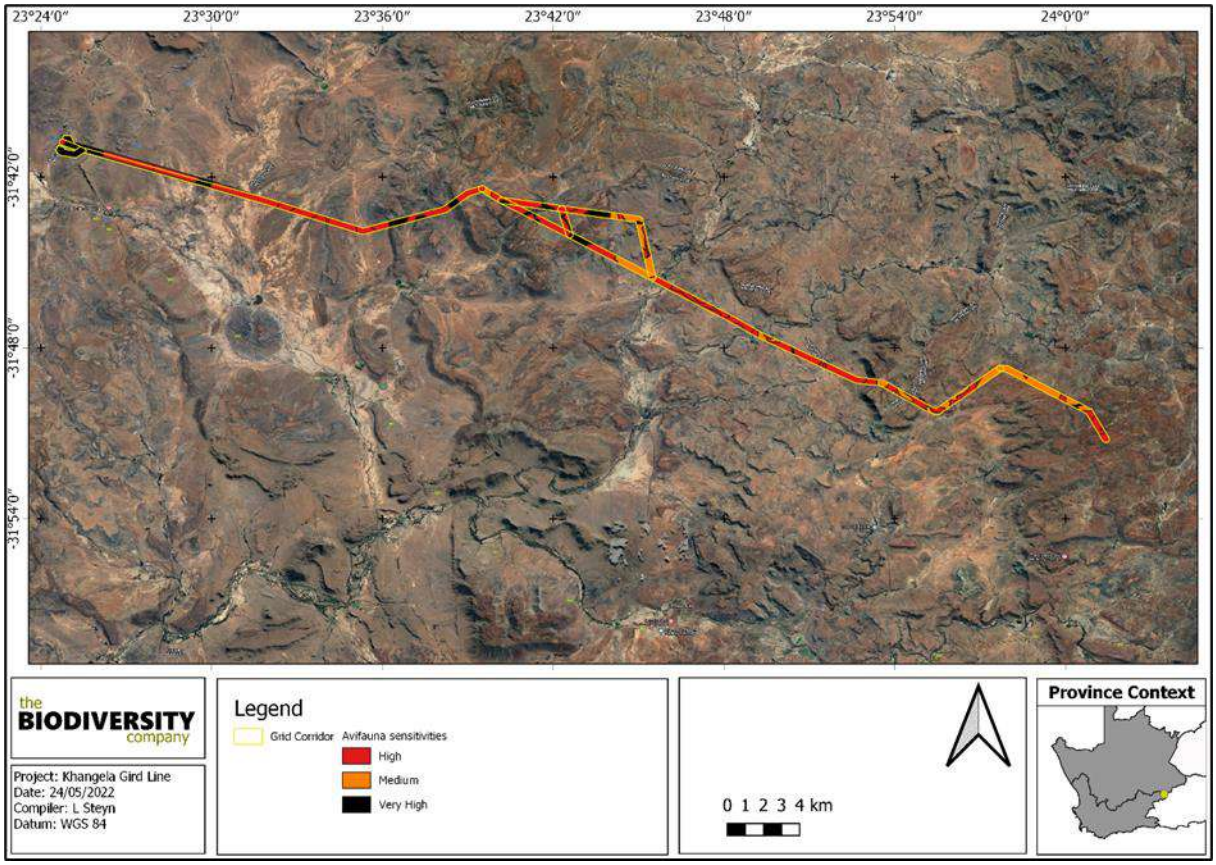


Figure 3-35 Sensitivities of the avifauna assessment

Interpretation of the SEI in the context of the proposed project is provided in Table 3-24.

Table 3-24 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities as per the species protocol guidelines

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.

4 Impact Risk Assessment

The proposed project includes the following:

- The establishment of a 132kV collector substation (switching station) within the authorised Umsinde Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of

approximately 100 m X 80 m (~0.8ha) to be located within an assessment footprint that encompasses a 300m radius.

- The establishment of a 132kV collector substation (switching station) within the authorised Khangela Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100 m X 80 m (~0.8ha) to be located within an assessment footprint that encompasses a 300 m radius.
- The establishment of a 132kV collector substation (switching station) within the authorised Ishwati Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 120 m X 100 m (~1.2 ha) with an assessment footprint that encompasses a 300m radius.
- The establishment of a 132kV powerline within a 400 m corridor that will extend from the Khangela switching station to the Ishwati switching station (~36 km), and then onward for ~25 km to the Eskom Gamma Substation. In addition, a further length of 132kV powerline (within a 400 m wide corridor) will extend from the Umsinde switching station to the Khangela switching station for ~8 km OR it may connect directly into the Khangela-Ishwati powerline at the Khangela switching station. An extended powerline development corridor of approximately 1,91 km^2 wide has been assessed in the vicinity of the Gamma Substation, that will enable the 132kV powerline to connect to either the south face of the Gamma Substation yard or approach from the east. The 132kV Powerline from Umsinde to Khangela, and from Khangela to Ishwati and onward to Gamma Substation will be a single- or double-circuit powerline, with a single set of pylons structures with a maximum height of 35 m Access/service tracks (jeep track) up to 7 m wide and associated watercourse crossings will be associated with the powerline, and will be located within the assessed powerline corridor.
- The establishment of a new access road approximately 14km long from the existing public road from Richmond to the Ishwati switching station site. The proposed new access road will be unsealed and up to 12m wide during construction, but will be reduced to a maximum of 6 m width during operation.

- Preferred Alternative = Red (From Umsinde on-site switching station to Khangela on-site switching station to the Ishwati onsite switching station to the Gamma Substation)
- Alternative 1 = Red +Light Blue + Red (From Umsinde on-site switching station to Khangela on-site substation to the Ishwati onsite substation to the Gamma Substation)
- Alternative 2 = Red +Light blue + Green + Red (From Umsinde on-site switching station to Khangela on-site substation to the Ishwati onsite substation to the Gamma Substation)

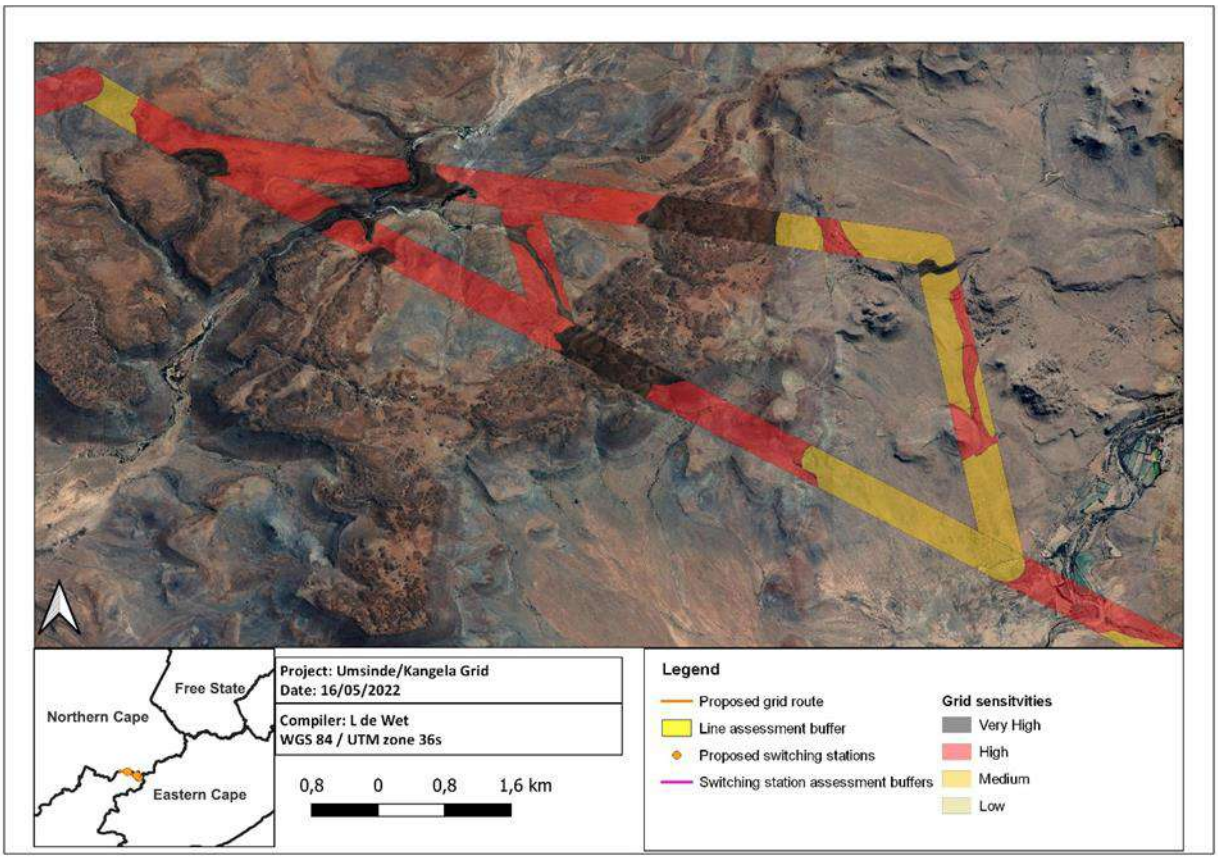


Figure 4-1 Map illustrating terrestrial Site Ecological Importance (SEI) of the alternatives proposed for the 132kV line.

4.1 Biodiversity and Avifauna Risk Assessment

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

The principle impacts of the operational phase are electrocution and collisions due to the powerlines. 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 powerlines. 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.

Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the project area. The relevant impacts associated with the proposed construction and operation of the development were then subjected to a prescribed impact assessment method. Impacts were assessed in terms of the construction and operational phases. The operational phase refers to that phase of the project where the construction has been completed. The development is set to be long lasting, and a closure phase was not assessed for that reason. Mitigation measures were only applied to impacts deemed relevant based on the impact analysis.

Impacts were assessed for the following activities:

1) Construction Phase
    a. Switching stations
    b. Powerline
        i. Preferred alternative
        ii. Alternative 1
        iii. Alternative 2
2) Operational Phase
    a. Switching stations
    b. Powerline
        i. Preferred alternative
        ii. Alternative 1
        iii. Alternative 2

4.2 Present Impacts to Biodiversity and Avifauna

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

- Erosion and loss of habitat as a result of runoff;
- Overgrazing;
- Existing powerlines and substation;
- Fences; and
- Loss of indigenous flora and associated edge effects from existing farming infrastructure.

4.3 Alternatives considered

- Alternative routing of the 132 kV line has been assessed including three possible routes,
- No alternatives were provided for the switching stations, as these must be located adjacent to the authorised Emoyeni wind farm substations.

4.4 Irreplaceable Loss

Without mitigation, the current proposed layout of the activity may result in the irreplaceable loss of;

- A part of a Critical Biodiversity Area (CBA);
- Avifauna SCCs; and
- Protected plant species.

4.5 Identification of Additional Potential Impacts

Within southern Africa, a proportion of biomes, and the associated vegetation types, are dependent on the dynamics of fire to maintain ecosystem functioning and wellbeing. In contrast, fire in the western arid region of the Nama Karoo is extremely rare. Occasional fires may occur after successive years of good rainfall in combination with light grazing, resulting in an increased fuel load. Fire is potentially more common in the east along the southwestern edge of the Grassland Biome including the interface with this biome on the eastern mountains. An appropriate fire management plan must therefore be developed and implemented.

Information on the influence of habitat fragmentation on the pollinator community within the Nama Karoo Biome is lacking. However, it is known that fragmentation of other shrub- or graminoid-dominated vegetation communities leads to a loss in pollinator diversity and change in behaviour (Donaldson *et al*, 2002; Rusterholz & Baur, 2010; Zschokke *et al*, 2000). This leads to negative alterations in the reproductive success in terms of fruit set of particular plant species, or a group of plant species, thereby causing a negative shift in the flora species composition and diversity. Therefore, it is postulated that if the proposed development drives habitat fragmentation, it will lead to a negative shift in the diversity of the pollinator community. In addition, the use of pesticides could lead to substantial declines in the diversity of the pollinator community, leading to a considerable negative shift in the levels of flora recruitment and overall ecosystem functioning.

A summary of the potential impacts during the construction and operational phases of the proposed activity are presented in Table 4-1. Impacts to water resources during the operational phase were undertaken as part of a separate water resources (aquatic biodiversity) assessment.

Table 4-1 Summary of potential impacts to biodiversity associated with the proposed activity prior to mitigation.

Main Impact	Project Activities	Potential Secondary Impacts
Loss of rocky outcrop (and dolerite outcrop) habitat	• Direct loss as a result of construction and operation of the proposed 132 kV line • Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas	• Habitat fragmentation. • Loss of ecosystem services. • Emigration of fauna species including SCC.
Loss of wash (wetland) and riparian areas	• Secondary impacts associated with noise, dust and influx of alien invasive plants into these areas	• Loss of ecosystem services
Degradation of surrounding highly sensitive habitats.	• Prevention of fires or incorrect fire regimes. • Removal of vegetation. • Improper solid waste disposal • Dust precipitation. • Spilling of hazardous chemicals from machinery. • Illegal hunting in sensitive areas.	• Loss of flora and fauna including SCC. • Increased potential for soil erosion. • Habitat fragmentation. • Increased potential for establishment of invasive alien vegetation.
Encroachment of invasive alien species in disturbed areas.	• Vegetation removal. • Soil disturbance	• Habitat loss for native flora & fauna (including SCC).

	• Vehicles potentially spreading seed. • Unsanitary conditions surrounding infrastructure promoting the establishment of pest rodents	• Alteration of fauna assemblages due to habitat modification. • Spreading of potentially dangerous diseases due to invasive and pest species • Increased potential for soil erosion
Direct mortality of fauna.	• Preparation of soil with heavy machinery • Intentional killing of fauna for food (hunting) or persecution (especially with regards to herpetofauna). • Pollution of water resources due to spilling of hazardous chemicals from heavy machinery during construction. • Collisions and Electrocutions of avifauna	• Loss of ecosystem services. • Loss of genetic diversity • Loss of migratory routes
Emigration of fauna	• Disturbance from construction activities. • Loss of habitat and degradation of surrounding habitats.	• Reduced population of SCC • Loss of ecosystem services.

4.6 Assessment of Impact Significance

The standard impact assessment methodology may be used in the capture of generic anticipated impacts and potential mitigation measures for Basic Assessment Reports and Environmental Impact Assessment (EIA) Reports. The methodology described herein complies with the requirements of the EIA Regulations (2014), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The purpose of the impact assessment is to:

- Assess impacts of proposed activities on biodiversity of the proposed development area;
- Assess whether proposed activities are likely to have significant impacts on biodiversity and specifically species of conservation concern; and
- Identify practically implementable mitigation measures to reduce the significance of proposed activities on biodiversity.

It is important to note that the ratings applied within the risk assessment model, considered impacts to open space or natural habitats within the development area and not for areas already transformed.

4.6.1 Construction Phase

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

- Destruction, further loss and fragmentation of habitats, ecosystems and vegetation communities,
- Introduction of alien species, especially plants;

- Destruction of protected plant species;
- Displacement of the faunal (including avifauna) communities due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching);
- Collection of eggs, nest destruction and poaching.

Table 4-2 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the development footprint (132 kV line and switching stations).

Nature: **Loss of vegetation within the development footprint**		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 4-3 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the development footprint (Preferred alternative).

Nature: **Loss of vegetation within the development footprint**		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:	
See Biodiversity Management Outcomes	
Residual Impacts:	
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.	

Table 4-4 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the development footprint (Alternative 1).

Nature: **Loss of vegetation within the development footprint**		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 4-5 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the development footprint (Alternative 2).

Nature: **Loss of vegetation within the development footprint**		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		

See Biodiversity Management Outcomes
Residual Impacts:
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.

Table 4-6 Impacts to biodiversity associated with the proposed construction phase: Loss of vegetation within the Ishwati road development footprint .

Nature: **Loss of vegetation within the development footprint**		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 4-7 Impacts to biodiversity associated with the proposed construction phase: Introduction of alien species, especially plants (Construction of all infrastructure, all options, including Ishwati road).

Nature: **Introduction of alien species, especially plants**		
Degradation and loss of surrounding natural vegetation arising from construction activities.		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		

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

Table 4-8 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of 132 kV line and switching stations)

Nature: **Destruction of protected plant species**		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-9 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Preferred alternative)

Nature: **Destruction of protected plant species**		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		

Residual Impacts:	
The loss of some of the protected species are unavoidable.	

Table 4-10 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Alternative 1)

Nature: **Destruction of protected plant species**		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-11 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Alternative 2)

Nature: **Destruction of protected plant species**		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-12 Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Ishwati road)

Nature: **Destruction of protected plant species**		
Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4-13 Impacts to biodiversity associated with the proposed construction phase: Displacement of faunal community (Construction of all infrastructure, all alternatives, including Ishwati road)

Nature: **Displacement of faunal (including avifauna) communities due to habitat loss, direct mortalities and disturbance**		
Construction activity may lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

Table 4-14 Impacts to avifauna associated with the proposed construction phase: Collection of eggs, nest destruction and poaching (Construction of all infrastructure, all options, including Ishwati road).

Nature: Poaching		
Collection of eggs, nest destruction and poaching		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• **All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. guineafowl, francolin), and owls, which are often persecuted out of superstition.** • **Signs must be put up stating that should any person be found poaching any species they will be fined and/or subject to strict disciplinary action.** **Construction must take place in the winter months as far as possible. If this is not possible then an area of 500m surrounding the Black Eagle nest must be avoided and development in this area should be restricted to the winter months.**		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

4.6.2 Operational Phase

It is anticipated that daily activities associated with the operation phase will lead to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but may lead to direct mortalities due to collisions.

- The following potential impacts were considered:
- Continued fragmentation and degradation of habitats and ecosystems;
- Spread of alien and/or invasive species;
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration);
- Collisions with powerlines and connection lines and fences; and
- Electrocution by powerline.

Table 4-15 Impacts to biodiversity associated with the proposed operational phase: Continued fragmentation and degradation of habitats and ecosystems (Operation of all infrastructure, all options, including Ishwati Road).

Nature: **Continued fragmentation and degradation of habitats and ecosystems**		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
There is still some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.		

Table 4-16 Impacts to biodiversity associated with the proposed operational phase: Spread of alien and/or invasive species (Operation of all infrastructure, all options, including Ishwati Road).

Nature: **Spread of alien and/or invasive species**		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long term broad scale IAP infestation if not mitigated.		

Table 4-17 Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of switching stations and 132 kV line)

Nature: **Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration)**		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Disturbance from maintenance activities will occur albeit at a low and infrequent level. Less migratory species will be found in the area. Road killings are still a possibility. Migratory routes of fauna may change, fauna and flora species composition may change.		

Table 4-18 Impacts to biodiversity associated with the proposed operational phase: Collisions with powerlines, connection lines and fences (all alternatives).

Nature: **Collisions with powerlines and connection lines**		
The powerlines and connections create a collision risk to avifauna.		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Very High (10)	High (8)
Probability	Highly probable (4)	Highly Probable (4)
Significance	**High**	**High**
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• **Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. The preferred option would be the direct approach to the Gamma MTS (i.e. from the east). Should this not be possible the 132kV powerline should be routed as close as possible to the existing 400kV OHLs near Gamma MTS (should the 132kV**		

OHL run parallel to the 400kV OHLs), and should traverse the existing 400 kV OHLs as close to perpendicular as is feasible, to limit the length of the 132kV span between the existing 400kV OHLs. • **Powerlines must be marked with industry standard (at the time of construction) bird flight diverters, this must be done for the extent of the line at 5 m intervals.** • **The design of the proposed line must be as per Birdlife specifications.**
Residual Impacts:
Some collisions of avifauna might still occur regardless of mitigation

Table 4-19 Impacts to biodiversity associated with the proposed operational phase: Electrocution by Powerline (all alternatives)

Nature: **Electrocution by powerline**		
	Without mitigation	**With mitigation**
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
• **Ensure that monitoring is sufficiently frequent (preferably monthly for the first year, followed by quarterly thereafter) to detect electrocutions reliably and that any areas on the powerline along which electrocutions of birds occurred are repaired as soon as possible.** • **During the first year of operation, quarterly reports summarizing interim findings should be complied by the owner of the powerlines and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.** • **Any carcasses found beneath power lines should be reported to the Eskom / EWT Incident Reporting Hotline (0860 111 535, email wep@ewt.org.za)** • **The design of the proposed grid connection infrastructure must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.** • **Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used.** • **Birdlife Verreauxs Eagle and Windfarm guidelines (2017) must be followed, to the extent applicable to the grid connection and related infrastructure.**		
Residual Impacts:		
Electrocutions might still occur regardless of mitigations		

4.7 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area (all activities, as required for assessment of cumulative impacts including surrounding wind energy facilities, powerlines and associated infrastructure in the region).

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 fauna and flora. Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers, dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Table 4-20 is relevant to terrestrial and avifauna species.

Table 4-20 Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss, thereby impacting ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Low (27)**	**High (65)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
Should the vegetation be removed, the impact cannot be mitigated.		
Residual Impacts:		
Will result in the loss of: • **Less migratory species will be found in the area.** • **Road killings are still a possibility.** • **Migratory routes of fauna will change.** • **Fauna and flora species composition may change.** • **Avifauna SCCs will be influenced.**		

4.8 Unplanned Events

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

Table 4-21 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 4-21 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be 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 vegetation..	An appropriate/adequate fire management plan needs to be implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the road	Storm water management plan must be compiled and implemented.

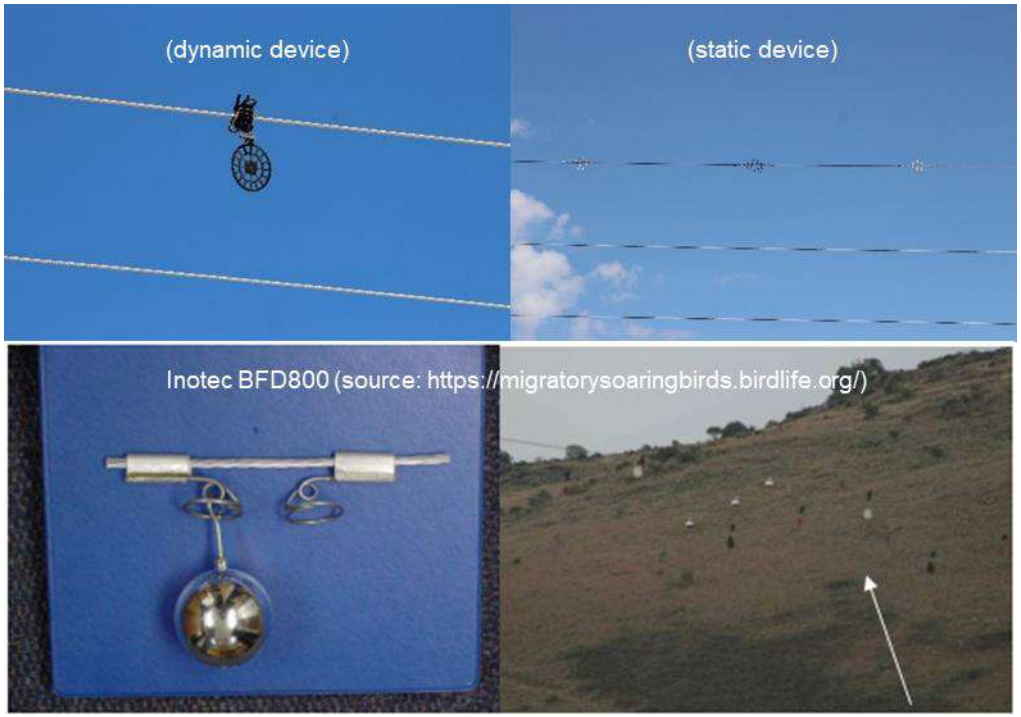
4.9 Biodiversity Management Objectives

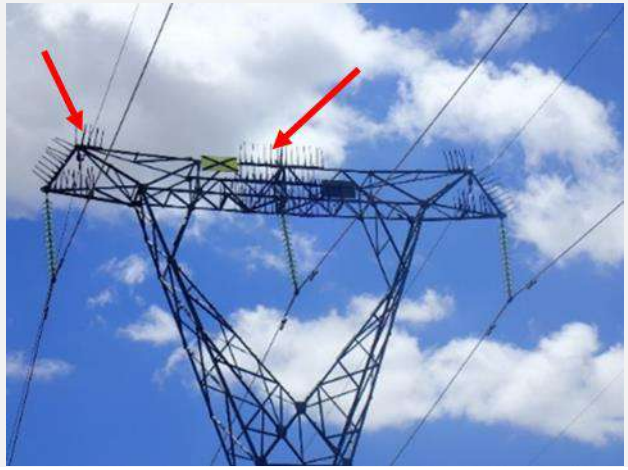
The purpose of the management Objectives is to inform on the mitigations required to lower the risk of the impacts associated with the proposed activity, provide measures for improving the conservation value of the property and to be able to be inserted into the Environmental Management Programme (EMPr). The mitigation actions required to reduce the significance of the impacts associated with the development are provided in Table 4-22. Please note that the construction phase activity measures are only implemented if there is a need for development.

Table 4-22 Summary of management objectives pertaining to impacts to biodiversity and ecosystems associated with the proposed development

Management Outcome: Vegetation and Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All development areas must be clearly demarcated. No development is to occur in areas possessing 'Very High' SEI wherever practicable. Only the 'High' SEI areas that have been authorised for development should be intruded into. Pylons may only be considered in "Very High SEI" areas where is it not feasible to span the area entirely. In such instances the minimum possible number of pylons with the smallest possible footprint must be utilised and the disturbance footprint must be strictly controlled. A service track (jeep track) is permissible in Very High SEI areas only to the extent required to establish and maintain the powerline, and only if no other access options are available in areas of lower sensitivity.	Life of operation	Project Manager	Infringement into these areas	Ongoing
The footprint of the Ishwati road must be kept to a minimum, and the areas disturbed outside of the direct operational footprint must be rehabilitated and monitored. Monitoring of the road edges must be conducted for 3 years after the construction phase on a quarterly basis. This is crucial to ensure the road edge is successfully rehabilitated and that erosion and alien invasive lant infestation is controlled.	Life of operation	Project Manager	Restriction of the road footprint.	Ongoing
Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager	Natural Areas (Karoo scrub, Rocky outcrops and Riparian thicket)	Ongoing
All activities must make use of existing roads and tracks as far as practically and feasibly possible.	Life of operation	Project Manager	Roads and paths used	Ongoing
Apply for a permit to relocate and transplant protected plant species into suitable areas outside the development footprint	Construction	Project Manager	Relocation/destruction of protected plant species	Ongoing
All laydown areas, chemical toilets etc. should be restricted to "Medium" or "Low" SEI areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended.	Construction	Project Manager Foreman	Laydown areas and material storage & placement.	Ongoing
Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Life of operation	Project Manager	Site footprint rehabilitation	Ongoing

Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Life of operation	Project Manager	Rehabilitated areas	Ongoing
A 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.	Life of operation	Project Manager Contractors Foreman	Spill events, Vehicles dripping.	Ongoing
Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora.	Life of operation	Project Manager Contractor	Erosion area	Annually
Management Outcome: Fauna and avifauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
A qualified ecologist or suitably experienced Environmental Officer must be on site when construction begins to identify fauna species that will be directly disturbed and to relocate protected fauna that are found during the construction activities. The area must be walked though prior to construction to ensure no faunal species remain in the habitat and get killed. 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	Project Manager Contractor	Presence of any fauna	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	Project Manager Contractor Foreman	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed	Life of operation	Project Manager Contractor	Evidence of trapping or carcasses	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Construction Phase	Project Manager Contractor	Construction	Ongoing
The design of the grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.,* 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase

Powerlines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites. 	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase

All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution 	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Install anti-perch devices such as spikes to prevent Pied Crows from nesting/perching. This is especially important to impede excessive predation on *Psammobates* sp.	Planning and construction	Environmental Officer & Contractor, Engineer	Over predation of tortoise	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase

Management Outcome: Invasive Alien Plants

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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 thereby causing further encroachment of invasive species.	Construction	Project Manager Contractor	Footprint Area	Bi-annually (twice a year)

Management Outcome: Dust Pollution

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, for all areas of construction. This includes wetting of exposed soft soil surfaces.	Life of operation	Project Manager Contractor	Dustfall	As per the Contractor's 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. All solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Project Manager Contractor	Waste Removal	Weekly
Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Health and Safety Officer Contractor	Number of toilets per staff member. Waste levels	Daily
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	Project Manager Health and Safety Officer Contractor	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. Recycling is encouraged.	Life of operation	Project Manager Health and Safety Officer Contractor	Management of bins and collection of waste	Ongoing
Management Outcome: Environmental Awareness Training				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel 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 species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.	Life of operation	Project Manager Health and Safety Officer Contractor Environmental Officer	Compliance to the training.	As needed

5 Avifaunal Monitoring

Should the development be authorised avifaunal SCC monitoring must be done to determine the effect of the development on these species, this would also allow for more available data for future projects.

- Monitoring must be done for 2 consecutive years during or after construction depending on the total length of construction. Based on the results, monitoring can then cease or must continue based on the recommendations of the assessment. Monitoring must include the walking of the lines on a quarterly basis to determine the bird strikes present. Monitoring must be conducted as per the guidelines specified in the Species Protocols (2020). The information obtained from the monitoring must be shared with the large terrestrial birds programme of Birdlife (https://www.birdlife.org.za/what-we-do/landscape-conservation/meet-the-team/). Any carcasses found beneath power lines should be reported to the Eskom / EWT Incident Reporting Hotline (0860 111 535, email wep@ewt.org.za)

6 Conclusion and Impact Statement

6.1 Conclusion

6.1.1 Terrestrial

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a medium-high confidence in the information provided. The survey ensured that there was suitable ground-truth coverage of the open-spaces or natural habitats, and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High SEI. This is due to the combination of their functional integrity and conservation importance.

Based on the habitat present, there is a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded from the study area. Permits will be required for the trimming, removal or relocation of any such species from the provincial authorities.

The ecosystems on site were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional. The findings of the field survey are therefore congruent with the screening tool.

Areas of rocky outcrops delineated as assigned an SEI of “Very High” sensitivity are considered no go areas and may be used for construction only if no other alternative is possible and construction in these areas is unavoidable. Where possible these areas should be spanned by overheard powerlines. Where it is not feasible or practicable to span the Very

High SEI areas completely, then the minimum possible number of pylons with the smallest possible footprint must be utilised and the disturbance footprint must be strictly controlled. A service track (jeep track) is permissible in Very High SEI areas only to the extent required to establish and maintain the powerline, and only if no other access options are available in areas of lower sensitivity.

Based on the provided options for the proposed 132kV line:

1) Preferred alternative
2) Alternative 1
3) Alternative 2

The option with the least impacts is the preferred alternative, or alternative 2, although only marginally as they traverse slightly less high SEI areas than alternative 1. As many of the Very High SEI areas should be avoided as possible. The preferred alternative is therefore considered the most acceptable option. Placement of infrastructure anywhere within the assessed corridors is considered acceptable, subject to the mitigation measures specified in this report and subject to the minimisation of the disturbance within high SEI areas as far as possible. Additionally, it is also recommended that the substation access road should avoid crossing the EN river and riparian zone as far as possible. It would be preferable to construct the access road follow the already existing section of farm road that already crosses the river, to minimise further habitat fragmentation.

6.1.2 Avifauna

During the field assessment 99 bird species were recorded of these eight of the species recorded were SCCs on a national or international scale. Blue Crane (*Grus paradisea*), Karoo Korhaan (*Eupodotis vigorsii*), Kori Bustard (*Ardeotis kori*), Ludwigs Bustard (*Neotis ludwigii*), Martial Eagle (*Polemaetus bellicosus*), Secretary bird (*Sagittarius serpentarius*), Verreauxs Eagle (*Aquila verreauxii*), and Lanner Falcon (*Falco biarmicus*) were the SCCs recorded. One nest of a Verreauxs Eagle was found close to the Gamma substation in an existing 400kV powerline, while an additional two nests' locations were provided by local farmers (these areas could not be accessed to confirm the nests). The high number of SCCs present increases the overall sensitivity of the area and is the reason for the powerline corridor mainly being made up of Very-High and High sensitivity areas. The straight approach of the powerline at the Gamma station is the preferred option, the southern approach is acceptable should all the mitigations be implemented.

The principle impacts of the operational phase are electrocution and collisions due to the powerlines. The impact of electrocutions were rated as High pre-mitigations and Low post-mitigations, while the collisions were rated as High pre-mitigations but were still high even after the implementation of mitigations. Mitigations in this instance would be the installation of bird diverters. The reason for the High post mitigation rating is because of the high number and density of SCCs recorded in the area. The development falls in a previously authorised WEF PAOI along with previously authorised powerlines. Therefore, even though the project has a very high sensitivity it is not regarded as a fatal flaw based on the previous assessments and their findings and recommendations.

6.2 Impact Statement

An impact statement is required as per the NEMA regulations with regards to the proposed development. The main impacts expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna and avifauna species and the emigration of fauna SCC due to disturbance.

Considering the above-mentioned information, the proposed development will result in the in the destruction of some functional habitats. It is the opinion of the specialist that the proposed activities can go ahead provided areas of high to very high SEI are avoided as far as practicable, and control of introduced alien invasive plants, as well as erosion mitigation is implemented. All Biodiversity Management Objectives provided in this report and mitigation measures provided in other supporting specialist reports must be implemented.

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8 Appendix Items

8.1 Appendix A – Protocol Checklist

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

Paragraph	Item	Pages	Comment
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	121	Appendix G
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	1-5	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these.	34 and 69	
2.3.2	Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site	34 and 78	
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna.	17-24	
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments.	17-24	
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: (a) main vegetation types; (b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified.	25-29 18	
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and	-	No "low" sensitivity areas were identified due to the ecological condition of the site.

	verified through the site sensitivity verification.		
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: (a) the reasons why an area has been identified as a CBA; (b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation; (c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s); (d) the impact on ecosystem threat status; (e) the impact on explicit subtypes in the vegetation; (f) the impact on overall species and ecosystem diversity of the site; and (g) the impact on any changes to threat status of populations of species of conservation concern in the CBA.	21-23 69-83	
2.3.7.2	Terrestrial ecological support areas (ESAs), including: (a) the impact on the ecological processes that operate within or across the site; (b) the extent the proposed development will impact on the functionality of the ESA; and (c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.	21-23	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- (a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan.	19-20	

2.3.7.4	Priority areas for protected area expansion, including- (a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network.	19-20	
2.3.7.5	SWSAs including: (a) the impact(s) on the terrestrial habitat of a SWSA; and (b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses)	23-24 69-83	
2.3.7.6	FEPA sub catchments, including- (a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment	23-24	
2.3.7.7	indigenous forests, including: (a) impact on the ecological integrity of the forest; and (b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	-	No forest habitats within the area
3.1.1.	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	122-124	Appendix G
3.1.2	A signed statement of independence by the specialist.	124	
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	6 11	
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.	8-16	
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.	6	

3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant).	65-68	
3.1.7	Additional environmental impacts expected from the proposed development.	69-83	
3.1.8	Any direct, indirect and cumulative impacts of the proposed development.	69-87	
3.1.9	The degree to which impacts and risks can be mitigated.	69-90	
3.1.10	The degree to which the impacts and risks can be reversed.	-	None
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	69-90	
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).	87-91	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate.	-	None
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not;	92	
3.1.15	any conditions to which this statement is subjected	92	

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

Family	Scientific name	IUCN	Endemic
Acanthaceae	*Justicia incana*		x
Aizoaceae	*Aloinopsis rosulata*	LC	x
Aizoaceae	*Drosanthemum lique*	LC	x
Aizoaceae	*Galenia africana*	LC	
Aizoaceae	*Galenia procumbens*	LC	x
Aizoaceae	*Galenia sarcophylla*	LC	x
Aizoaceae	*Mesembryanthemum coriarium*		x
Aizoaceae	*Mesembryanthemum nodiflorum*	LC	
Aizoaceae	*Ruschia dejagerae*	LC	x
Aizoaceae	*Ruschia spinosa*	LC	x
Aizoaceae	*Tetragonia echinata*	LC	x
Aizoaceae	*Trichodiadema attonsum*	LC	x
Amaranthaceae	*Exomis microphylla var. axyrioides*	LC	x
Amaranthaceae	*Salsola kali*		
Anacampserotaceae	*Anacampseros arachnoides*	LC	x
Anacardiaceae	*Searsia lancea*	LC	
Apiaceae	*Deverra denudata subsp. aphylla*	LC	x
Apocynaceae	*Cynanchum orangeanum*	LC	
Apocynaceae	*Duvalia maculata*	LC	x
Apocynaceae	*Fockea comaru*	LC	x
Apocynaceae	*Microloma armatum var. armatum*	LC	x
Apocynaceae	*Stapelia grandiflora var. grandiflora*	LC	x
Apocynaceae	*Tridentea virescens*	LC	x
Asparagaceae	*Asparagus capensis var. capensis*	LC	x
Asphodelaceae	*Haworthia bolusii var. bolusii*	NE	x
Asphodelaceae	*Haworthiopsis tessellata*		x
Asteraceae	*Arctotis leiocarpa*	LC	x
Asteraceae	*Chrysocoma ciliata*	LC	
Asteraceae	*Conyza scabrida*		
Asteraceae	*Cuspidia cernua subsp. annua*	LC	x
Asteraceae	*Denekia capensis*	LC	
Asteraceae	*Dimorphotheca cuneata*	LC	x
Asteraceae	*Euryops annae*	LC	x
Asteraceae	*Euryops lateriflorus*	LC	x
Asteraceae	*Euryops oligoglossus subsp. oligoglossus*	LC	x
Asteraceae	*Euryops petraeus*	LC	x
Asteraceae	*Euryops tenuissimus subsp. trifurcatus*	LC	x

Family	Scientific name	IUCN	Endemic
Asteraceae	*Felicia filifolia subsp. filifolia*	LC	x
Asteraceae	*Felicia filifolia subsp. schaeferi*	LC	x
Asteraceae	*Felicia muricata subsp. muricata*	LC	
Asteraceae	*Felicia ovata*	LC	x
Asteraceae	*Garuleum bipinnatum*	LC	x
Asteraceae	*Gazania krebsiana subsp. arctotoides*	LC	
Asteraceae	*Gazania linearis var. linearis*	LC	x
Asteraceae	*Helichrysum albo-brunneum*	LC	x
Asteraceae	*Helichrysum lineare*	LC	
Asteraceae	*Helichrysum nudifolium var. nudifolium*	LC	
Asteraceae	*Helichrysum pumilio subsp. pumilio*	LC	x
Asteraceae	*Helichrysum rosum var. arcuatum*	LC	x
Asteraceae	*Helichrysum splendidum*	LC	
Asteraceae	*Helichrysum stoloniferum*	LC	x
Asteraceae	*Helichrysum tysonii*	LC	x
Asteraceae	*Helichrysum zeyheri*	LC	x
Asteraceae	*Hertia cluytiifolia*	LC	x
Asteraceae	*Hilliardiella capensis*		
Asteraceae	*Oedera oppositifolia*		x
Asteraceae	*Oedera spinescens*		x
Asteraceae	*Osteospermum incanum subsp. subcanescens*	LC	x
Asteraceae	*Osteospermum scariosum var. scariosum*	NE	x
Asteraceae	*Osteospermum sinuatum*		x
Asteraceae	*Osteospermum sinuatum var. sinuatum*	LC	x
Asteraceae	*Osteospermum spinescens*	LC	x
Asteraceae	*Othonna auriculifolia*	LC	x
Asteraceae	*Othonna coronopifolia*	LC	x
Asteraceae	*Pegolettia retrofracta*	LC	x
Asteraceae	*Pentzia globosa*	LC	x
Asteraceae	*Pentzia incana*	LC	x
Asteraceae	*Pentzia punctata*	LC	x
Asteraceae	*Pteronia adenocarpa*	LC	x
Asteraceae	*Senecio consanguineus*	LC	x
Asteraceae	*Senecio cotyledonis*	LC	x
Asteraceae	*Senecio hastatus*	LC	x
Asteraceae	*Senecio reptans*	LC	x
Asteraceae	*Ursinia pilifera*	LC	x
Boraginaceae	*Anchusa riparia*	LC	x

Family	Scientific name	IUCN	Endemic
Brassicaceae	*Heliophila crithmifolia*	LC	x
Brassicaceae	*Heliophila rigidiuscula*	LC	x
Campanulaceae	*Wahlenbergia nodosa*	LC	x
Campanulaceae	*Wahlenbergia thunbergiana*	LC	x
Colchicaceae	*Colchicum albomarginatum*	LC	x
Colchicaceae	*Colchicum melanthioides subsp. melanthioides*	LC	x
Crassulaceae	*Adromischus triflorus*	LC	x
Crassulaceae	*Crassula capitella subsp. thyrsiflora*	LC	x
Crassulaceae	*Crassula corallina subsp. corallina*	LC	x
Cyperaceae	*Afroscirpoides dioeca*		x
Cyperaceae	*Isolepis expallescens*	VU	x
Dryopteridaceae	*Dryopteris antarctica*	LC	
Dryopteridaceae	*Dryopteris dracomontana*	LC	x
Ebenaceae	*Diospyros austroafricana var. microphylla*	LC	x
Ericaceae	*Erica woodii var. woodii*	LC	
Euphorbiaceae	*Euphorbia mauritanica*	LC	
Euphorbiaceae	*Euphorbia stellispina*	LC	x
Fabaceae	*Cullen tomentosum*	LC	
Fabaceae	*Indigofera alternans var. alternans*	LC	
Fabaceae	*Indigofera sessilifolia*	LC	x
Fabaceae	*Lessertia annularis*	LC	x
Fabaceae	*Melolobium calycinum*	LC	
Fabaceae	*Rhynchosia capensis*	LC	x
Geraniaceae	*Pelargonium proliferum*	LC	x
Geraniaceae	*Pelargonium tragacanthoides*	LC	x
Hypoxidaceae	*Empodium gloriosum*	LC	x
Iridaceae	*Babiana bainesii*	LC	
Iridaceae	*Dierama pendulum*	LC	x
Iridaceae	*Hesperantha longituba*	LC	x
Iridaceae	*Lapeirousia plicata subsp. plicata*	LC	x
Iridaceae	*Romulea macowanii var. alticola*	LC	x
Iridaceae	*Tritonia karooica*	LC	x
Iridaceae	*Tritonia laxifolia*	LC	
Juncaceae	*Juncus rigidus*	LC	
Lamiaceae	*Stachys hyssopoides*	LC	x
Lamiaceae	*Stachys rugosa*	LC	x
Limeaceae	*Limeum africanum*		x
Loranthaceae	*Moquiniella rubra*	LC	x

Family	Scientific name	IUCN	Endemic
Loranthaceae	*Septulina glauca*	LC	x
Loranthaceae	*Tapinanthus oleifolius*	LC	
Malvaceae	*Hermannia coccocarpa*	LC	x
Malvaceae	*Hermannia cuneifolia var. cuneifolia*	LC	x
Malvaceae	*Hermannia cuneifolia var. glabrescens*	LC	x
Malvaceae	*Hermannia grandiflora*	LC	x
Malvaceae	*Hermannia pulchella*	LC	x
Malvaceae	*Hermannia vestita*	LC	x
Melianthaceae	*Melianthus comosus*	LC	x
Melianthaceae	*Melianthus dregeanus subsp. dregeanus*	LC	x
Orchidaceae	*Habenaria arenaria*	LC	
Orobanchaceae	*Hyobanche sanguinea*	LC	x
Osmundaceae	*Todea barbara*	LC	
Poaceae	*Agrostis lachnantha var. lachnantha*	LC	x
Poaceae	*Amelichloa clandestina*		
Poaceae	*Aristida adscensionis*	LC	
Poaceae	*Aristida congesta subsp. congesta*	LC	
Poaceae	*Aristida diffusa subsp. diffusa*	LC	x
Poaceae	*Bromus catharticus*	NE	
Poaceae	*Cenchrus ciliaris*	LC	
Poaceae	*Chloris virgata*	LC	
Poaceae	*Cynodon incompletus*	LC	x
Poaceae	*Digitaria eriantha*	LC	
Poaceae	*Digitaria sanguinalis*	NE	
Poaceae	*Echinochloa crus-galli*	LC	
Poaceae	*Enneapogon desvauxii*	LC	
Poaceae	*Enneapogon scaber*	LC	
Poaceae	*Enneapogon scoparius*	LC	
Poaceae	*Eragrostis bicolor*	LC	
Poaceae	*Eragrostis cilianensis*	LC	
Poaceae	*Eragrostis curvula*	LC	
Poaceae	*Eragrostis lehmanniana var. lehmanniana*	LC	
Poaceae	*Eragrostis obtusa*	LC	x
Poaceae	*Eragrostis tef*	NE	
Poaceae	*Eragrostis truncata*	LC	x
Poaceae	*Eustachys paspaloides*	LC	
Poaceae	*Festuca arundinacea*	NE	
Poaceae	*Fingerhuthia africana*	LC	x

Family	Scientific name	IUCN	Endemic
Poaceae	*Heteropogon contortus*	LC	
Poaceae	*Leptochloa fusca*	LC	
Poaceae	*Lolium multiflorum*	NE	
Poaceae	*Lolium perenne*	NE	
Poaceae	*Lolium temulentum*	NE	
Poaceae	*Oropetium capense*	LC	
Poaceae	*Panicum coloratum*	LC	
Poaceae	*Polypogon monspeliensis*	NE	
Poaceae	*Schismus barbatus*	LC	
Poaceae	*Setaria italica*	NE	
Poaceae	*Setaria verticillata*	LC	
Poaceae	*Sporobolus ioclados*	LC	
Poaceae	*Stipa dregeana var. dregeana*	LC	x
Poaceae	*Stipagrostis ciliata var. capensis*	LC	
Poaceae	*Stipagrostis obtusa*	LC	
Poaceae	*Themeda triandra*	LC	
Poaceae	*Tragus berteronianus*	LC	
Poaceae	*Tragus koelerioides*	LC	
Poaceae	*Tragus racemosus*	LC	
Poaceae	*Tribolium purpureum*	LC	x
Poaceae	*Urochloa panicoides*	LC	
Polygalaceae	*Muraltia alticola*	LC	x
Polypodiaceae	*Polypodium vulgare*	LC	
Pteridaceae	*Adiantum capillus-veneris*	LC	
Pteridaceae	*Cheilanthes eckloniana*	LC	
Pteridaceae	*Cheilanthes induta*	LC	x
Pteridaceae	*Pellaea calomelanos var. calomelanos*	LC	
Santalaceae	*Lacomucinaea lineata*		x
Santalaceae	*Thesium megalocarpum*		
Scrophulariaceae	*Chaenostoma rotundifolium*	LC	x
Scrophulariaceae	*Diascia alonsooides*	LC	x
Scrophulariaceae	*Jamesbrittenia filicaulis*	LC	x
Scrophulariaceae	*Manulea crassifolia subsp. thodeana*	LC	x
Scrophulariaceae	*Peliostomum leucorrhizum*	LC	x
Scrophulariaceae	*Selago albida*	LC	x
Scrophulariaceae	*Selago corymbosa*	LC	x
Scrophulariaceae	*Selago geniculata*	LC	x
Scrophulariaceae	*Selago saxatilis*	LC	x

Family	Scientific name	IUCN	Endemic
Thymelaeaceae	*Lasiosiphon microphyllus*	LC	x
Thymelaeaceae	*Lasiosiphon polycephalus*	LC	x
Urticaceae	*Urtica urens*		

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

Family	Scientific name	Common name	RedList
Brevicepitidae	*Breviceps pentheri*	Eastern Cape Rain Frog	
Brevicepitidae	*Breviceps verrucosus*	Plaintive Rain Frog	LC
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	LC
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad (subsp. gariepensis)	
Hyperoliidae	*Afrixalus spinifrons*	Natal Leaf-folding Frog	LC
Hyperoliidae	*Hyperolius marmoratus*	Painted Reed Frog	LC
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC
Hyperoliidae	*Semnodactylus wealii*	Rattling Frog	LC
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	LC
Pipidae	*Xenopus laevis*	Common Platanna	LC
Ptychadenidae	*Ptychadena porosissima*	Striped Grass Frog	LC
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	LC
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	LC
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	LC
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC
Pyxicephalidae	*Cacosternum nanum*	Bronze Caco	LC
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	LC
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	LC
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	LC
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	LC

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

Family	Scientific name	Common name	RedList
Agamidae	*Agama atra*	Southern Rock Agama	LC
Chamaeleonidae	*Bradypodion ventrale*	Eastern Cape Dwarf Chameleon	LC
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	LC
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC
Cordylidae	*Cordylus cordylus*	Cape Girdled Lizard	LC
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC
Cordylidae	*Pseudocordylus melanotus subviridis*	Drakensberg Crag Lizard	LC
Cordylidae	*Pseudocordylus microlepidotus fasciatus*	Karoo Crag Lizard	LC
Elapidae	*Hemachatus haemachatus*	Rinkhals	LC
Gekkonidae	*Afroedura karroica*	Karoo Flat Gecko	LC
Gekkonidae	*Afroedura pondolia*	Pondo Flat Gecko	LC
Gekkonidae	*Afroedura tembulica*	Tembu Flat Gecko	LC
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	LC
Gekkonidae	*Pachydactylus maculatus*	Spotted Gecko	LC
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	LC
Lacertidae	*Pedioplanis burchelli*	Burchell's Sand Lizard	LC
Lacertidae	*Pedioplanis laticeps*	Karoo Sand Lizard	LC
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	LC
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	LC
Lamprophiidae	*Lamprophis aurora*	Aurora House Snake	LC
Lamprophiidae	*Lamprophis guttatus*	Spotted House Snake	LC
Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake	LC
Lamprophiidae	*Macrelaps microlepidotus*	Natal Black Snake	NT
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	LC
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake	LC
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	NE
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	LC
Scincidae	*Trachylepis variegata*	Variegated Skink	LC
Testudinidae	*Homopus femoralis*	Greater Padloper	LC
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise	
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	LC

8.5 Appendix E – Avifauna 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 baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Afrotis afraoides	Korhaan, Northern Black	Unlisted	LC
Alopochen aegyptiaca	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	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 crenatus	Pipit, African Rock	NT	NT
Anthus leucophrys	Pipit, Plain-backed	Unlisted	LC
Anthus nicholsoni	Nicholson's pipit	Unlisted	LC
Anthus vaalensis	Pipit, Buffy	Unlisted	LC
Apalis thoracica	Apalis, Bar-throated	Unlisted	LC
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
Apus horus	Swift, Horus	Unlisted	LC
Aquila verreauxii	Eagle, Verreaux's	VU	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardeola ralloides	Heron, Squacco	Unlisted	LC
Ardeotis kori	Bustard, Kori	NT	NT
Batis pririt	Batis, Pririt	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, 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

Calendulauda sabota	Lark, Sabota	Unlisted	LC
Calidris minuta	Stint, Little	LC	LC
Caprimulgus pectoralis	Nightjar, Fiery-necked	Unlisted	LC
Caprimulgus rufigena	Nightjar, Rufous-cheeked	Unlisted	LC
Cecropis cucullata	Swallow, Greater Striped	Unlisted	LC
Cercotrichas coryphoeus	Scrub-robin, Karoo	Unlisted	LC
Cercotrichas paena	Scrub-robin, Kalahari	Unlisted	LC
Certhilauda subcoronata	Lark, Karoo Long-billed	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Chalcomitra amethystina	Sunbird, Amethyst	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC
Ciconia ciconia	Stork, White	Unlisted	LC
Ciconia microscelis	Stork, Woolly-necked	Unlisted	NT
Ciconia nigra	Stork, Black	VU	LC
Cinnyris chalybeus	Sunbird, Southern Double-collared	Unlisted	LC
Cinnyris fuscus	Sunbird, Dusky	Unlisted	LC
Circus macrourus	Harrier, Pallid	NT	NT
Circus maurus	Harrier, Black	EN	EN
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola subruficapilla	Cisticola, Grey-backed	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Clamator jacobinus	Cuckoo, Jacobin	Unlisted	LC
Colius colius	Mousebird, White-backed	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Coracias garrulus	Roller, European	NT	LC
Corvus albicollis	Raven, White-necked	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Corythornis cristatus	Kingfisher, Malachite	Unlisted	Unlisted
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC

Creatophora cinerea	Starling, Wattled	Unlisted	LC
Crithagra albogularis	White-throated Canary	LC	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra gularis	Seedeater, Streaky-headed	Unlisted	LC
Cuculus canorus	Cuckoo, Common	Unlisted	LC
Curruca layardi	Tit-Babbler, Layard's	Unlisted	LC
Curruca subcoerulea	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
Cypsiurus parvus	Palm-swift, African	Unlisted	LC
Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC
Dendropicos fuscescens	Woodpecker, Cardinal	Unlisted	LC
Dicrurus adsimilis	Drongo, Fork-tailed	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emarginata schlegelii	Chat, Karoo	Unlisted	LC
Emarginata sinuata	Chat, Sickle-winged	Unlisted	LC
Emarginata tractrac	Chat, Tractrac	Unlisted	LC
Emberiza capensis	Bunting, Cape	Unlisted	LC
Emberiza flaviventris	Bunting, Golden-breasted	Unlisted	LC
Emberiza impetuani	Bunting, Lark-like	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Eremomela gregalis	Eremomela, Karoo	Unlisted	LC
Eremomela icteropygialis	Eremomela, Yellow-bellied	Unlisted	LC
Eremopterix australis	Sparrow-lark, Black-eared	Unlisted	LC
Eremopterix verticalis	Sparrowlark, Grey-backed	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 biarmicus	Falcon, Lanner	VU	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Galerida magnirostris	Lark, Large-billed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Geocolaptes olivaceus	Woodpecker, Ground	Unlisted	NT
Grus paradisea	Crane, Blue	NT	VU

Gymnoris superciliaris	Petronia, Yellow-throated	Unlisted	LC
Halcyon albiventris	Kingfisher, Brown-hooded	Unlisted	LC
Haliaeetus vocifer	Fish-eagle, African	Unlisted	LC
Hieraaetus pennatus	Eagle, Booted	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo dimidiata	Swallow, Pearl-breasted	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Indicator indicator	Honeyguide, Greater	Unlisted	LC
Indicator minor	Honeyguide, Lesser	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Lagonosticta senegala	Firefinch, Red-billed	Unlisted	LC
Lamprotornis bicolor	Starling, Pied	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Malcorus pectoralis	Warbler, Rufous-eared	Unlisted	LC
Megaceryle maxima	Kingfisher, Giant	Unlisted	Unlisted
Melaenornis infuscatus	Flycatcher, Chat	Unlisted	LC
Melaenornis silens	Flycatcher, Fiscal	Unlisted	LC
Melaniparus afer	Tit, Grey	Unlisted	Unlisted
Melierax canorus	Goshawk, Southern Pale Chanting	Unlisted	LC
Merops apiaster	Bee-eater, European	Unlisted	LC
Microcarbo africanus	Cormorant, Reed	Unlisted	LC
Micronisus gabar	Goshawk, Gabar	Unlisted	LC
Mirafra fasciolata	Lark, Eastern Clapper	Unlisted	LC
Monticola brevipes	Rock-thrush, Short-toed	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	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
Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Nycticorax nycticorax	Night-Heron, Black-crowned	Unlisted	LC
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
Oriolus oriolus	Oriole, Eurasian Golden	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Petrochelidon spilodera	Cliff-swallow, South African	Unlisted	LC
Phalacrocorax lucidus	Cormorant, White-breasted	Unlisted	LC
Phoenicopterus roseus	Flamingo, Greater	NT	LC
Phragmacia substriata	Warbler, Namaqua	Unlisted	Unlisted
Phylloscopus trochilus	Warbler, Willow	Unlisted	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Polemaetus bellicosus	Eagle, Martial	EN	EN
Polyboroides typus	Harrier-Hawk, African	Unlisted	LC
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Prinia maculosa	Prinia, Karoo	Unlisted	LC
Psalidoprocne pristoptera	Saw-wing, Black	Unlisted	LC
Pterocles namaqua	Sandgrouse, Namaqua	Unlisted	LC
Ptyonoprogne fuligula	Martin, Rock	Unlisted	Unlisted
Pycnonotus nigricans	Bulbul, African Red-eyed	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Rallus caerulescens	Rail, African	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Rhinoptilus africanus	Courser, Double-banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Sagittarius serpentarius	Secretarybird	VU	EN
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila afra	Francolin, Grey-winged	Unlisted	LC
Scopus umbretta	Hamerkop, Hamerkop	Unlisted	LC
Serinus alario	Canary, Black-headed	Unlisted	LC
Serinus canicollis	Canary, Cape	Unlisted	LC
Spatula smithii	Shoveler, Cape	Unlisted	LC

Spilopelia senegalensis	Dove, Laughing	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Sporopipes squamifrons	Finch, Scaly-feathered	Unlisted	LC
Stenostira scita	Flycatcher, Fairy	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Struthio camelus	Ostrich, Common	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
Tchagra tchagra	Tchagra, Southern	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Terathopius ecaudatus	Bateleur, Bateleur	EN	EN
Terpsiphone viridis	Paradise-flycatcher, African	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Tricholaema leucomelas	Barbet, Acacia Pied	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Turdus smithi	Thrush, Karoo	Unlisted	LC
Turtur chalcospilos	Wood-dove, Emerald-spotted	Unlisted	LC
Upupa africana	Hoopoe, African	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vidua chalybeata	Indigobird, Village	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Zosterops pallidus	White-eye, Orange River	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC

8.7 Appendix F – Mammal species expected to occur within the project area

Family	Scientific name	Common name	RedList
Bovidae	*Aepyceros melampus*	Impala	LC
Bovidae	*Alcelaphus buselaphus*	Hartebeest	LC
Bovidae	*Antidorcas marsupialis*	Springbok	LC
Bovidae	*Connochaetes gnou*	Black Wildebeest	LC
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	LC
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	LC
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC
Bovidae	*Tragelaphus scriptus*	Bushbuck	LC
Canidae	*Canis mesomelas*	Black-backed Jackal	LC
Canidae	*Otocyon megalotis*	Bat-eared Fox	LC
Canidae	*Vulpes chama*	Cape Fox	LC
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC
Cervidae	*Dama dama*	Fallow Deer	Introduced
Chrysochloridae	*Amblysomus corriae*	Fynbos Golden Mole	NT
Equidae	*Equus quagga*	Plains Zebra	LC
Felidae	*Caracal caracal*	Caracal	LC
Felidae	*Felis nigripes*	Black-footed Cat	VU
Felidae	*Felis silvestris*	Wildcat	LC
Gliridae	*Graphiurus (Graphiurus) ocularis*	Spectacled African Dormouse	LC
Leporidae	*Lepus saxatilis*	Scrub Hare	LC
Leporidae	*Pronolagus crassicaudatus*	Natal Red Rock Hare	LC
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	LC
Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	LC
Molossidae	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	LC
Muridae	*Aethomys granti*	Grant's Rock Mouse	LC
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	LC
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	LC
Muridae	*Mastomys natalensis*	Natal Mastomys	LC
Muridae	*Mus musculus musculus*		LC
Muridae	*Otomys irroratus*	Southern African Vlei Rat (Fynbos type)	LC
Muridae	*Otomys unisulcatus*	Karoo Bush Rat	LC
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	LC
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC
Mustelidae	*Mellivora capensis*	Honey Badger	LC
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	LC
Nycteridae	*Nycteris thebaica*	Egyptian Slit-faced Bat	LC
Pedetidae	*Pedetes capensis*	South African Spring Hare	LC

Family	Scientific name	Common name	RedList
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	LC
Rhinolophidae	*Rhinolophus capensis*	Cape Horseshoe Bat	LC
Rhinolophidae	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	LC
Sciuridae	*Xerus inauris*	South African Ground Squirrel	LC
Soricidae	*Myosorex varius*	Forest Shrew	LC
Vespertilionidae	*Miniopterus natalensis*	Natal Long-fingered Bat	LC
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	LC
Viverridae	*Genetta tigrina*	Cape Genet (Cape Large-spotted Genet)	LC

8.8 Appendix G – Avifauna field results

Common Name	Scientific Name	Guild code	Relative abundance	Frequency
Acacia Pied Barbet	*Tricholaema leucomelas*	OMD	0,005	7,5
African Pipit	*Anthus cinnamomeus*	IGD	0,002	2,5
African Red-eyed Bulbul	*Pycnonotus nigricans*	OMD	0,008	7,5
Ant-eating Chat	*Myrmecocichla formicivora*	IGD	0,035	25
Barn Swallow	*Hirundo rustica*	IAD	0,025	2,5
Black Sparrowhawk	*Accipiter melanoleucus*	CGD	0,002	2,5
Black-chested Prinia	*Prinia flavicans*	IGD	0,008	10
Black-headed Canary	*Serinus alario*	GGD	0,048	7,5
Blue Crane	*Grus paradisea*	OMD	0,015	12,5
Bokmakierie	*Telophorus zeylonus*	OMD	0,045	37,5
Brown-throated Martin	*Riparia paludicola*	IAD	0,002	2,5
Cape Robin-chat	*Cossypha caffra*	OMD	0,002	2,5
Cape Sparrow	*Passer melanurus*	GGD	0,020	12,5
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	GGD	0,012	15
Cape Wagtail	*Motacilla capensis*	IGD	0,002	2,5
Capped Wheatear	*Oenanthe pileata*	IGD	0,003	2,5
Chat Flycatcher	*Melaenornis infuscatus*	IGD	0,012	10
Chestnut-vented Tit-Babbler (Warbler)	*Curruca subcoerulea*	IGD	0,003	5
Crowned Lapwing	*Vanellus coronatus*	IGD	0,005	2,5
Desert Cisticola	*Cisticola aridulus*	IGD	0,003	5
Double-banded Courser	*Rhinoptilus africanus*	IGD	0,002	2,5
Drakensberg Prinia	*Prinia hypoxantha*	IGD	0,003	2,5
Dusky Sunbird	*Cinnyris fuscus*	NFD	0,005	7,5
Egyptian Goose	*Alopochen aegyptiaca*	HWD	0,002	2,5
Fairy Flycatcher	*Stenostira scita*	IGD	0,003	5
Fiscal Flycatcher	*Melaenornis silens*	OMD	0,003	5
Greater Striped Swallow	*Cecropis cucullata*	IAD	0,017	7,5
Grey Tit	*Melaniparus afer*	IGD	0,003	2,5
Grey-backed Cisticola	*Cisticola subruficapilla*	IGD	0,013	12,5
Hadeda (Hadada) Ibis	*Bostrychia hagedash*	OMD	0,003	2,5
Helmeted Guineafowl	*Numida meleagris*	OMD	0,017	5
Jackal Buzzard	*Buteo rufofuscus*	CGD	0,005	5
Karoo Korhaan	*Eupodotis vigorsii*	OMD	0,035	22,5
Karoo Long-billed Lark	*Certhilauda subcoronata*	IGD	0,018	25
Karoo Prinia	*Prinia maculosa*	IGD	0,005	5
Karoo Scrub Robin	*Cercotrichas coryphoeus*	IGD	0,018	15
Kori Bustard	*Ardeotis kori*	OMD	0,003	5

Common Name	Scientific Name	Guild code	Relative abundance	Frequency
Large-billed Lark	*Galerida magnirostris*	IGD	0,010	12,5
Lark-like Bunting	*Emberiza impetuani*	GGD	0,091	22,5
Ludwig's Bustard	*Neotis ludwigii*	OMD	0,002	2,5
Mountain Wheatear	*Myrmecocichla monticola*	IGD	0,005	5
Northern Black Korhaan	*Afrotis afraoides*	IGD	0,013	12,5
Pale Chanting Goshawk	*Melierax canorus*	CGD	0,008	10
Pied Crow	*Corvus albus*	OMD	0,050	47,5
Red-billed Quelea	*Quelea quelea*	GGD	0,058	10
Red-faced Mousebird	*Urocolius indicus*	FFD	0,007	5
Red-winged Starling	*Onychognathus morio*	IGD	0,003	2,5
Rock Kestrel	*Falco rupicolus*	CGD	0,003	2,5
Rufous-eared Warbler	*Malcorus pectoralis*	IGD	0,033	37,5
Sabota Lark	*Calendulauda sabota*	OMD	0,005	7,5
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*	GGD	0,023	15
Sickle-winged Chat	*Emarginata sinuata*	IGD	0,007	10
South African Cliff Swallow	*Petrochelidon spilodera*	IAD	0,005	2,5
South African Shelduck	*Tadorna cana*	OMD	0,007	5
Southern Masked Weaver	*Ploceus velatus*	GGD	0,007	7,5
Spike-heeled Lark	*Chersomanes albofasciata*	IGD	0,025	12,5
Wattled Starling	*Creatophora cinerea*	OMD	0,197	12,5
White-backed Mousebird	*Colius colius*	FFD	0,010	2,5
White-necked Raven	*Corvus albicollis*	OMD	0,010	10
White-throated Canary	*Crithagra albogularis*	GGD	0,008	7,5
Yellow-bellied Eremomela	*Eremomela icteropygialis*	IGD	0,005	5

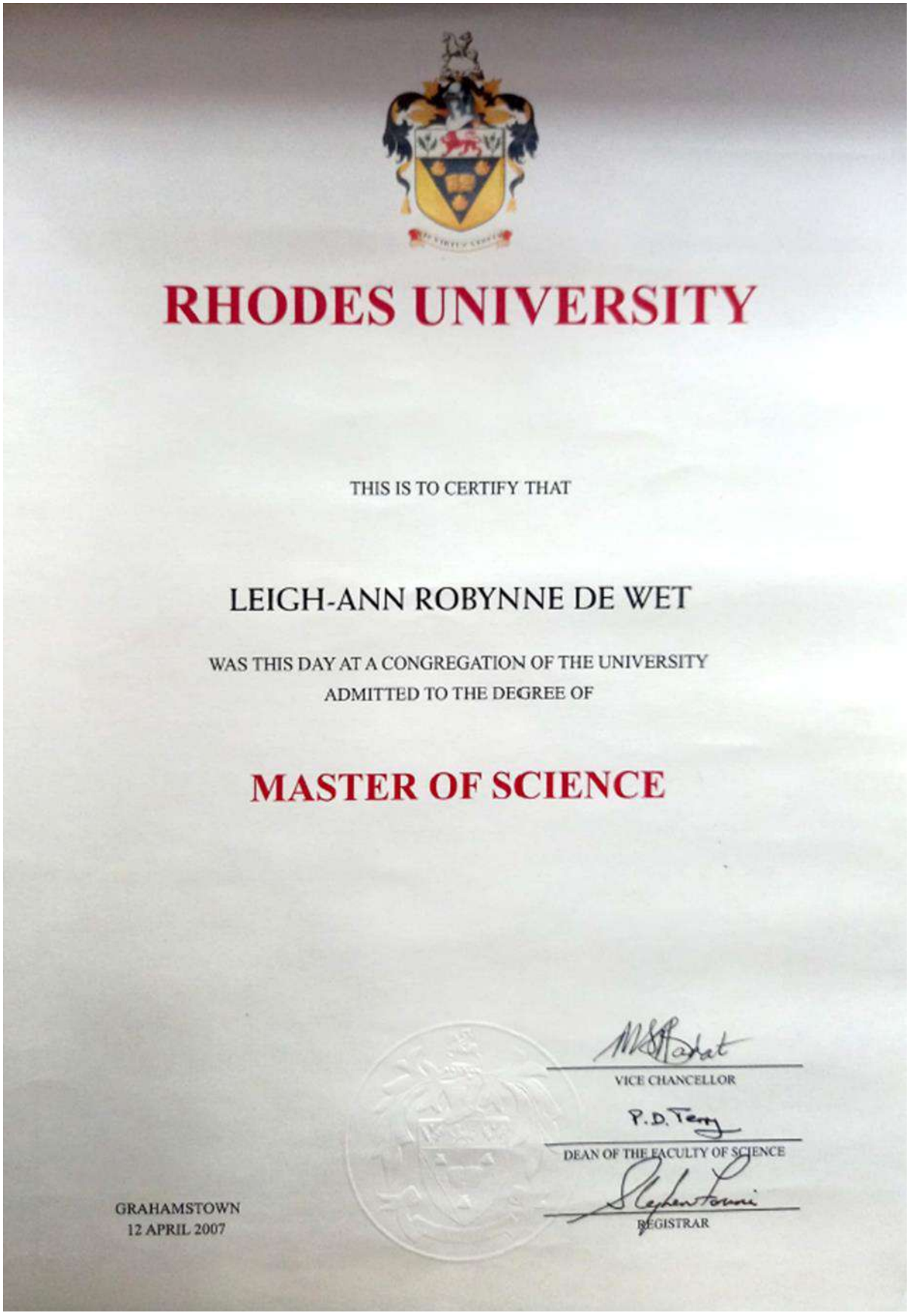
8.9 Appendix H – Avifauna incidental records

Common Name	Scientific Name
Acacia Pied Barbet	*Tricholaema leucomelas*
African Harrier-Hawk	*Polyboroides typus*
African Hoopoe	*Upupa africana*
African Pipit	*Anthus cinnamomeus*
African Red-eyed Bulbul	*Pycnonotus nigricans*
Amur Falcon	*Falco amurensis*
Ant-eating Chat	*Myrmecocichla formicivora*
Barn Swallow	*Hirundo rustica*
Black Sparrowhawk	*Accipiter melanoleucus*
Black-chested Prinia	*Prinia flavicans*
Black-eared Sparrow-Lark	*Eremopterix australis*
Black-headed Heron	*Ardea melanocephala*
Blacksmith Lapwing	*Vanellus armatus*
Black-throated Canary	*Crithagra atrogularis*
Bokmakierie	*Telophorus zeylonus*
Cape Bunting	*Emberiza capensis*
Cape Longclaw	*Macronyx capensis*
Cape Robin-chat	*Cossypha caffra*
Cape Wagtail	*Motacilla capensis*
Cape White-eye	*Zosterops virens*
Capped Wheatear	*Oenanthe pileata*
Chestnut-vented Tit-Babbler (Warbler)	*Curruca subcoerulea*
Cinnamon-breasted Bunting	*Emberiza tahapisi*
Common Quail	*Coturnix coturnix*
Desert Cisticola	*Cisticola aridulus*
Double-banded Courser	*Rhinoptilus africanus*
Dusky Sunbird	*Cinnyris fuscus*
Egyptian Goose	*Alopochen aegyptiaca*
Fiscal Flycatcher	*Melaenornis silens*
Greater Kestrel	*Falco rupicoloides*
Grey-backed Cisticola	*Cisticola subruficapilla*
Hadeda (Hadada) Ibis	*Bostrychia hagedash*
Hamerkop	*Scopus umbretta*
Helmeted Guineafowl	*Numida meleagris*
House Sparrow	*Passer domesticus*
Jackal Buzzard	*Buteo rufofuscus*
Karoo Chat	*Emarginata schlegelii*

Common Name	Scientific Name
Karoo Korhaan	*Eupodotis vigorsii*
Karoo Thrush	*Turdus smithi*
Kori Bustard	*Ardeotis kori*
Lanner Falcon	*Falco biarmicus*
Large-billed Lark	*Galerida magnirostris*
Lark-like Bunting	*Emberiza impetuani*
Little Egret	*Egretta garzetta*
Ludwig's Bustard	*Neotis ludwigii*
Martial Eagle	*Polemaetus bellicosus*
Mountain Wheatear	*Myrmecocichla monticola*
Namaqua Warbler	*Phragmacia substriata*
Pied Starling	*Lamprotornis bicolor*
Pririt Batis	*Batis pririt*
Red-backed Shrike	*Lanius collurio*
Red-billed Quelea	*Quelea quelea*
Red-capped Lark	*Calandrella cinerea*
Red-winged Starling	*Onychognathus morio*
Rock Kestrel	*Falco rupicolus*
Rock Martin	*Ptyonoprogne fuligula*
Sabota Lark	*Calendulauda sabota*
Scaly-feathered Finch (Weaver)	*Sporopipes squamifrons*
Secretarybird	*Sagittarius serpentarius*
Sickle-winged Chat	*Emarginata sinuata*
South African Cliff Swallow	*Petrochelidon spilodera*
South African Shelduck	*Tadorna cana*
Southern (Common) Fiscal	*Lanius collaris*
Southern Grey-headed Sparrow	*Passer diffusus*
Speckled Pigeon	*Columba guinea*
Spike-heeled Lark	*Chersomanes albofasciata*
Spotted Eagle-Owl	*Bubo africanus*
Spotted Thick-knee	*Burhinus capensis*
Spur-winged Goose	*Plectropterus gambensis*
Temminck's Courser	*Cursorius temminckii*
Three-banded Plover	*Charadrius tricollaris*
Verreaux's Eagle	*Aquila verreauxii*
Wattled Starling	*Creatophora cinerea*
White-backed Mousebird	*Colius colius*
White-rumped Swift	*Apus caffer*

Common Name	Scientific Name
Yellow-bellied Eremomela	*Eremomela icteropygialis*
Zitting Cisticola	*Cisticola juncidis*

8.10 Appendix G – Specialists Qualifications



RHODES UNIVERSITY

THIS IS TO CERTIFY THAT

LEIGH-ANN ROBYNNE DE WET

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

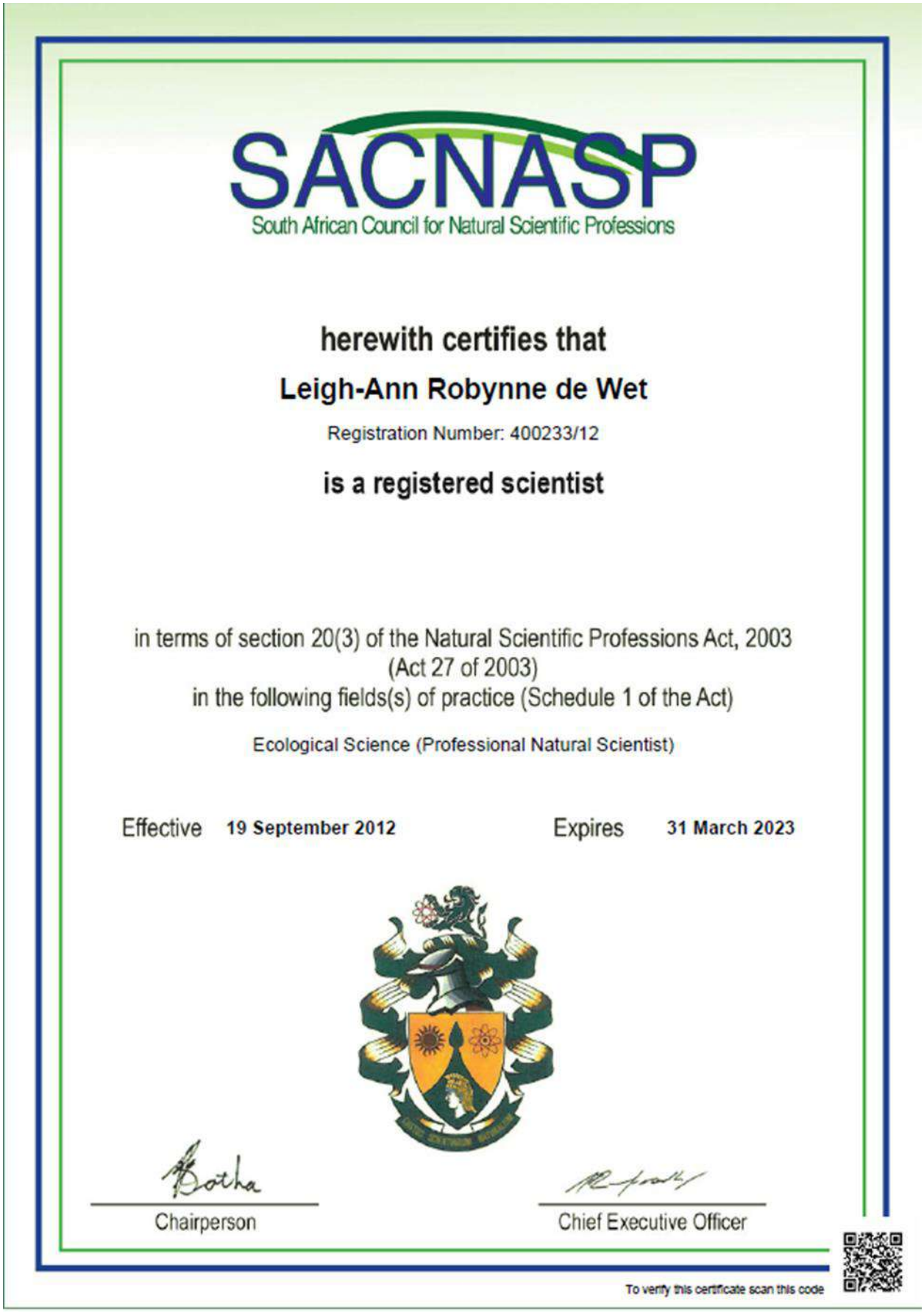
MASTER OF SCIENCE

VICE CHANCELLOR

DEAN OF THE FACULTY OF SCIENCE

REGISTRAR

GRAHAMSTOWN
12 APRIL 2007



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Leigh-Ann Robynne de Wet

Registration Number: 400233/12

is a registered scientist

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

Ecological Science (Professional Natural Scientist)

Effective 19 September 2012 Expires 31 March 2023

Chairperson

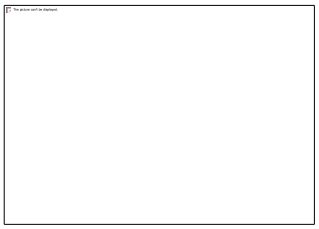
Chief Executive Officer

To verify this certificate scan this code

8.11 Appendix H – Specialists Declaration of Independence

I, Leigh-Ann de Wet, declare that:

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



Leigh-Ann de Wet

Biodiversity Specialist

The Biodiversity Company

May 2022

8.12 Appendix I – Specialist CV

Leigh-Ann de Wet

M.Sc Botany (*Pr Sci Nat*)

Cell: +27 83 352 1936

Email: leigh-ann@thebiodiversitycompany.com

Identity Number: 8209010127081

Date of birth: 1 September 1982

Profile Summary

Working experience throughout South Africa, Southern Africa West and Central Africa and also Madagascar.

Specialist experience in exploration, mining, engineering, hydropower, private sector and renewable energy.

Experience with project management for national and international biodiversity projects.

Experience with IFC Performance Standards, Critical Habitat and High Conservation Value Assessments. Experience in numerous vegetation and habitat types throughout Africa,

Specialist expertise includes botany, forest ecology, avifauna and terrestrial fauna. Methodology development, conservation management and terrestrial monitoring.

Areas of Interest

Forest ecology and ecosystem functionality.

Ecology and plant identification.

Field methodology.

Publication of scientific journals and articles.

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements.
- Familiar with High Conservation Value assessments as per ProForest guidelines.
- Conservation Management Plans.
- Flora assessments.
- Avifauna assessments.
- Terrestrial fauna assessments.
- Monitoring.
- Ecosystem services
- Rehabilitation Plans.
- Alien Invasive Plant Management Plans.
- Permitting.

Country Experience

Mozambique,

Malawi,

Zambia,

Madagascar,

Liberia,

Guinea'

Democratic Republic of the Congo,

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Zulu - Basic

Qualifications

- MSc (Rhodes University) – Botany.
- BSc Honours (Rhodes University) – Botany
- BSc Natural Science (Botany and Entomology)
- Pr Sci Nat (400233/12)
- Certificate of Competence: UFS Introduction to wetland delineation.
- Certificate of Competence: UFS Introduction to wetland law
- Certificate of competence: Africa Land Use Training Grass Identification (long and short course)
- Certificate of Competence: ASI Snake Awareness, first aid for snake bite and venomous snake handling.

SELECTED PROJECT EXPERIENCE

Project Name: The Environmental Impact Assessment for the Karpowership Project including ships, and associated terrestrial infrastructure in Richards Bay, Coega and Saldanha Bay, South Africa.

Personal position / role on project: Specialist Terrestrial Ecologist and Avifauna specialist.

Location: South Africa (including KZN, Eastern and Western Cape) (2021).

Main project features: To determine the current status of the avifauna and terrestrial biodiversity.

Project Name: A biodiversity baseline and impact assessment for the proposed Siguiri Gold Mine Project, in Kankan Province, Guinea.

Personal position / role on project: Botanist

Location: Guinea

Main project features: To conduct a dual season ecological baseline assessment for the expected impact footprint area. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: The Environmental Impact Assessment for the proposed Sibaya Node 6 development, Umdloti, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed mixed use development location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora.

Project Name: Terrestrial Biodiversity Monitoring (including rehabilitation, alien vegetation and indigenous ecology) for the Sibaya Node 6 development, Umdloti, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct monthly monitoring for the Sibaya Node 6 development (Salta) for 6 months including completing a detailed Vegetation Assessment, Rehabilitation Plan, Plant Rescue Plan, Conservation Management Plan and Biodiversity Action Plan.

Project Name: The Environmental Impact Assessment for the proposed Roodeplaatwind energy facility, Eastern Cape, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed wind farm location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora. This included An Ecological Assessment, Rehabilitation Plan, Plant Rescue and Protection Plan, Open Space Management Plan and Alien Vegetation Management Plan.

Project Name: The Environmental Impact Assessment for the proposed Roodeplaatwind energy facility, Eastern Cape, South Africa.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa

Main project features: To conduct a flora and fauna specialist assessment of the proposed wind farm location and determine the impacts associated with the proposed development in relation to terrestrial fauna and flora.

Project Name: Conservation Value Assessment for the City of Johannesburg (Little Falls Nature Reserve, Melville Koppies Nature Reserve, Ruimsig Butterfly Reserve and Rietfontein Nature Reserve)

Personal position / role on project: Terrestrial Ecologist

Location: Gauteng, South Africa

Main project features: Determination of the conservation potential and connectivity of four nature reserves within the City of Johannesburg including both fauna and flora.

Project Name: Feronia Palm Oil Projects, Including Boteka, Lokutu and Yaligimba, Democratic Republic of the Congo.

Personal position / role on project: Terrestrial Ecologist and HCV Specialist

Location: Democratic Republic of the Congo

Main project features: Determination and mapping of High Conservation Value areas within three oil palm plantations in the DRC to meet international best practice. Components including flora and fauna assessments as well as the integration of social aspects into the HCV assessment.

OVERVIEW

An overview of the specialist technical expertise includes the following:

- Terrestrial Ecological baseline assessments and categorization of the current condition of the environment.
- Ecosystem services for biodiversity, and the ecological and social interactions.

- Integration of specialist reports into IFC standard or HCV reporting.
- Design and adaptation of field methodology for assessment.
- Terrestrial Biodiversity offset strategy designs.
- Terrestrial rehabilitation plans.
- Monitoring plans for terrestrial systems.
- Faunal surveys which include mammals, birds, amphibians and reptiles.
- The design, compilation and implementation of Biodiversity and Land Management Plans and strategies.

EMPLOYMENT EXPERIENCE

The Biodiversity Company (March 2022 – Present)

Terrestrial Ecologist.

LD Biodiversity (August 2014 – March 2022)

Director and Terrestrial Ecologist

Digby Wells Environmental (July 2012 – September 2014)

Terrestrial Ecologist

Coastal and Environmental Services (March 2009 – June 2012)

Terrestrial Ecologist

PREVIOUS EMPLOYMENT: Rhodes University Department of Botany

Research Assistant

ACADEMIC QUALIFICATIONS

Rhodes University, Grahamstown, South Africa (2007): MAGISTER SCIENTIAE (MSc) - Botany:

Title: *Pollinator mediated selection in Pelargonium reniforme Curtis (Geraniaceae): Patterns and Process.*

Rand Afrikaans University (RAU), Johannesburg, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Botany

Rand Afrikaans University (RAU), Johannesburg, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Entomology and Botany.

PUBLICATIONS

Taylor, S, Ripley, B, Martin, T, **de Wet, L,** Woodward, I and Osborne, C (2014.) Physiological advantages of C4 grasses in the field: a comparative experiment demonstrating the importance of drought. Global Change Biology – in Press.

Ripley BS, **de Wet, L** and Hill MP (2008). Herbivory-induced reduction in photosynthetic productivity of water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach (Pontederiaceae), is not directly related to reduction in photosynthetic leaf area. African Entomology 16(1): 140-142.

de Wet LR, Barker NP and Peter CI (2008). The long and the short of gene flow and reproductive isolation: Inter-Simple Sequence Repeat (ISSR) markers support the recognition of two floral forms in *Pelargonium reniforme* (Geraniaceae). Biochemical Systematics and Ecology 36: 684-690.

de Wet L, NP Barker and CI Peter (2006). Beetles and Bobartia: an interesting herbivore-plant relationship. Veld & flora. September: 150 – 151.

de Wet LR and Botha CEJ (2007). Resistance or tolerance: An examination of aphid (*Sitobion yakini*) phloem feeding on Betta and Betta-Dn wheat (*Triticum aestivum* L.). South African Journal of Botany 73(1): 35-39.

de Wet L (2005). Is *Pelargonium reniforme* in danger? The effects of harvesting on *Pelargonium reniforme*. Veld & Flora. December: 182-184.

TERRESTRIAL ECOLOGY: SITE SENSITIVITY VERIFICATION

CONTENTS

1. INTRODUCTION

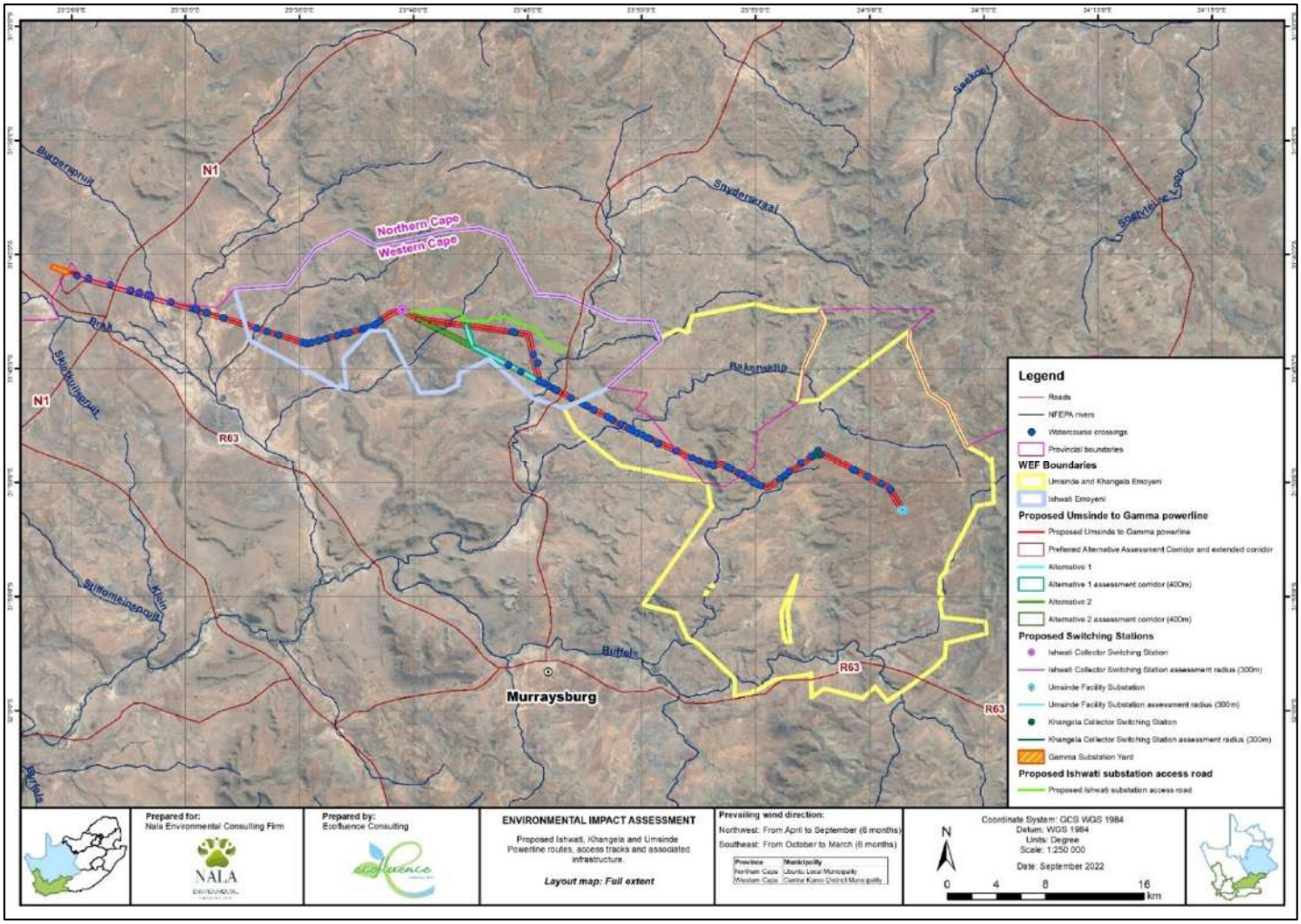
The applicant, Eskom Holdings SOC Limited is proposing the establishment of the 132kV grid connection infrastructure (overhead powerline and x3 on-site switching stations), associated access tracks & watercourse crossings associated with the authorised Emoyeni Wind Energy Facilities located in the Beaufort West & Ubuntu Local Municipalities, Northern and Western Cape Provinces.

The following Environmental Authorisations for various grid connection infrastructure and wind energy facilities related to the Emoyeni Wind Energy Facilities and their authorised grid connection infrastructure were previously obtained:

Umsinde Emoyeni Wind Energy Facility	DFFE Ref: 14/12/16/3/3/2/686 on 06 September 2018
132kV Grid connection Infrastructure associated with the Umsinde Emoyeni WEF	DFFE Ref: 14/12/16/3/3/2/684 on 06 September 2018
Khangela Emoyeni Wind Energy Facility	DFFE REF:. 14/12/16/3/3/2/687 on the 06 September 2018
132kV Grid connection Infrastructure associated with the Khangela Emoyeni WEF	DFFE REF:. 14/12/16/3/3/2/685 on 06 September 2018
Ishwati Emoyeni Wind Energy Facility	DFFE Ref: 12/12/20/2351 on 2 July 2015
Transmission grid connection infrastructure (Eskom Gamma Main Transmission Substation)	DFFE Ref: 14/12/16/3/3/2/410 on 02 July 2015

Distribution grid connection infrastructure (Eskom distribution grid connection infrastructure consisting of 132kV power lines and on-site switching station located within the authorised Ishwati Emoyeni Wind Energy Facility)	DFFE Ref: 14/12/16/3/3/2/411 on 02 July 2015

Following receipt of the relevant Environmental Authorisations for the grid connection infrastructure for the Umsinde and Khangela Emoyeni Wind Energy Facilities (DFFE Ref:14/12/16/3/3/2/684 and DFFE Ref:.14/12/16/3/3/2/685) , it was noted that several listed activities that were relevant to the grid infrastructure had not been considered , therefore new a Basic Assessment process



will be undertaken that will now consider all the applicable listed activities as per the EIA Regulations. In addition, due to alterations in the wind farm layouts, and based on further technical analysis and liaison with Eskom's technical and grid access units it was determined that the previously authorised powerline routings intended to evacuate electricity generated from these authorised wind energy facilities to the National Grid via the Gamma Substation are no longer suitable/ optimal and will need to be revised to cater for final wind farm layouts, and Eskom's connection requirements. A new Basic Assessment will therefore be undertaken to assess the revised (re-optimised) grid connection layout as well all applicable listed activities, including the listed activities omitted from the original BA process. The proposed 400m wide development corridor that has been identified for the development of the grid connection infrastructure required to evacuate power generated from the authorised Emoyeni WEFs, is informed by the most feasible grid connection point into the national grid from a technical, economic and environmental perspective.

Figure 1. Proposed Layout map for the proposed development corridor and associated infrastructure related to the Emoyeni Wind Energy Facilities

Since the Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities have been selected as preferred bidder projects by private offtakers and based on further technical analysis and liaison with Eskom's technical and grid access units it was determined that the previously authorised powerline routings intended to evacuate electricity generated from these authorised wind energy facilities to the National Grid via the Gamma Substation are no longer suitable/ optimal and will need to be revised to cater for final wind farm layouts, and Eskom's connection requirements. Therefore, new grid connection infrastructure is proposed that is in line with Eskom's technical and feasibility requirements. The following Infrastructure has been assessed:

- The establishment of a 132kV collector substation (switching station) within the authorised Umsinde Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100m X 80m (~0.8ha) to be located within an assessment footprint that encompasses a 300m radius.
- The establishment of a 132kV collector substation (switching station) within the authorised Khangela Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100m X 80m (~0.8ha) to be located within an assessment footprint that encompasses a 300m radius.

- The establishment of a 132kV collector substation (switching station) within the authorised Ishwati Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 120m X 100m (~1.2 ha) with an assessment footprint that encompasses a 300m radius.

- The establishment of a 132kV powerline within a 400m wide corridor that will extend from the Khangela switching station to the Ishwati switching station (~36km), and then onward for ~25km to the Eskom Gamma Substation. In addition, a further length of 132kV powerline (within a 400m wide corridor) will extend from the Umsinde switching station to the Khangela switching station for ~8km OR it may connect directly into the Khangela-Ishwati powerline at the Khangela switching station. An extended powerline development corridor of approximately 1.91 km^2 has been assessed in the vicinity of the Gamma Substation, that will enable the 132kV powerline to connect to either the south face of the Gamma Substation yard or approach from the east, depending on the available connection point at the time of connection. The 132kV Powerline from Umsinde to Khangela, and from Khangela to Ishwati and onward to Gamma Substation will be a single- or double-circuit overhead powerline, with a single set of pylons structures with a maximum height of 35m Access/service tracks (jeep track) up to 7m wide and associated watercourse crossings will be associated with the powerline, and will be located within the assessed powerline corridor.

- The establishment of a new access road approximately 14km long from the existing public road from Richmond to the Ishwati switching station site. The proposed new access road will be unsealed and up to 12m wide during construction , but will be reduced to a maximum of 6 m width during operation. The access road will largely follow an existing farm road (to be upgraded), but will also entail development of a new length of road.

The proposed grid infrastructure along with the access roads and water crossings are located within the authorised Umsinde, Khangela and Ishwati Wind Energy Facilities northeast of the town of Murraysburg. The authorised Umsinde Emoyeni WEF (DFFE REF: :.14/12/16/3/3/2/686), Khangela Emoyeni Wind Energy Facility (DEA REF:. 14/12/16/3/3/2/687) and the Ishwati Emoyeni Wind Energy Facility (DFFE REF: DFFE Ref: 12/12/20/2351) sites are located within the Beaufort West Renewable Energy Development Zone (REDZ) and the majority of the new proposed grid connection infrastructure falls within the REDZ and the Central Corridor of the Strategic Transmission Corridors.

Table 1.1: Location of proposed new development corridor housing the 132kV grid connection infrastructure, access tracks and watercourse crossings:

Province	Northern and Western Cape Province

Local Municipality	Beaufort West and Ubuntu Local Municipality
District Municipality	Central Karoo and Pixley ka Seme District Municipality
Nearest Town	Murraysburg
Ward No.	Ward 1 (BWLM), Ward 3 (ULM)
Details of properties affected	• Portion 1 of farm Klein Driefontein No. 152 • Remainder of Farm De Hoop No. 30; • Portion 2 of Farm De Hoop No. 30 • Remainder of Farm Swavel Kranse No. 28 • Portion 2 of Farm Swavel Kranse No. 28 • Portion 4 (portion of portion 1) of Farm Driefontein 26 • Portion 6 of Farm Klipplaat No. 109 Portion 4 (portion of portion 2) of Farm Klipplaat No. 109 • Portion 1 of the Farm Klipplaat No. 109 • Remainder Klipplaat No. 109 • Portion 1 of the Farm Uitvlugtfontein No. 265 • The Farm Riet Poort No. 9 • Remainder of Farm Driefontein No. 8 • Portion 3 of Farm Badfontein No. 10 (powerline alternative 1 route) • Remainder of Farm Leeuwenfontein No. 6 • Portion 2 of Farm Leeuwenfontein No. 6 • Portion 4 (a portion of portion 1) of Farm Allemansfontein No.7 • Portion 2 (a portion of portion 1) of Farm Allemansfontein No.7 • The Farm Klein Los Kop No.5 • Remainder of the Farm Schietkuil No.3

Table 1.2. The centre line co-ordinates of the 400m wide development corridor* are presented below for the proposed corridor alternatives:

	Preferred Alternative		**Alternative 1**		**Alternative 2**	
	Latitude	**Longitude**	**Latitude**		**Longitude**	
Start (on-site substation at Umsinde Emoyeni WEF site)	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E
Point 2	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E
Point 3	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E
Start (on-site substation at	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E

Khangela Emoyeni WEF site)						
Point 4	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E
Point 5	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E
Point 6	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E
Point 7	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E
Point 8	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E
Point 9	31°43'29.18"S	23°45'1.23"E	31°44'1.56"S	23°42'34.93"E	31°44'1.56"S	23°42'34.93"E
Point 10	31°42'48.88"S	23°40'11.59"E	31°43'6.86"S	23°42'18.16"E	31°42'48.88"S	23°40'11.59"E
			31°42'48.88"S	23°40'11.59"E		
Point 11 (Ishwati Collector Sub)	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E
Point 12	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E
Point 13	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E
Point 14	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E
Point 15	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E
End (Extended 1.91 km^2 development corridor to (Gamma Substation) Preferred Alternative from the east	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E
End (Extended 1.91 km^2 development corridor to Gamma Substation) Preferred Alternative from the south	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E

Table 1.3. Water Crossing Points along the 132kV Powerline within a 400m-wide corridor and gravel access track approximately 7m wide from the Umsinde Emoyeni switching station and extended 1.91 km^2 corridor to the Gamma Substation (Preferred Alternative):

Gamma Substation to Ishwati Switching Station					
Watercourse Crossing	GPS Coordinates		Watercourse Crossing	GPS Coordinates	
	Latitude	Longitude		Latitude	Longitude
1	31º 40.895'S	23º 25.233'E	16	31º 43.839'S	23º 35.129'E
2	31º 41.036'S	23º 25.743'E	17	31º 43.889'S	23º 35.303'E
3	31º 41.303'S	23º 26.688'E	18	31º 43.853'S	23º 35.487'E
4	31º 41.551'S	23º 27.579'E	19	31º 43.738'S	23º 35.826'E
5	31º 41.647'S	23º 27.969'E	20	31º 43.660'S	23º 36.141'E
6	31º 41.776'S	23º 28.327'E	21	31º 43.518'S	23º 36.634'E
7	31º 41.815'S	23º 28.474'E	22	31º 43.458'S	23º 36.905'E
8	31º 42.067'S	23º 29.346'E	23	31º 43.453'S	23º 36.987'E
9	31º 42.354'S	23º 30.316'E	24	31º 43.389'S	23º 37.208'E
10	31º 42.405'S	23º 30.479'E	25	31º 43.261'S	23º 37.699'E
11	31º 42.538'S	23º 30.925'E	26	31º 43.238'S	23º 37.813'E
12	31º 42.772'S	23º 31.654'E	27	31º 43.229'S	23º 37.905'E
13	31º 43.233'S	23º 33.111'E	28	31º 43.178'S	23º 38.061'E
14	31º 43.362'S	23º 33.570'E	29	31º 43.082'S	23º 38.300'E
15	31º 43.536'S	23º 34.080'E	30	31º 42.930'S	23º 38.518'E

Ishwati Switching Station to Khangela Switching Station					
Watercourse Crossing	GPS Coordinates		Watercourse Crossing	GPS Coordinates	
	Latitude	Longitude		Latitude	Longitude
31	31º 42.866'S	23º 40.290'E	58	31º 47.823'S	23º 49.804'E
32	31º 43.284'S	23º 41.134'E	59	31º 47.901'S	23º 49.951'E
33	31º 43.688'S	23º 41.937'E	60	31º 48.006'S	23º 50.198'E
34	31º 42.898'S	23º 41.616'E	61	31º 48.066'S	23º 50.364'E
35	31º 43.027'S	23º 42.364'E	62	31º 48.259'S	23º 50.708'E
36	31º 44.009'S	23º 42.534'E	63	31º 48.621'S	23º 51.486'E
37	31º 43.178'S	23º 43.374'E	64	31º 48.904'S	23º 52.183'E
38	31º 43.261'S	23º 44.255'E	65	31º 49.041'S	23º 52.498'E
39	31º 43.293'S	23º 44.328'E	66	31º 49.190'S	23º 52.867'E
40	31º 44.504'S	23º 43.539'E	67	31º 49.215'S	23º 53.392'E
41	31º 44.270'S	23º 45.237'E	68	31º 49.404'S	23º 53.891'E
42	31º 44.826'S	23º 44.149'E	69	31º 49.442'S	23º 53.813'E
43	31º 45.124'S	23º 44.700'E	70	31º 49.598'S	23º 54.228'E
44	31º 44.812'S	23º 45.526'E	71	31º 49.640'S	23º 54.290'E
45	31º 45.537'S	23º 45.494'E	72	31º 49.691'S	23º 54.376'E
46	31º 45.845'S	23º 46.109'E	73	31º 49.860'S	23º 54.672'E
47	31º 45.739'S	23º 45.958'E	74	31º 50.021'S	23º 54.889'E
48	31º 45.629'S	23º 45.691'E	75	31º 50.088'S	23º 55.079'E
49	31º 46.235'S	23º 46.853'E	76	31º 50.152'S	23º 55.217'E
50	31º 46.547'S	23º 47.440'E	77	31º 49.854'S	23º 56.055'E
51	31º 46.717'S	23º 47.775'E	78	31º 49.748'S	23º 56.220'E

52	31º 46.785'S	23º 47.899'E	**79**	31º 49.677'S	23º 56.303'E
53	31º 47.088'S	23º 48.482'E	**80**	31º 49.532'S	23º 56.461'E
54	31º 47.290'S	23º 48.698'E	**81**	31º 49.124'S	23º 56.975'E
55	31º 47.414'S	23º 48.959'E	**82**	31º 48.830'S	23º 57.425'E
56	31º 47.492'S	23º 49.051'E	**83**	31º 48.558'S	23º 57.715'E
57	31º 47.708'S	23º 49.547'E	**84**	31º 48.759'S	23º 57.831'E

Khangela Switching Station to Umsinde Switching Station		
Watercourse Crossing	**GPS Coordinates**	
	Latitude	**Longitude**
83	31º 48.558'S	23º 57.715'E
84	31º 48.759'S	23º 57.831'E
85	31º 48.886'S	23º 58.233'E
86	31º 49.101'S	23º 58.643'E
87	31º 49.438'S	23º 59.251'E
88	31º 49.489'S	23º 59.362'E
89	31º 49.750'S	23º 59.910'E
90	31º 50.062'S	24º 00.493'E
91	31º 50.317'S	24º 00.890'E

Table 1.4. Proposed New Access Road Co-ordinates to the authorised Ishwati Substation site:

	Latitude	**Longitude**
Start (off the existing unnamed gravel road)	31º 44.203'S	23º 46.714'E
Middle	31º 42.906'S	23º 42.942'E
End (Authorised Ishwati Substation site)	31º 42.407'S	23º 39.506'E

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended], various aspects of the proposed developments may have an impact on the environment and are considered to be listed activities. These activities require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and the Environment (DFFE), prior to the commencement thereof. Further to this as per GN R. 2313 : ***Adoptions of the standard for the development and expansion of powerlines and substation with identified geographical areas and the exclusion of this infrastructure from the requirements to obtain Environmental Authorisation***, the Standard was adopted in terms of section 24(10)(a) of the Act for the purpose of excluding the activities contemplated in paragraph 5.1 and 5.2 of the Schedule from the requirement to obtain environmental authorisation prior to commencement. In terms of the procedural requirement set out in the standard, screening tool reports have been undertaken for the grid corridor and associated infrastructure and site sensitivity verifications have been undertaken by the relevant specialists in accordance with the sensitivity themes. As per 6.1. of the GNR .2313, "Where any part of the infrastructure occurs on an area for which the environmental sensitivity for any environmental theme is identified as being very high or high by the national web based environmental screening tool and confirmed to be such through the application of the

procedures set out in the Standard", the site sensitivity verifications have been performed as per the procedural requirements set out.

In accordance with GN 320 and GN 1150 (20 March 2020)[1] of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Leigh- Ann De Wet, Andrew Husted and Jan Jacobs, as terrestrial specialists, have been commissioned to verify the sensitivity of the project sites under these specialist protocols.

The scope of this report is for one (1) application, namely the 132KV grid connection infrastructure, associated access tracks & water course crossings associated with the authorised Emoyeni wind energy facilities, near Murraysburg, Beaufort West and Ubuntu Local Municipalities and Central Karoo and Pixely ka Seme District Municipalities, Western Cape, and Northern Cape Provinces.

2. SITE SENSITIVITY VERIFICATION METHODOLOGY

The following information sources were consulted to compile this report:

- National Biodiversity Assessment 2018 (Skowno *et al,* 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2022) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
    - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection.

[1] GN 320 (20 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

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

- Northern Cape Critical Biodiversity Areas (2016): The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.
    - The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.
    - The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province.
- Western Cape Biodiversity Spatial Plan (WCBSP): The WCBSP has been developed by CapeNature Scientific Services Land Use Team in order to identify the priority biodiversity areas and ecological infrastructure that must be conserved to meet the provincial biodiversity mandate (Pool-Stanvliet *et.al.* 2017). The plan includes land use guidelines along with biodiversity priority areas, covering terrestrial, freshwater, coastal and marine areas. The plan identified areas as Critical Biodiversity Areas (CBAs) which cannot be lost if conservation goals are to be met, and Ecological Support Areas (ESAs) (Table 5-1), which are required to support the functioning of ecosystems and CBAs (Pool-Stanvliet *et.al.* 2017).
- 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.

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. 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.

Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the FrogMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022a) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares;
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the ReptileMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022b) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares; and
- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the MammalMap database of the Animal Demography Unit (FitzPatrick Institute of African Ornithology. 2022c.) using the 3128CB, 3128DA, 3123DB, 3123DD and 3124CC quarter degree squares.

Flora Assessment

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

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

Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al,* 2015);

- Karoo: South African Wild Flower Guide 6. (Shearing 2008);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);
- Field Guide to Succulents in Southern Africa (Smith *et al,* 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at https://www.inaturalist.org/home (the project specific data can be found at https://www.inaturalist.org/projects/kangela, where a full up-to-date species list of all photographed species resides).

Faunal Assessment

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

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

Diagnostic features of the individuals that were captured were photographed at site and released.

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

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

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 1.5 and Table 1.6 respectively.

Table 1.5. 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 1.6 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 1.7

Table 1.7 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 1.8

Table 1.8 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 1.9

Table 1.9 Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance

Site Ecological Importance		Biodiversity Importance				
		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

3. OUTCOME OF SITE SENSITIVITY VERIFICATION

The combined Terrestrial Biodiversity Theme Sensitivity for the assessment area was derived to be Very High as indicated in the National Environmental Screening Tool.

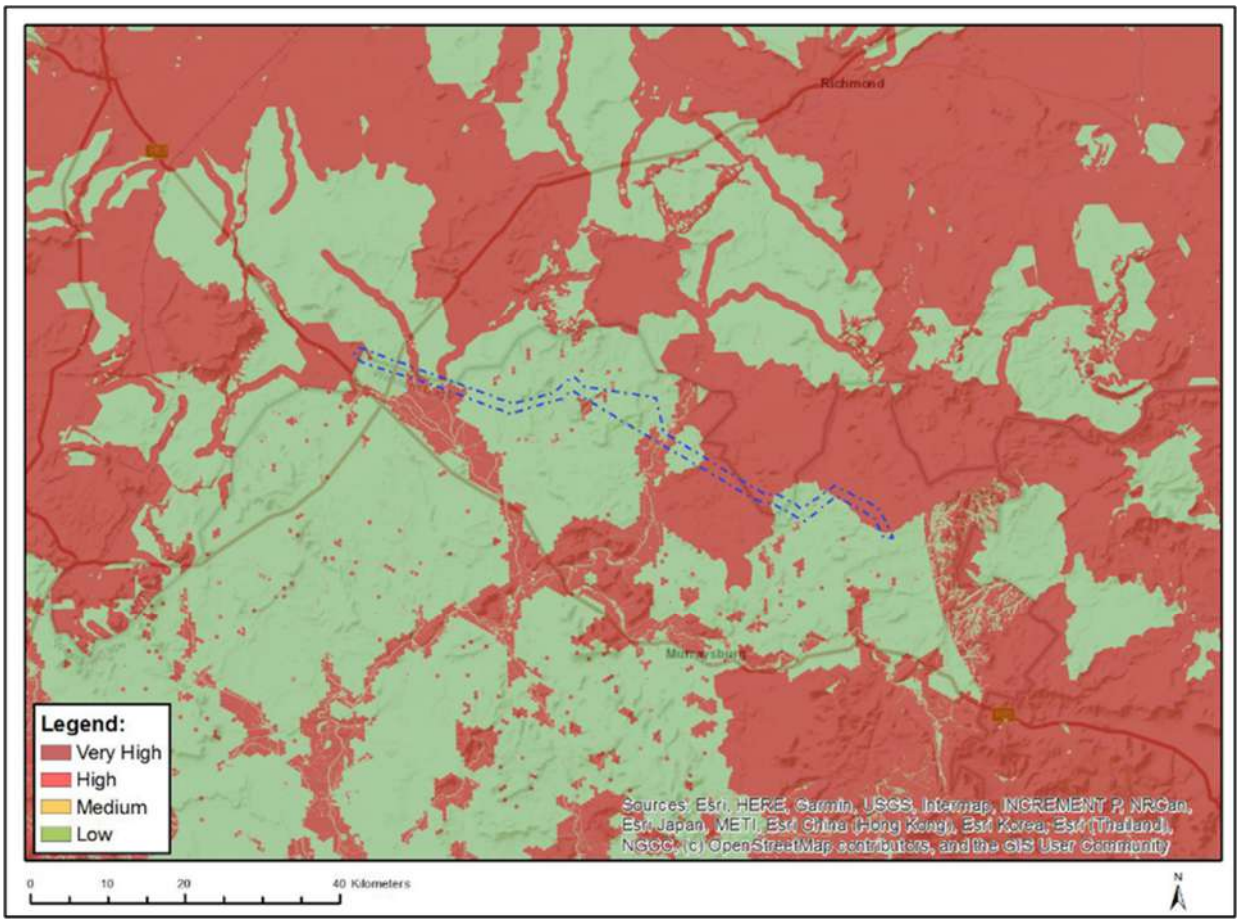


Figure 2: The classification of the study area in the DFFE online screening tool.

Four (4) different habitat types were delineated within the assessment area (Table 1.10). Based on the criteria provided in the species protocols for the site ecological sensitivity, all habitats within the assessment area of the proposed development were allocated a sensitivity category or SEI. The sensitivities of the habitat types delineated are illustrated in Figure 3.

Habitats categorised as Transformed consisted of buildings, roads, and cleared areas and were determined to be a 'Very Low' SEI.

Table 1.10 Summary of habitat types delineated within the field assessment area of the proposed development

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**
Karoo scrub (flat)	Medium	High	**Medium**	Medium	**Medium**
Rocky outcrops	High	High	**High**	Low	**Very high**
Wash (wetland) areas	Medium	High	**High**	Medium	**High**

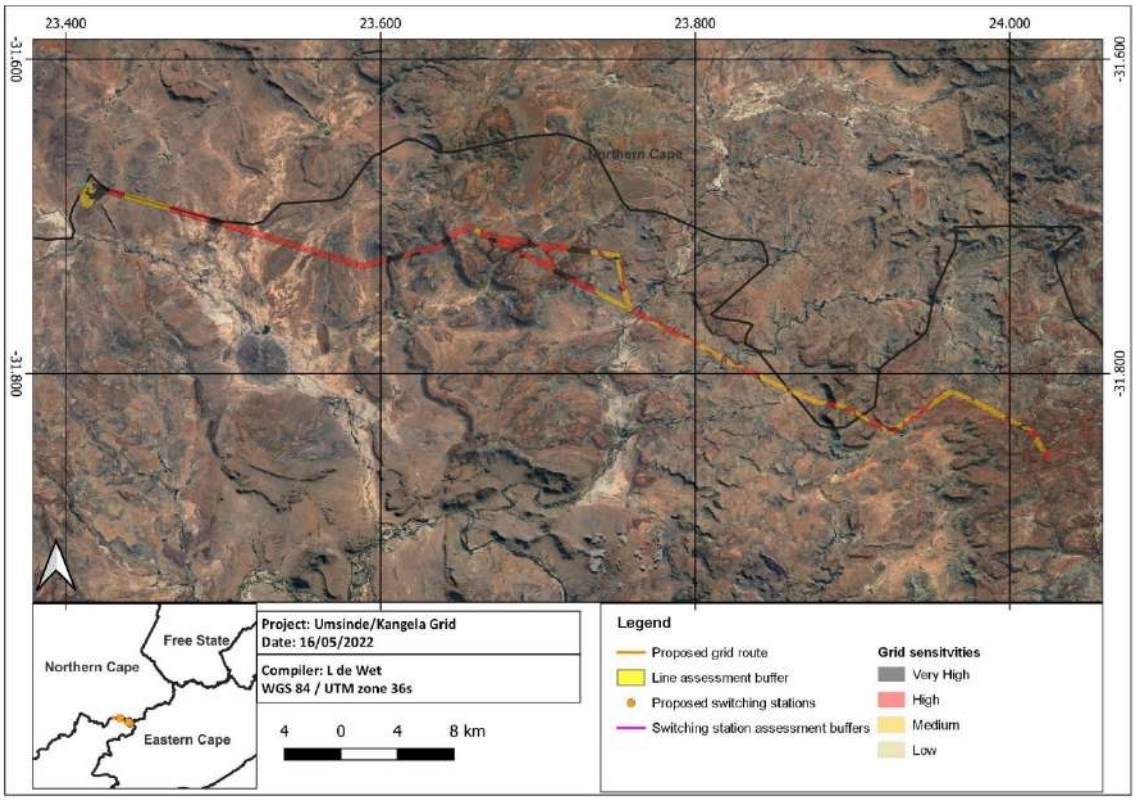


Figure 3 Map illustrating Site Ecological Importance (SEI) of the terrestrial habitat types within the assessment area

It can thus be said that the overall screening tool rating were confirmed by the field assessment, however the report disagrees with the low rating in certain portions based on the map provided.

4. CONCLUSION

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High and Very High SEI. This is due to the combination of their functional integrity and conservation importance.

Based on the habitat present, there is a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded in the study area.
This overall classification of the screening tool is thus confirmed to be accurate as far as the impact of the proposed powerline, substation and associated infrastructure is concerned, based on actual conditions recorded on the ground during the site visit of March 2022, April 2022 and August 2022.

AVIFAUNA: SITE SENSITIVITY VERIFICATION

CONTENTS

1. INTRODUCTION

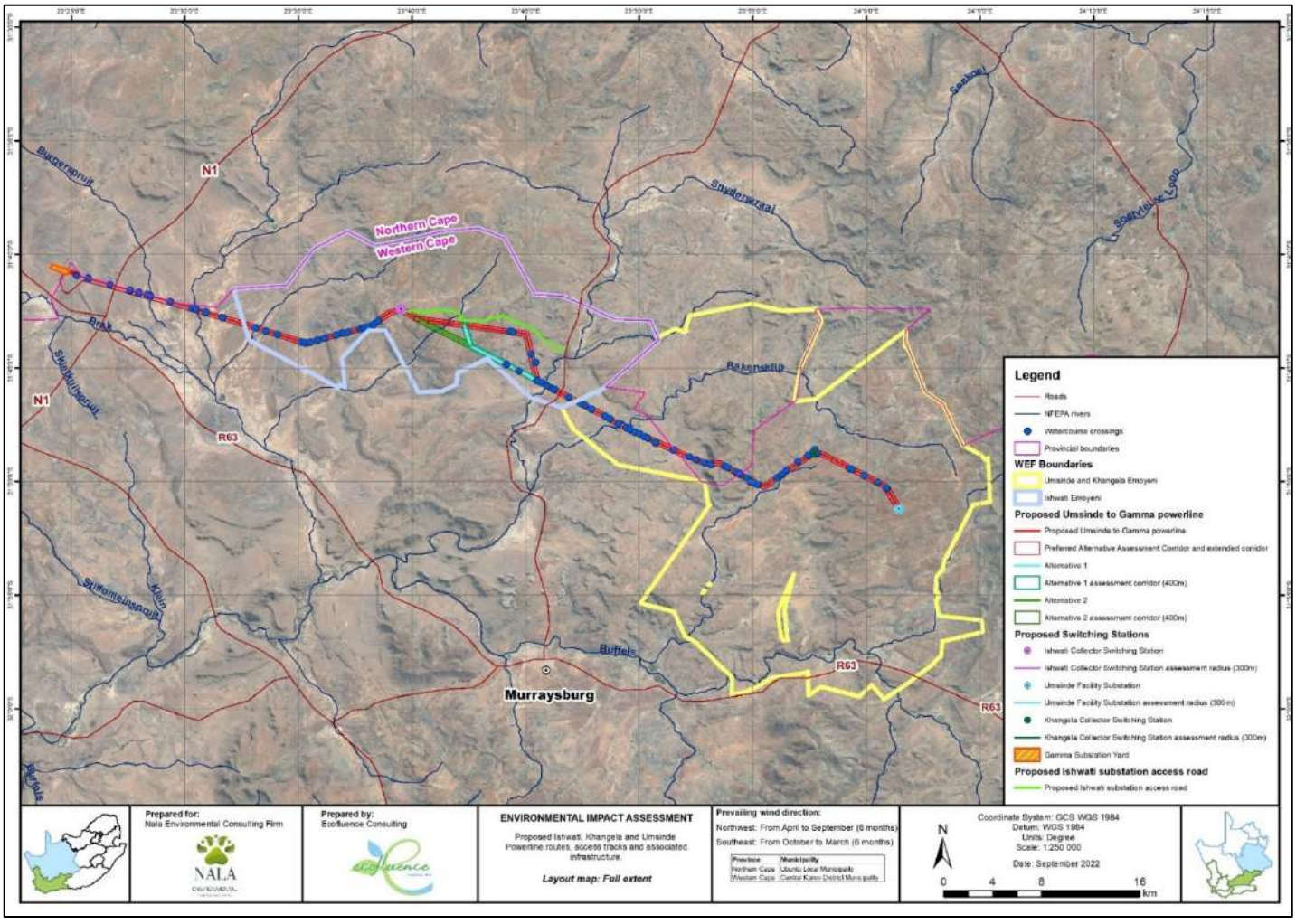
The applicant, Eskom Holdings SOC Limited is proposing the establishment of the 132kV grid connection infrastructure (overhead powerline and x3 on-site switching stations), associated access tracks & watercourse crossings associated with the authorised Emoyeni Wind Energy Facilities located in the Beaufort West & Ubuntu Local Municipalities, Northern and Western Cape Provinces.

The following Environmental Authorisations for various grid connection infrastructure and wind energy facilities related to the Emoyeni Wind Energy Facilities and their authorised grid connection infrastructure were previously obtained:

Umsinde Emoyeni Wind Energy Facility	DFFE Ref: 14/12/16/3/3/2/686 on 06 September 2018
132kV Grid connection Infrastructure associated with the Umsinde Emoyeni WEF	DFFE Ref: 14/12/16/3/3/2/684 on 06 September 2018
Khangela Emoyeni Wind Energy Facility	DFFE REF:. 14/12/16/3/3/2/687 on the 06 September 2018
132kV Grid connection Infrastructure associated with the Khangela Emoyeni WEF	DFFE REF:. 14/12/16/3/3/2/685 on 06 September 2018

Ishwati Emoyeni Wind Energy Facility	DFFE Ref: 12/12/20/2351 on 2 July 2015
Transmission grid connection infrastructure (Eskom Gamma Main Transmission Substation)	DFFE Ref: 14/12/16/3/3/2/410 on 02 July 2015
Distribution grid connection infrastructure (Eskom distribution grid connection infrastructure consisting of 132kV power lines and on-site switching station located within the authorised Ishwati Emoyeni Wind Energy Facility)	DFFE Ref: 14/12/16/3/3/2/411 on 02 July 2015

Following receipt of the relevant Environmental Authorisations for the grid connection infrastructure for the Umsinde and Khangela Emoyeni Wind Energy Facilities (DFFE Ref:14/12/16/3/3/2/684 and DFFE Ref:.14/12/16/3/3/2/685) , it was noted that several listed activities that were relevant to the grid infrastructure had not been considered , therefore new a Basic Assessment process



will be undertaken that will now consider all the applicable listed activities as per the EIA Regulations. In addition, due to alterations in the wind farm layouts, and based on further technical analysis and liaison with Eskom's technical and grid access units it was determined that the previously authorised powerline routings intended to evacuate electricity generated from these authorised wind energy facilities to the National Grid via the Gamma Substation are no longer suitable/ optimal and will need to be revised to cater for final wind farm layouts, and Eskom's connection requirements. A new Basic Assessment will therefore be undertaken to assess the revised (re-optimised) grid connection layout as well all applicable listed activities, including the listed activities omitted from the original BA process. The proposed 400m wide development corridor that has been identified for the development of the grid connection infrastructure required to evacuate power generated from the authorised Emoyeni WEFs, is informed by the most feasible grid connection point into the national grid from a technical, economic and environmental perspective.

Figure 1. Proposed Layout map for the proposed development corridor and associated infrastructure related to the Emoyeni Wind Energy Facilities

Since the Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities have been selected as preferred bidder projects by private offtakers and based on further technical analysis and liaison with Eskom's technical and grid access units it was determined that the previously authorised powerline routings intended to evacuate electricity generated from these authorised wind energy facilities to the National Grid via the Gamma Substation are no longer suitable/ optimal and will need to be revised to cater for final wind farm layouts, and Eskom's connection requirements. Therefore, new grid connection infrastructure is proposed that is in line with Eskom's technical and feasibility requirements. The following Infrastructure has been assessed:

- The establishment of a 132kV collector substation (switching station) within the authorised Umsinde Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100m X 80m (~0.8ha) to be located within an assessment footprint that encompasses a 300m radius.
- The establishment of a 132kV collector substation (switching station) within the authorised Khangela Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 100m X 80m (~0.8ha) to be located within an assessment footprint that encompasses a 300m radius.

- The establishment of a 132kV collector substation (switching station) within the authorised Ishwati Emoyeni WEF site (adjacent to the WEF facility substation) with a footprint of approximately 120m X 100m (~1.2 ha) with an assessment footprint that encompasses a 300m radius.

- The establishment of a 132kV powerline within a 400m wide corridor that will extend from the Khangela switching station to the Ishwati switching station (~36km), and then onward for ~25km to the Eskom Gamma Substation. In addition, a further length of 132kV powerline (within a 400m wide corridor) will extend from the Umsinde switching station to the Khangela switching station for ~8km OR it may connect directly into the Khangela-Ishwati powerline at the Khangela switching station. An extended powerline development corridor of approximately 1.91 km^2 has been assessed in the vicinity of the Gamma Substation, that will enable the 132kV powerline to connect to either the south face of the Gamma Substation yard or approach from the east, depending on the available connection point at the time of connection. The 132kV Powerline from Umsinde to Khangela, and from Khangela to Ishwati and onward to Gamma Substation will be a single- or double-circuit overhead powerline, with a single set of pylons structures with a maximum height of 35m Access/service tracks (jeep track) up to 7m wide and associated watercourse crossings will be associated with the powerline, and will be located within the assessed powerline corridor.

- The establishment of a new access road approximately 14km long from the existing public road from Richmond to the Ishwati switching station site. The proposed new access road will be unsealed and up to 12m wide during construction , but will be reduced to a maximum of 6 m width during operation. The access road will largely follow an existing farm road (to be upgraded), but will also entail development of a new length of road.

The proposed grid infrastructure along with the access roads and water crossings are located within the authorised Umsinde, Khangela and Ishwati Wind Energy Facilities northeast of the town of Murraysburg. The authorised Umsinde Emoyeni WEF (DFFE REF: :.14/12/16/3/3/2/686), Khangela Emoyeni Wind Energy Facility (DEA REF:. 14/12/16/3/3/2/687) and the Ishwati Emoyeni Wind Energy Facility (DFFE REF: DFFE Ref: 12/12/20/2351) sites are located within the Beaufort West Renewable Energy Development Zone (REDZ) and the majority of the new proposed grid connection infrastructure falls within the REDZ and the Central Corridor of the Strategic Transmission Corridors.

Table 1.1: Location of proposed new development corridor housing the 132kV grid connection infrastructure, access tracks and watercourse crossings:

Province	Northern and Western Cape Province
Local Municipality	Beaufort West and Ubuntu Local Municipality
District Municipality	Central Karoo and Pixley ka Seme District Municipality
Nearest Town	Murraysburg
Ward No.	Ward 1 (BWLM), Ward 3 (ULM)
Details of properties affected	• Portion 1 of farm Klein Driefontein No. 152 • Remainder of Farm De Hoop No. 30; • Portion 2 of Farm De Hoop No. 30 • Remainder of Farm Swavel Kranse No. 28 • Portion 2 of Farm Swavel Kranse No. 28 • Portion 4 (portion of portion 1) of Farm Driefontein 26 • Portion 6 of Farm Klipplaat No. 109 Portion 4 (portion of portion 2) of Farm Klipplaat No. 109 • Portion 1 of the Farm Klipplaat No. 109 • Remainder Klipplaat No. 109 • Portion 1 of the Farm Uitvlugtfontein No. 265 • The Farm Riet Poort No. 9 • Remainder of Farm Driefontein No. 8 • Portion 3 of Farm Badfontein No. 10 (powerline alternative 1 route) • Remainder of Farm Leeuwenfontein No. 6 • Portion 2 of Farm Leeuwenfontein No. 6 • Portion 4 (a portion of portion 1) of Farm Allemansfontein No.7 • Portion 2 (a portion of portion 1) of Farm Allemansfontein No.7 • The Farm Klein Los Kop No.5 • Remainder of the Farm Schietkuil No.3

Table 1.2. The centre line co-ordinates of the 400m wide development corridor* are presented below for the proposed corridor alternatives:

	Preferred Alternative		**Alternative 1**		**Alternative 2**	
	Latitude	**Longitude**	**Latitude**		**Longitude**	
Start (on-site substation at Umsinde Emoyeni WEF site)	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E	31°51'13.38"S	24° 1'25.58"E
Point 2	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E	31°50'14.37"S	24° 0'50.32"E
Point 3	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E	31°48'43.59"S	23°57'55.92"E

Start (on-site substation at Khangela Emoyeni WEF site)	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E	31°48'43.05"S	23°57'42.71"E
Point 4	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E	31°50'14.63"S	23°55'28.86"E
Point 5	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E	31°49'13.74"S	23°53'33.39"E
Point 6	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E	31°49'7.26"S	23°52'39.52"E
Point 7	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E	31°47'31.74"S	23°49'11.72"E
Point 8	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E	31°45'32.28"S	23°45'29.58"E
Point 9	31°43'29.18"S	23°45'1.23"E	31°44'1.56"S	23°42'34.93"E	31°44'1.56"S	23°42'34.93"E
Point 10	31°42'48.88"S	23°40'11.59"E	31°43'6.86"S	23°42'18.16"E	31°42'48.88"S	23°40'11.59"E
			31°42'48.88"S	23°40'11.59"E		
Point 11 (Ishwati Collector Sub)	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E	31°42'24.42"S	23°39'30.33"E
Point 12	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E	31°42'34.31"S	23°38'58.91"E
Point 13	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E	31°43'9.01"S	23°38'11.49"E
Point 14	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E	31°43'54.78"S	23°35'20.23"E
Point 15	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E	31°40'58.19"S	23°25'27.11"E
End (Extended 1.91 km^2 development corridor to (Gamma Substation) Preferred Alternative from the east	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E	31°40'46.22"S	23°24'46.55"E
End (Extended 1.91 km^2 development corridor to Gamma Substation) Preferred Alternative from the south	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E	31°40'56.04"S	23°24'40.11"E

Table 1.3. Water Crossing Points along the 132kV Powerline within a 400m-wide corridor and gravel access track approximately 7m wide from the Umsinde Emoyeni switching station and extended 1.91 km^2 corridor to the Gamma

Substation (Preferred Alternative):

Gamma Substation to Ishwati Switching Station					
Watercourse Crossing	GPS Coordinates		Watercourse Crossing	GPS Coordinates	
	Latitude	Longitude		Latitude	Longitude
1	31° 40.895'S	23° 25.233'E	16	31° 43.839'S	23° 35.129'E
2	31° 41.036'S	23° 25.743'E	17	31° 43.889'S	23° 35.303'E
3	31° 41.303'S	23° 26.688'E	18	31° 43.853'S	23° 35.487'E
4	31° 41.551'S	23° 27.579'E	19	31° 43.738'S	23° 35.826'E
5	31° 41.647'S	23° 27.969'E	20	31° 43.660'S	23° 36.141'E
6	31° 41.776'S	23° 28.327'E	21	31° 43.518'S	23° 36.634'E
7	31° 41.815'S	23° 28.474'E	22	31° 43.458'S	23° 36.905'E
8	31° 42.067'S	23° 29.346'E	23	31° 43.453'S	23° 36.987'E
9	31° 42.354'S	23° 30.316'E	24	31° 43.389'S	23° 37.208'E
10	31° 42.405'S	23° 30.479'E	25	31° 43.261'S	23° 37.699'E
11	31° 42.538'S	23° 30.925'E	26	31° 43.238'S	23° 37.813'E
12	31° 42.772'S	23° 31.654'E	27	31° 43.229'S	23° 37.905'E
13	31° 43.233'S	23° 33.111'E	28	31° 43.178'S	23° 38.061'E
14	31° 43.362'S	23° 33.570'E	29	31° 43.082'S	23° 38.300'E
15	31° 43.536'S	23° 34.080'E	30	31° 42.930'S	23° 38.518'E

Ishwati Switching Station to Khangela Switching Station					
Watercourse Crossing	GPS Coordinates		Watercourse Crossing	GPS Coordinates	
	Latitude	Longitude		Latitude	Longitude
31	31° 42.866'S	23° 40.290'E	58	31° 47.823'S	23° 49.804'E
32	31° 43.284'S	23° 41.134'E	59	31° 47.901'S	23° 49.951'E
33	31° 43.688'S	23° 41.937'E	60	31° 48.006'S	23° 50.198'E
34	31° 42.898'S	23° 41.616'E	61	31° 48.066'S	23° 50.364'E
35	31° 43.027'S	23° 42.364'E	62	31° 48.259'S	23° 50.708'E
36	31° 44.009'S	23° 42.534'E	63	31° 48.621'S	23° 51.486'E
37	31° 43.178'S	23° 43.374'E	64	31° 48.904'S	23° 52.183'E
38	31° 43.261'S	23° 44.255'E	65	31° 49.041'S	23° 52.498'E
39	31° 43.293'S	23° 44.328'E	66	31° 49.190'S	23° 52.867'E
40	31° 44.504'S	23° 43.539'E	67	31° 49.215'S	23° 53.392'E
41	31° 44.270'S	23° 45.237'E	68	31° 49.404'S	23° 53.891'E
42	31° 44.826'S	23° 44.149'E	69	31° 49.442'S	23° 53.813'E
43	31° 45.124'S	23° 44.700'E	70	31° 49.598'S	23° 54.228'E
44	31° 44.812'S	23° 45.526'E	71	31° 49.640'S	23° 54.290'E
45	31° 45.537'S	23° 45.494'E	72	31° 49.691'S	23° 54.376'E
46	31° 45.845'S	23° 46.109'E	73	31° 49.860'S	23° 54.672'E
47	31° 45.739'S	23° 45.958'E	74	31° 50.021'S	23° 54.889'E
48	31° 45.629'S	23° 45.691'E	75	31° 50.088'S	23° 55.079'E

49	31º 46.235'S	23º 46.853'E	**76**	31º 50.152'S	23º 55.217'E
50	31º 46.547'S	23º 47.440'E	**77**	31º 49.854'S	23º 56.055'E
51	31º 46.717'S	23º 47.775'E	**78**	31º 49.748'S	23º 56.220'E
52	31º 46.785'S	23º 47.899'E	**79**	31º 49.677'S	23º 56.303'E
53	31º 47.088'S	23º 48.482'E	**80**	31º 49.532'S	23º 56.461'E
54	31º 47.290'S	23º 48.698'E	**81**	31º 49.124'S	23º 56.975'E
55	31º 47.414'S	23º 48.959'E	**82**	31º 48.830'S	23º 57.425'E
56	31º 47.492'S	23º 49.051'E	**83**	31º 48.558'S	23º 57.715'E
57	31º 47.708'S	23º 49.547'E	**84**	31º 48.759'S	23º 57.831'E

Khangela Switching Station to Umsinde Switching Station		
Watercourse Crossing	**GPS Coordinates**	
	Latitude	**Longitude**
83	31º 48.558'S	23º 57.715'E
84	31º 48.759'S	23º 57.831'E
85	31º 48.886'S	23º 58.233'E
86	31º 49.101'S	23º 58.643'E
87	31º 49.438'S	23º 59.251'E
88	31º 49.489'S	23º 59.362'E
89	31º 49.750'S	23º 59.910'E
90	31º 50.062'S	24º 00.493'E
91	31º 50.317'S	24º 00.890'E

Table 1.4. Proposed New Access Road Co-ordinates to the authorised Ishwati Substation site:

	Latitude	**Longitude**
Start (off the existing unnamed gravel road)	31º 44.203'S	23º 46.714'E
Middle	31º 42.906'S	23º 42.942'E
End (Authorised Ishwati Substation site)	31º 42.407'S	23º 39.506'E

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended], various aspects of the proposed developments may have an impact on the environment and are considered to be listed activities. These activities require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and the Environment (DFFE), prior to the commencement thereof. Further to this as per GN R. 2313 : ***Adoptions of the standard for the development and expansion of powerlines and substation with identified geographical areas and the exclusion of this infrastructure from the requirements to obtain Environmental Authorisation***, the Standard was adopted in terms of section 24(10)(a) of the Act for the purpose of excluding the activities contemplated in paragraph 5.1 and 5.2 of the Schedule from the requirement to obtain environmental authorisation prior to commencement. In terms of the procedural requirement set out in the standard, screening tool reports have been undertaken for the grid corridor and associated infrastructure and site sensitivity verifications have been undertaken by the relevant specialists in accordance with the sensitivity themes. As per 6.1. of the GNR .2313, "Where any part of

the infrastructure occurs on an area for which the environmental sensitivity for any environmental theme is identified as being very high or high by the national web based environmental screening tool and confirmed to be such through the application of the procedures set out in the Standard", the site sensitivity verifications have been performed as per the procedural requirements set out.

In accordance with GN 320 and GN 1150 (20 March 2020)[1] of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Leigh- Ann De Wet, Andrew Husted and Lindi Steyn, as avifauna specialists, have been commissioned to verify the sensitivity of the project sites under these specialist protocols.

The scope of this report is for one (1) application, namely the 132KV grid connection infrastructure, associated access tracks & water course crossings associated with the authorised Emoyeni wind energy facilities, near Murraysburg, Beaufort West and Ubuntu Local Municipalities and Central Karoo and Pixely ka Seme District Municipalities, Western Cape, and Northern Cape Provinces.

2. SITE SENSITIVITY VERIFICATION METHODOLOGY

The following information sources were consulted to compile this report:

- National Biodiversity Assessment 2018 (Skowno *et al,* 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
    - South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2022) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

[1] GN 320 (20 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

    - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2018) – 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.
- Northern Cape Critical Biodiversity Areas (2016): The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.
    - The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.
    - The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province.
- Western Cape Biodiversity Spatial Plan (WCBSP): The WCBSP has been developed by CapeNature Scientific Services Land Use Team in order to identify the priority biodiversity areas and ecological infrastructure that must be conserved to meet the provincial biodiversity mandate (Pool-Stanvliet *et.al.* 2017). The plan includes land use guidelines along with biodiversity priority areas, covering terrestrial, freshwater, coastal and marine areas. The plan identified areas as Critical Biodiversity Areas (CBAs) which cannot be lost if conservation goals are to be met, and Ecological Support Areas (ESAs) (Table 5-1), which are required to support the functioning of ecosystems and CBAs (Pool-Stanvliet *et.al.* 2017).
- 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.

Desktop avifaunal Assessment

The avifaunal desktop assessment comprised of the following:

- Compiling an expected avifauna list from the Southern African Bird Atlas Project 2 (SABAP2) using the 3128CB, 3128DA, 3123DB, 3123DD and 2124CC quarter degree squares and their associated pentads.
- Confirmation of nearby Coordinated Avifaunal Road Count (CAR) route.
- Confirmation of nearby Coordinated Waterbird Count (CWAC) site.

Faunal Assessment

Sampling consisted of standardized point counts as well as random diurnal incidental surveys and vantage point surveys. Standardized point counts (following Buckland *et al.* 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. Each point count was run over a 10 min period. The horizontal detection limit was set at 50 m. At each point the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, river scanning and road cruising.

Nests, feathers, individuals and signs were photographed and GSP coordinates were taken.

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

- Roberts Bird Guide; A comprehensive field guide to over 950 bird species in southern Africa 1st Edition (Chittenden, 2007); and
- Roberts Birds of Southern Africa mobile app.

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 1.5 and Table 1.6 respectively.

Table 1.5. 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.

Conservation Importance	Fulfilling Criteria
	> 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 1.6 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 1.7

Table 1.7 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 1.8

Table 1.8 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 1.9

Table 1.9 Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance

Site Ecological Importance		Biodiversity Importance				
		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

3. OUTCOME OF SITE SENSITIVITY VERIFICATION

The combined Fauna Theme Sensitivity for the assessment area was derived to be High as indicated in the National Environmental Screening Tool.

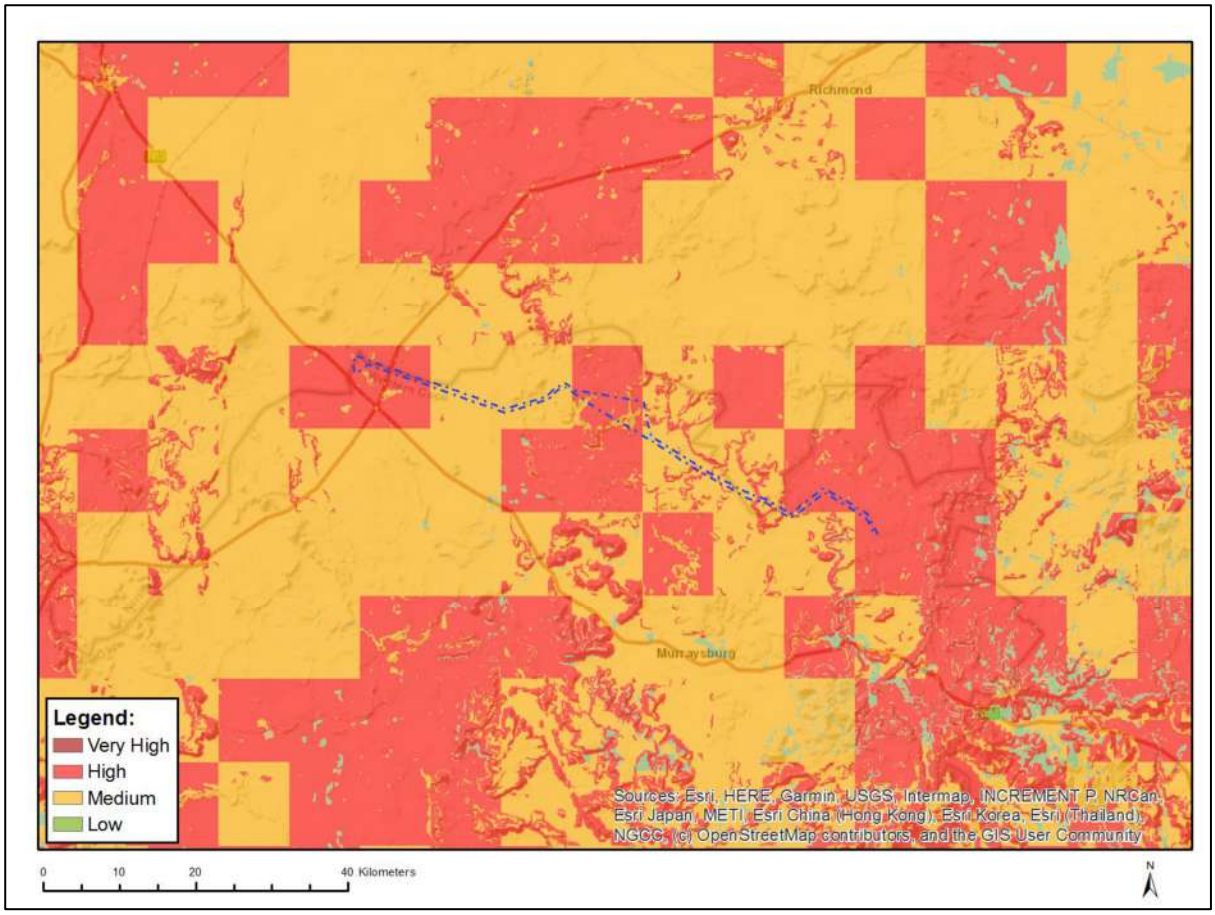


Figure 2: The classification of the study area in the DFFE online screening tool.

Four (4) different habitat types were delineated within the assessment area (Table 1.10). Based on the criteria provided in the species protocols for the site ecological sensitivity, all habitats within the assessment area of the proposed development were allocated a sensitivity category or SEI. The sensitivities of the habitat types delineated are illustrated in Figure 3.

The reason for the very high rating in the transformed area is based on the presence of the Verreaux's Eagle Nest on an existing powerline.

Table 1.10 Summary of habitat types delineated within the field assessment area of the proposed development

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	High	Low	**Medium**	Low	**Very High**
Karoo scrub (flat)	Medium	High	**Medium**	Medium	**Medium**
Rocky outcrops	High	High	**High**	Low	**Very high**
Wash (wetland) areas	High	High	**High**	Medium	**High**

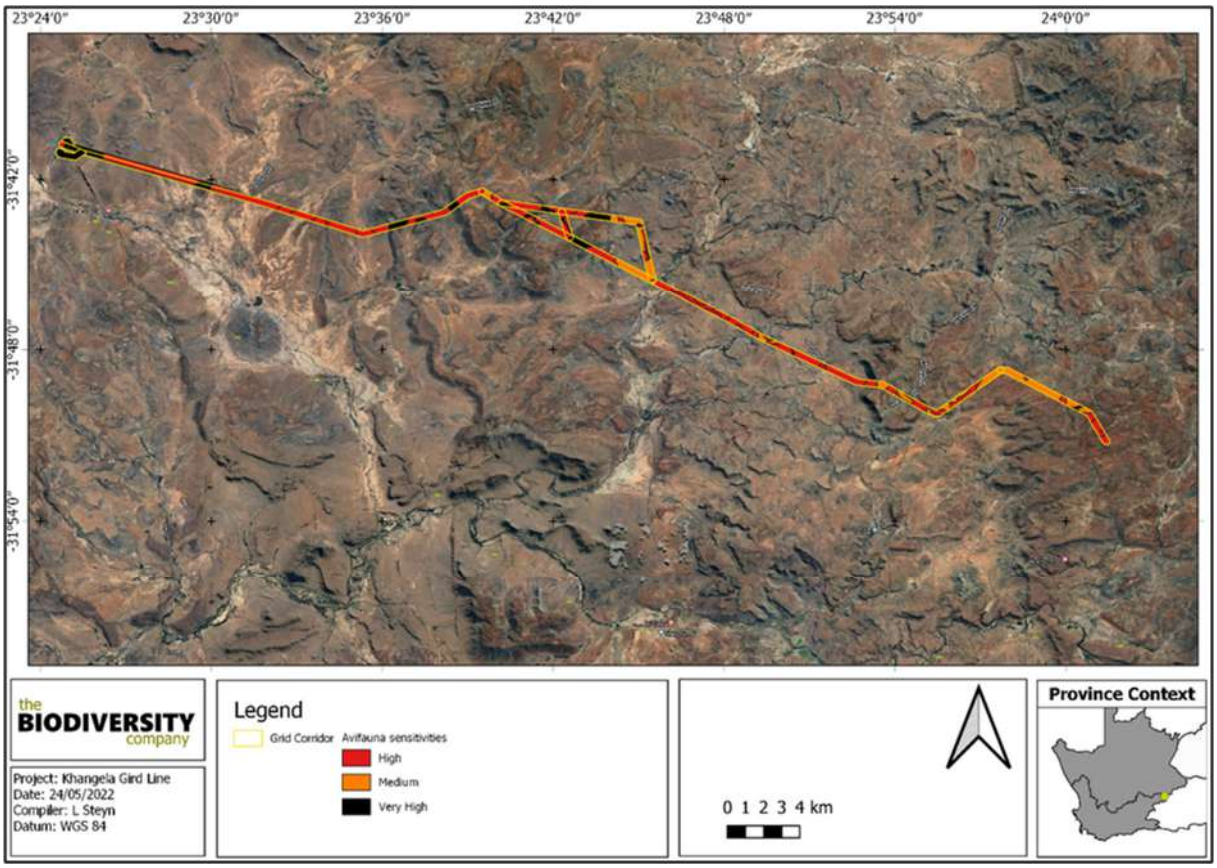


Figure 3 Map illustrating Site Ecological Importance (SEI) of the avifauna habitat types within the assessment area

4. CONCLUSION

During the field assessment 99 bird species were recorded of these eight of the species recorded were SCCs on a national or international scale. Blue Crane (*Grus paradisea*), Karoo Korhaan (*Eupodotis vigorsii*), Kori Bustard (*Ardeotis kori*), Ludwigs Bustard (*Neotis ludwigii*), Martial Eagle (*Polemaetus bellicosus*), Secretary bird (*Sagittarius serpentarius*), Verreauxs Eagle (*Aquila verreauxii*), and Lanner Falcon (*Falco biarmicus*) were the SCCs recorded. One nest of a Verreauxs Eagle was found close to the Gamma substation in an existing 400kV powerline, while an additional two nests' locations were provided by local farmers (these areas could not be accessed to confirm the nests). The high number of SCCs present increases the overall sensitivity of the area and is the reason for the powerline corridor mainly being made up of Very-High and High sensitivity areas.

This classification of the screening tool was found to be too low for certain portions as far as the impact of the proposed powerline, substation and associated infrastructure is concerned, based on actual conditions recorded on the ground during the site visit of March 2022 and April 2022 the rating should be High for majority of the line.