



# Terrestrial Biodiversity Assessment

FE Kudu Wind Energy Facility (Aberdeen)

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Author: J. Pote

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Revised Draft Report

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# 1 Introduction & Background

## 1.1 Background

Savannah Environmental has been appointed to undertake the relevant environmental applications for the development of a WEF (Wind Energy Facility) located between **Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape** province. This report is the terrestrial Biodiversity Assessment pertaining to the FE Kudu Wind Energy Facility site, to assess the impact of the proposed project.

## 1.2 Purpose of Report

The purpose of this report is to undertake an ecological and biodiversity screening of the site to determine the condition of the remnant natural vegetation and to inform environmental requirements of the proposed project.

- This screening report has been compiled with reference to the reporting requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.
- This screening report also addresses the requirements in terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal (species) themes**.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development.

### 1.2.1 Report Structure

This report has been structured and written to provide background information relating to the various topics, primarily for the unfamiliar reader. Specific observations and analyses of the project in relation to the various topics are indicated in **green text**. Text boxes at the end of each section summarise the implications of the aspect under consideration in relation to the specific project. Summary information tables are provided, including a synopsis of applicable regional planning aspects (Table 1). A general description of the systematic conservation planning components is provided in Appendix D: Systematic Conservation Planning for reference purposes.

## 1.3 Project Description

### 1.3.1 Activity Location and Description

FE Kudu (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 40 km west of Aberdeen in the Eastern Cape Province. The project is located within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85

(Figure 1). The project is known as the FE Kudu Wind Energy Facility. The project is planned as part of a cluster of renewable energy projects, which includes a second wind energy facility with a capacity of up to 240 MW (FE Tango Wind Energy Facility), located approximately 20 km east of the FE Kudu Wind Energy Facility.

The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e., REDZ Focus Area 11). The undertaking of a basic assessment process for the project is in-line with the requirements stated in GNR 114 of 16 February 2018.

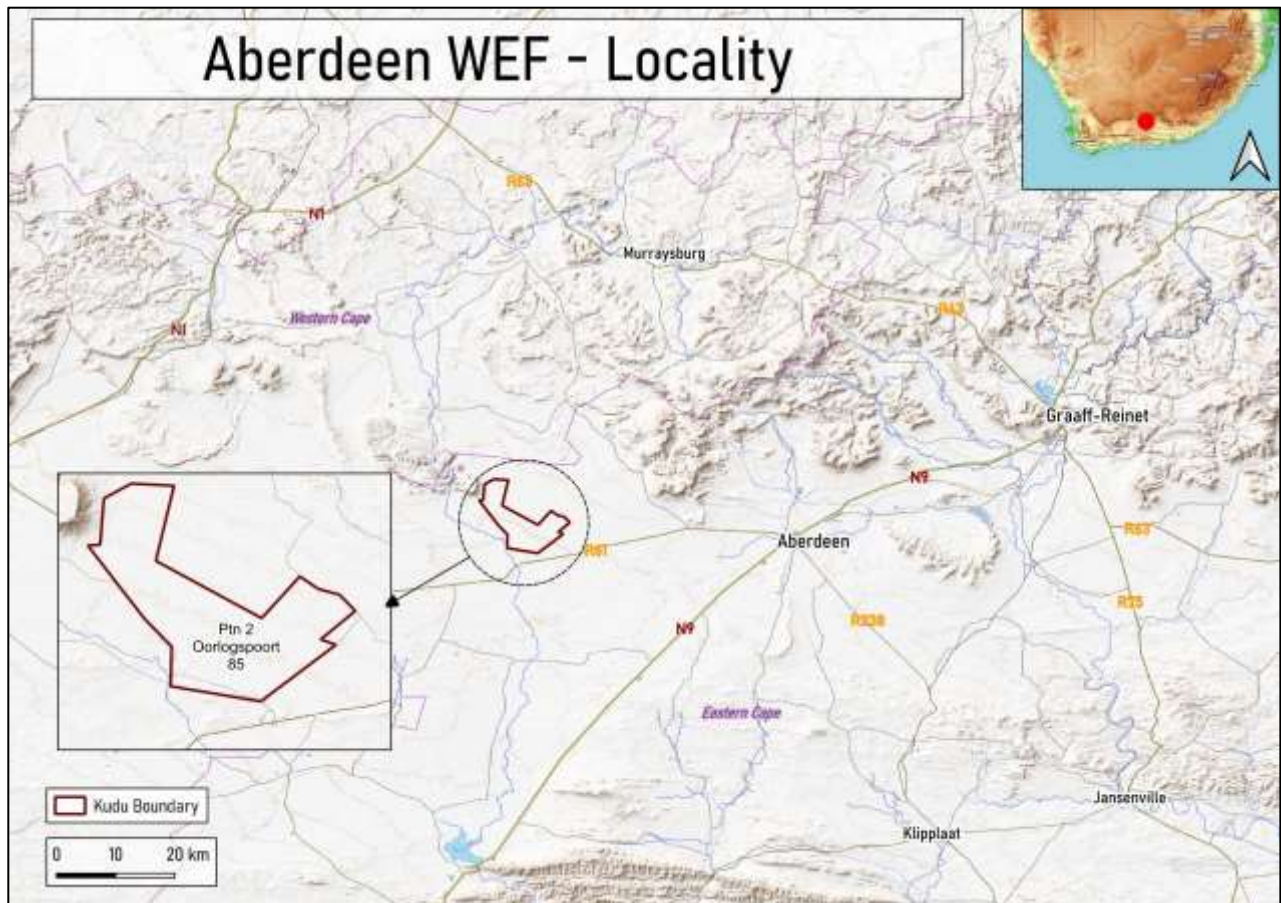


Figure 1: Site location comprised of commercial farmland with predominantly natural vegetation but with cultivated lands in the surrounding area.

The FE Kudu Wind Energy Facility will have a contracted capacity of up to 600 MW and comprise wind turbines with a capacity of up to 7.5 MW each. The project has a preferred project site of approximately ~9 170 ha. The current infrastructure is preliminarily proposed and will be updated once an optimised layout with all sensitivities considered has been generated. Access to the site will be via an access road off of the nearby R61. The FE Kudu Wind Energy Facility project site is proposed to accommodate the following infrastructure:

- Up to 80 wind turbines, turbine foundations and turbine hardstands
- An on-site substation hub incorporating:
  - A 132 kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings



- A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
- Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible<sup>1</sup>.
- Access roads to the site and between project components with a width up to 8 m for primary access routes.

A technically viable development footprint was proposed by the developer and assessed as part of the studies. The details of the project are as follows:

<b>Project Name</b>	FE Kudu Wind Energy Facility
<b>Location</b>	Portion 2 of Farm Oorlogspoort 85
<b>Applicant</b>	FE Kudu (Pty) Ltd
<b>Contracted capacity</b>	Up to 600 MW (turbines up to 7.5 MW in capacity)
<b>Number of turbines</b>	Up to 80 turbines <sup>2</sup>
<b>Turbine hub height</b>	Up to 164 m
<b>Turbine top tip height</b>	Up to 250 m
<b>Capacity of on-site substation</b>	132 kV
<b>Area occupied by the on-site substation</b>	~ 2 ha in extent
<b>Underground cabling</b>	Underground cabling, with a capacity of 33 kV, will be installed to connect the turbines to the on-site facility substation.
<b>Battery Energy Storage System (BESS)</b>	Solid state battery technology (e.g., Lithium-ion technology) as a preferred technology. BESS will be housed in containers approximately 20 m long, 3 m wide, and 5 m high with an approximate footprint of up to 5 Ha.
<b>Operation and maintenance (O&amp;M) buildings</b>	~ 1 ha in extent
<b>Balance of plant area</b>	Temporary laydown areas with an extent up to 6 Ha. Temporary warehouse of 1 Ha Temporary site camp establishment and concrete batching plants of 1 ha.
<b>Access and internal roads – Main Road</b>	Main access road to the site and between project components with a width up to 8 m and a servitude of 13.5 m.
<b>Access and internal roads – internal network</b>	Road network between project components with a width up to 8 m
<b>Turbine hardstand footprint</b>	~up to 7 500 m <sup>2</sup> per turbine
<b>Turbine foundation footprint</b>	~ 1 000 m <sup>2</sup> per turbine

The project is intended to provide electricity to the national grid through the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or other public or private off-taker programmes.

<sup>1</sup> The intention is for internal project cabling to follow the internal roads.

<sup>2</sup> 42 north turbines, and 41 south turbines

### 1.3.2 Aspects of the project that could potentially have Biodiversity related Impacts

The proposed project will require clearing of natural vegetation for the construction of the wind energy facility as well as infrastructure including access roads and grid connections (substation, BESS, and powerlines), as well as any construction areas and laydown areas.

## 1.4 Methodology and Approach

The preferred project footprint will be assessed, implementing the following approach:

1. Undertake a comprehensive desktop study to identify potential risks for terrestrial biodiversity inclusive of the national screening tool, relevant regional biodiversity planning frameworks, any previous studies as well as interrogation of applicable databases.
2. Two seasonal site visits to assess the following:
  - a. Verification of findings of the National Environmental Screening Tool.
  - b. Broad level Field survey of vegetation, flora, and habitats present (including any riparian vegetation or wetland vegetation).
  - c. Verify and update species list, identifying, highlighting, and locating flora species that are of Conservation Concern, Threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and any respective Provincial Ordinances. Mapping of any populations of such species observed during the site visit.
  - d. Mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and flora species of special concern, the outcome being a detailed sensitivity map ranked into high, medium, or low classes.
3. Detailed reporting will be comprised of a Draft Terrestrial Biodiversity Assessment Report (for public review and comment) and a Final Terrestrial Biodiversity Assessment Report for submission. The draft and final detailed reports will address the following (as per the gazetted Terrestrial Biodiversity Assessment Protocol):
  - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
  - A detailed flora species list highlighting the various species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds). Clearly indicate the need for any further permitting/licensing or detailed studies to specification of animal and plant species protocols.
  - Faunal assessment will be comprised of a general fauna desktop assessment, as well as specific taxa specialist assessments, which would include on-site assessments as required and camera trapping. It is not anticipated that any methods requiring fauna capture will be followed.
  - Description and assessment of the habitat units and site sensitivities ranked into high, medium, or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
  - A habitat sensitivity map will be compiled, indicating the sensitivities as described above, inclusive of a riparian delineation for the aquatic report.
  - A map indicating buffers to accommodate Regional Planning requirements (if required).
  - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.

- A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
- Address any comments raised by IAP's or identified in the project in the final draft and final report.

This terrestrial biodiversity assessment report is aligned with the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

#### 1.4.1 Site visit

A preliminary site verification for screening purposes was conducted between 25 and 28 April 2023. This initial site visit did not include any detailed habitat or species assessments, the purpose being to obtain an overview of the site only and to identify possible risks to the proposed activity and undertake preliminary habitat mapping in order to inform layout revisions. A follow-up site visit was conducted between 24 & 26 May 2023 in order to supplement the initial findings from the site sensitivity verification survey, undertake further species surveys as well as refine sensitivity mapping, after which further layout revisions were made.

#### 1.4.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 7. Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2022) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Conservation Acts and Ordinances. NEM:BA Threatened or Protected Species (ToPS).
- Regional Systematic and Bioregional Planning frameworks, guidelines and GIS data sources.
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI).
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>)
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

### 1.4.3 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- No assessment has been made of aquatic processes relating to any wetlands, pans, and rivers/seeps and/or estuaries outside of the scope of those having an influence on the terrestrial biodiversity. The May 2023 site visit was however conducted in conjunction with the aquatic specialist and thus aligns to some extent with recommendations made by the aquatic specialist.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

## 2 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on the proposed activity and terrestrial biodiversity<sup>3</sup>:

### Listing Notice 1 (GNR):

1. The development of facilities or infrastructure for the generation of electricity from a renewable resource where—
  - (i) the electricity output is more than 10 megawatts but less than 20 megawatts; or
  - (ii) the output is 10 megawatts or less, but the total extent of the facility covers an area in excess of 1 hectare.

Activity 1 could apply relating to facilities or infrastructure for the generation of electricity more than 10 megawatts but less than 20 megawatts from a renewable resource but is not related to terrestrial biodiversity unless additional activities are triggered, as below.

12. The development of:
  - (ii) infrastructure or structures with a physical footprint of 100 square metres or more. where such development occurs—
    - (a) within a watercourse.
    - ~~(b) in front of a development setback; or~~
    - (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse: —

Watercourses are present on site and the listed activity will likely be triggered, as construction within watercourses is likely to be required for access road crossings.

<sup>3</sup> The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list of potential triggers.

19. The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from a watercourse.

Watercourses are present on site and the listed activity will likely be triggered as construction in watercourses will be required for access roads.

27. The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

- ~~(i) the undertaking of a linear activity; or~~
- ~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

Indigenous vegetation is present on site and the listed activity will likely be triggered as clearing of indigenous vegetation will exceed 1 Ha.

### Listing Notice 2 (GNR):

15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—

- ~~(i) the undertaking of a linear activity; or~~
- ~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

The WEF footprint will likely require the clearing of greater than 20 Ha of indigenous vegetation, hence Activity 15 would likely be triggered, however the site is within a Renewable Energy Development Zone (REDZ), hence the Basic Assessment process is applicable rather than a Full Scoping & EIA process.

### Listing Notice 3 (GNR):

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

#### (a) Eastern Cape

- i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
- ii. Within critical biodiversity areas identified in bioregional plans;
- iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;
- iv. Outside urban areas, within 100 metres inland from an estuarine functional zone; or
- v. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

A small portion of the site is designated as CBA, hence this activity could be triggered, depending on final layout, including access roads and other infrastructure. Approximately 380 meters of access road to WEF turbine S18 will pass through designated CBA, which will exceed the clearing of 300 square meters within a CBA, hence this listed activity will be triggered.

Activity 14: The development of—

- (ii) infrastructure or structures with a physical footprint of 10 m<sup>2</sup> or more, where such development occurs—

- (a) within a watercourse;
- (b) in front of a development setback; or
- (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse

In the Eastern Cape –

i. Outside urban areas:

- (aa) A protected area identified in terms of NEMPAA, excluding conservancies;
- (bb) National Protected Area Expansion Strategy Focus areas;
- (cc) World Heritage Sites;
- (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;
- (ee) Sites or areas identified in terms of an international Convention;
- (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
- (gg) Core areas in biosphere reserves;
- (hh) ~~Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve~~

Watercourse crossings will be required, that will likely include structures with a physical footprint of 10 m<sup>2</sup> or more within designated Ecological Support Areas, hence this activity will be triggered.

#### Implications:

- The proposed activity will require the clearing of more than 300 m<sup>2</sup> of indigenous vegetation within a CBA and greater than 1 Ha and 20 Ha of indigenous vegetation and/or an activity in a watercourse to construct access road crossings, hence as a minimum a Basic Assessment application process would be triggered.
- Due to the scale of the project and largely indigenous nature of the site, it is likely that more than 20 Ha of indigenous vegetation will require clearing, however the site is within a Renewable Energy Development Zone (REDZ), hence the Basic Assessment process is applicable rather than a Full Scoping & EIA process.
- Additional listed activities that may pertain to the type of activity (WEF) rather than directly to terrestrial biodiversity features have not been considered in depth.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.

- **Public participation:** Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- **Constitution of Republic of South Africa (1996):** Section 24(a) of the Constitution states that everyone has the right ‘to an environment that is not harmful to their health or well-being’. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- **National Forests Act 84 of 1998 with Amendments:** Lists Protected trees, requiring permits for removal Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate that ‘natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social, or environmental benefits’.
- **Water Use Authorisations: The National Water Act (No. 36 of 1998):** Requires that provision is made both in terms of water quantity and quality for ‘the reserve’, namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed, and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- **Conservation of Agricultural Resources Act 43 of 1993:** Lists Alien invasive species requiring removal.
- **National Environmental Management Act, 1998 (Act No. 107 of 1998):** DARDLEA and DEA are the Competent Authority for the implementation of the National Environmental Impact Assessment Regulations, promulgated under the National Environmental Management Act NEMA], as amended.

## 2.1 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 1), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Vulnerable Ecosystems
- Critical Biodiversity Areas & Ecological Support Areas
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and NPAES
- Critical Habitat for listed endemic or protected species.

Table 1: Summary of Regional Planning Biodiversity features.

FEATURE <sup>4</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool	Terrestrial Biodiversity – <i>Very High &amp; Low</i> Animal Species – <i>High, Medium, &amp; Low</i>	CBA 2, ESA 1 & ESA 2 Various faunal species of conservation concern have been flagged as potentially present.
	Plant Species – <i>Medium &amp; Low</i>	Various floral species of conservation concern have been flagged as potentially present.
	Aquatic Biodiversity – <i>Very High &amp; Low</i>	Rivers, and Wetlands have been flagged as present.

<sup>4</sup> Refer to Section 2.1.

FEATURE <sup>4</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
National Vegetation Map (NVM, 2018)	Eastern Lower Karoo (NKI <sub>2</sub> ) Southern Karoo Riviere (AZI <sub>6</sub> ) Gamka Karoo (NKI <sub>1</sub> )	Least Concern Least Concern Least Concern
Critically Endangered and Endangered Ecosystems (NBA 2018)	None	N/A
Vulnerable Ecosystems (NBA)	None	N/A
Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019)	Majority of central and western sections fall within ESA 1; eastern section is predominantly designated ONA. A small portion along the southern boundary is designated CBA 2.	The site is within designated ESA and some CBA area, mostly associated with the drainage features through the site (Southern Karoo Riviere)
Protected Areas (SAPAD)	Steenbokkie Private Nature Reserve >50 km W, Aberdeen Nature Reserve >30 km E, Camdeboo National Park >50 km NE, Mountain Zebra-Camdeboo Protected Environment > 15 km NE.	No protected areas nor any ecological processes associated with them are directly affected by the proposed WEF project.
NPAES	None	N/A
Strategic Water Source Areas (SWSA)	Not situated within a designated SWSA area.	Specific activity unlikely to have any significant impact to downstream water resources.
Freshwater Ecosystem Priority Areas (FEPA's)	Tributaries (unnamed (CLASS C: MODERATELY MODIFIED) and the Tulpleegte River (CLASS C: MODERATELY MODIFIED)) to the Kariega River (CLASS C: MODERATELY MODIFIED) run through the central and western parts of the site contributing to Upstream River FEPA. A section of the southern portion of the site also falls under Fish Corridor.	Specific activity may have impact to nearby rivers, predominantly the Kudu site. Further investigation and recommendations by aquatic specialist will be required.
Regional Hotspots & Regions of Endemism	Outside of any endemism hotspots.	N/A, although species of conservation concern are known from the surrounding area.
Important Bird Areas (IBA's)	Karoo National Park IBA around >70 km north-east of the site footprints.	The specific activity will unlikely have any direct impact on the IBA. The IBA is mostly within a mountainous area, whereas the site is situated in a plain, however site likely to provide occasional habitat for species that are associated with the IBA.
Key Biodiversity Areas (KBA's)	None	N/A
Marine/Coastal areas	None	N/A
Estuaries	None	N/A
RAMSAR sites	None	N/A
Within 32 m of Watercourse	Several non-perennial watercourses are present on both sites.	Watercourses will only be affected if proposed activity is undertaken in proximity or where access road crossings are required.
Within 100 m of River	Tributaries (unnamed (CLASS C: MODERATELY MODIFIED) and the Tulpleegte River (CLASS C: MODERATELY MODIFIED)) to the Kariega River (CLASS C: MODERATELY MODIFIED) run through the central and western parts of the site.	Activity will occur within 100 m of a river. Further investigation and recommendations by aquatic specialist will be required.



FEATURE <sup>4</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
Within 500 m of Wetland	The site footprints contain several NBA & NFEPA classified wetlands. Several man-made dams of varying size are present on or surrounding the sites, the Kudu WEF might hold several alluvial pan features.	Wetlands will only be affected if proposed activity is undertaken in proximity. The alluvial areas within the site footprints that might be present, may require further aquatic specialist assessment and could serve a secondary function as habitat for avifauna.
Forest	None	N/A
Surrounding Land Uses	Mostly commercial dryland agriculture (sheep).	Site is generally natural to near natural within minimal transformation, although historical overgrazing would have been prevalent with evidence still present.
Critical Habitat for listed endemic/ protected species	There are several red listed faunal and floral species in the surrounding area (refer to Section 3.1).	

### Implications:

- The vegetation units currently have a Least Concern conservation status; hence natural vegetation does not have an elevated status.
- The current Conservation Planning designation for both the site is comprised of a significant proportion being an ESA 1 corridors generally associated with watercourses and some peripheral CBA pockets.
- Non-perennial watercourses are present with several farm dams.
- The Southern Karoo Riviere vegetated area has alluvial characteristics that will require further investigation by the aquatic specialist.
- The Karoo National Park is located more than 40 km off of the northwestern boundary of the site and unlikely to be directly or indirectly affected.

## 2.1.1 National Environmental Screening Tool

The DFFE screening tool flagged sensitivities are indicated in Figure 2 to Figure 5 below, with the Screening Tool Site Sensitivity Verification Report (SSVR) attached as Appendix I. The content of this report will address the findings of the screening tool as well as any site-specific sensitivities that may not have been identified the screening tool. Not all features may necessarily be directly affected by the activity but being in proximity, the associated risks will be assessed further and addressed in the report where appropriate. The DFFE Screening Tool indicates the following ecological sensitivities for **FE Kudu Wind Energy Facility**:

- Terrestrial Biodiversity – *Very High & Low*
- Animal Species – *High, Medium, & Low*
- Plant Species – *Medium & Low*
- Aquatic Biodiversity – *Very High & Low*

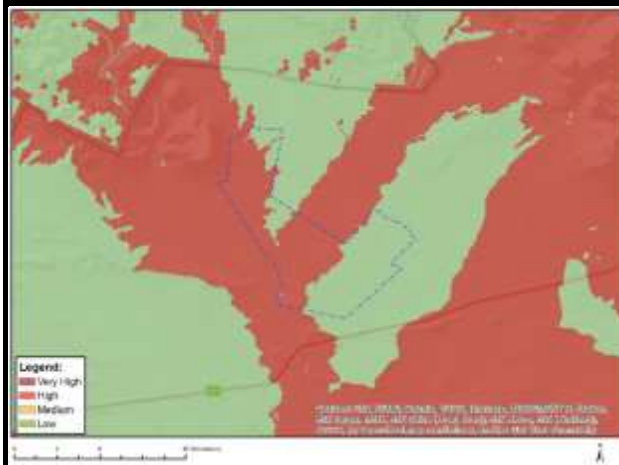


Figure 2: Terrestrial Biodiversity Sensitivity.

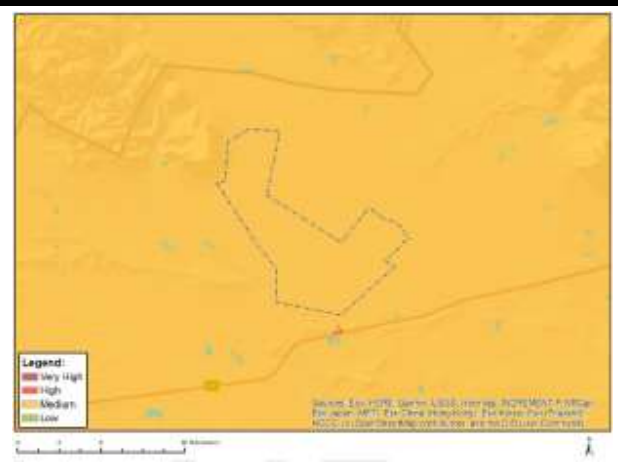


Figure 3: Plant Species Sensitivity.

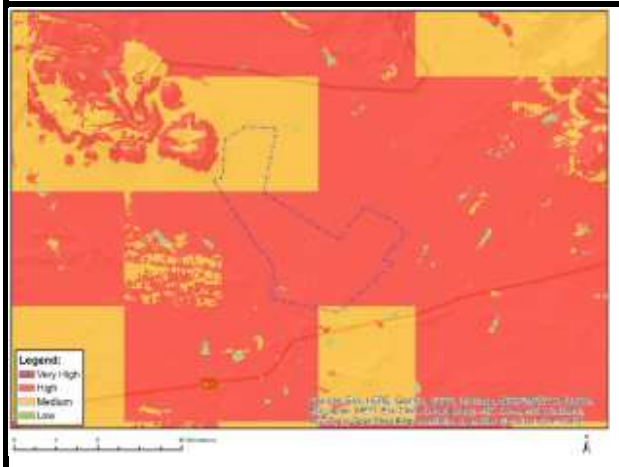


Figure 4: Animal Species Sensitivity.



Figure 5: Aquatic Biodiversity Sensitivity.

SENSITIVITY	DESCRIPTION - FEATURE(S) IN PROXIMITY
<b>Terrestrial Sensitivity</b>	
Very High	CBA 2, ESA 1 & 2
High	None
Medium	None
Low	Present
<b>Plant Sensitivity</b>	
Very High	None
High	None
Medium	Sensitive species 1212 & 1039, <i>Peersia frithii</i> , <i>Tridentea virescens</i> , <i>Cliffortia montana</i>
Low	Present
<b>Animal Sensitivity</b>	
Very High	None
High	<i>Neotis ludwigii</i> , <i>Afrotis afra</i> (Birds)
Medium	<i>Neotis ludwigii</i> , <i>Afrotis afra</i> (Birds) & <i>Chersobius boulengeri</i> (reptile)
Low	Present
<b>Aquatic Sensitivity</b>	
Very High	Rivers & Wetlands
High	None
Medium	None
Low	Present

## 2.1.2 Vegetation of Southern Africa

Three vegetation units (Table 1, Figure 6) are primarily affected by the proposed project (Mucina & Rutherford, 2006). The site is located mainly within [Southern Karoo Riviere](#) (currently having a [Least Concern](#) conservation status) and [Eastern Lower Karoo](#) (currently having a [Least Concern](#) conservation status), with a small portion occurring in the [Gamka Karoo](#) (currently having a [Least Concern](#) conservation status) vegetation unit (Figure 6). A general description of the vegetation units is provided in [Appendix D: Systematic Conservation Planning](#) as a reference point for the baseline vegetation composition.

[Southern Karoo Riviere](#) is a vegetation type found in the Western and Eastern Cape Provinces of South Africa. It is characterized by narrow riverine flats supporting *Vachellia karroo* or *Tamarix usneoides* thickets, bordered by *Salsola* (saltbush)-dominated shrubland, especially on heavier (and salt-laden) soils on very broad alluvia. The [vegetation type occurs on the alluvial plains](#) of among other the Buffels, Dwyka and Gamka Rivers. Altitude ranges considerably between 250 and 1550 m. It is home to a variety of plant species, including *Vachellia karroo*, *Tamarix usneoides*, *Salsola* spp., *Acacia karroo*, *Rhigozum trichotomum*, and *Euphorbia tirucalli*. The vegetation type is also home to a variety of animal species, including Cape fox, Cape ground squirrel, Cape hare, and Cape porcupine. The vegetation type is threatened by a number of factors, including habitat loss, fragmentation, and invasive alien plants. The vegetation type is also threatened by climate change, which is causing the region to become drier. There are a number of conservation initiatives underway to protect the vegetation type including the establishment of protected areas, such as the Karoo National Park, and the implementation of land management practices that are designed to conserve the vegetation type.

The [Eastern Lower Karoo](#) is a semi-arid region of South Africa that lies between the Great Karoo and the Eastern Cape Midlands. It is a vast and sparsely populated region, with a landscape that is characterized by low-lying hills, rocky outcrops, and dry grasslands. The Eastern Lower Karoo is home to a variety of plant and animal species, including succulents, shrubs, and antelope. The dominating vegetation is low to middle-height microphyllous shrubland with drought-resistant 'white' grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families Aizoaceae and Crassulaceae can also be encountered.

The [Gamka Karoo](#) is a low-lying vegetation type in the semi-arid Nama Karoo in the south-western part of South Africa with extensive rangelands used for livestock ranching and wildlife. The vegetation unit is characterized by a shrubby vegetation with a dominance of *Acacia karroo*, *Rhigozum trichotomum* and *Euphorbia tirucalli*. The vegetation type is found on the alluvial plains of the Gamka River and its tributaries, as well as on the lower slopes of the surrounding mountains. The Gamka Karoo is a dry region, with an average annual rainfall of about 250 millimetres. The vegetation type is adapted to this dry climate and is able to store water in its leaves and stems. The unit is home to a variety of plant and animal species, including succulents, shrubs, antelope, and birds.

## 2.1.3 Red List of Ecosystem Status and National Biodiversity Assessment

The National Biodiversity Assessment (NBA, 2018) and more recent Red List of Ecosystem Status (RLE, 2022) are the primary tools for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The RLE/NBA is especially important for informing the National Biodiversity Strategy and

Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES) and informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 and 34%).

The outcome of the most recent National Biodiversity Assessment (2018) indicates that **Southern Karoo Riviere, Eastern Lower Karoo and Gamka Karoo** all have a *Least Concern* conservation status (Table 1), which is the lowest threat status elevation. This indicates that more than 60 % of the unit remains intact. There is a moderate to low level of utilization of this unit with lower degradation and transformation compared to units having an elevated status. Development of a portion of the site will thus not significantly affect conservation targets for the affected vegetation unit(s).

As is evident from land-use coverages, the broader area is currently not significantly fragmented other than some road networks, with minimal agricultural transformation. The specific site is relatively unmodified, although the specific state or level of degradation cannot be accurately determined without further seasonal site investigations.

#### Implications:

- The vegetation units, Southern Karoo Riviere, Eastern Lower Karoo and Gamka Karoo, have a Least Concern status, indicating that less than 40% has been transformed and there is currently minimal loss or disruptions to ecological functioning at a regional level.

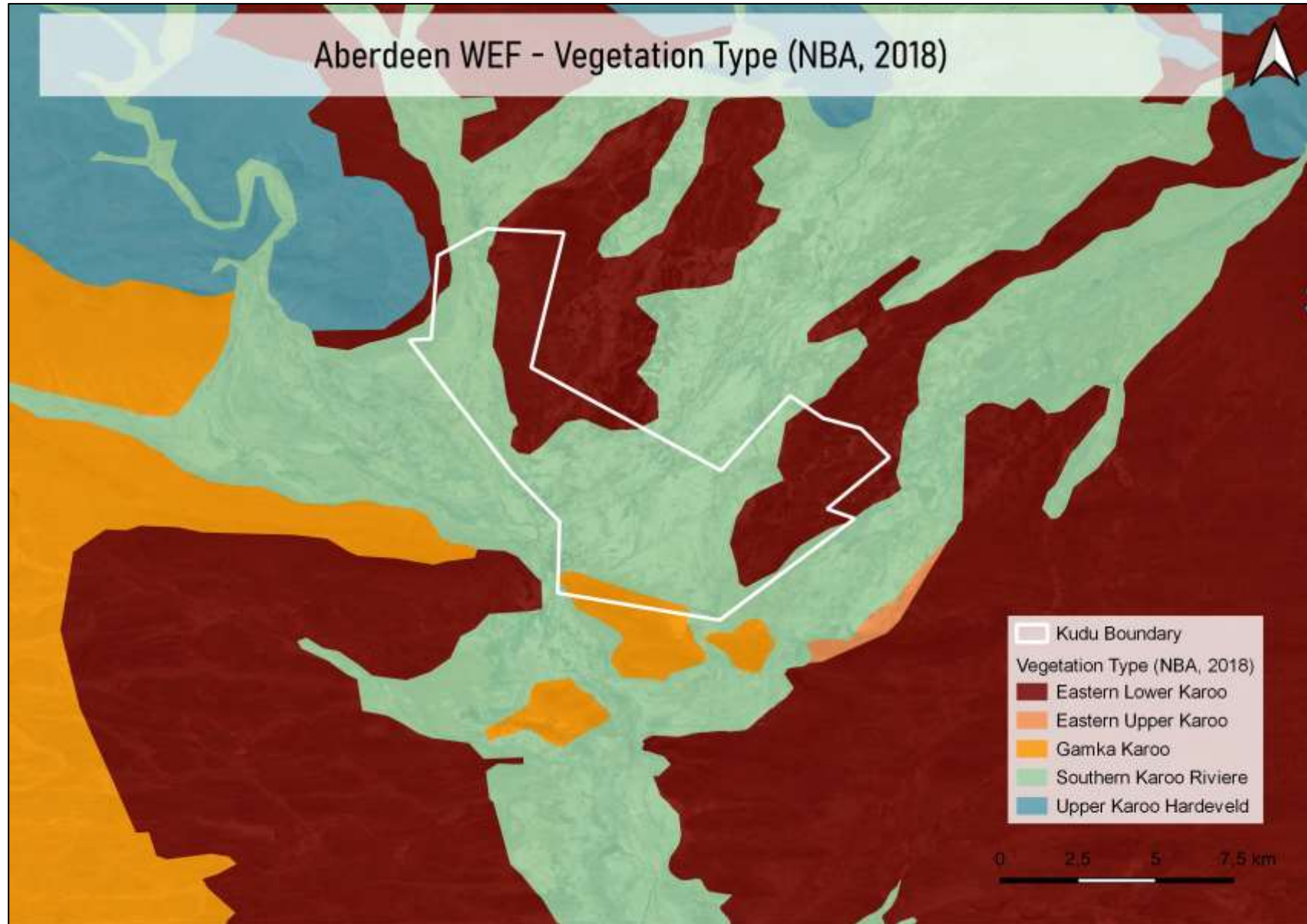


Figure 6: National Vegetation Map (2018).

## 2.1.4 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019)

The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, “Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans”. A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was undertaken. The ECBCP (2019) will replace the ECBCP (2007) in its entirety as a Systematic Conservation Plan. The ECBCP is not a Bioregional Plan.

As indicated in Figure 7, **FE Kudu Wind Energy Facility** site is situated within areas designated ESA 1, CBA 2, and ONA. The ESA corridors are broadly aligned with Southern Karoo Riviere vegetated watercourses with associated adjacent alluvial areas. The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in Table 2.

Table 2: Linking CBA categories to management objectives.

CBA MAP CATEGORY	DESIRED STATE	LAND MANAGEMENT OBJECTIVE
Ecological Support Area 1	Functional	<p>Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.</p> <p>For areas classified as ESA 1, the following objectives apply:</p> <ul style="list-style-type: none"> <li>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.</li> <li>• These systems may vary in condition and maintaining function is the main objective, therefore: <ul style="list-style-type: none"> <li>o Ecosystems still in natural, near natural state should be maintained.</li> <li>o Ecosystems that are moderately disturbed/degraded should be restored.</li> </ul> </li> </ul>
Critical Biodiversity Area 2	Natural	<p>Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:</p> <p>For areas classified as CBA 2, the following objectives must apply:</p> <ul style="list-style-type: none"> <li>• Ecosystem and species must remain intact and undisturbed.</li> </ul> <p>There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA 2 area may elevate other CBA 2 areas to a CBA 1 category.</p> <ul style="list-style-type: none"> <li>• These biodiversity features are at risk of reaching their limits of acceptable change.</li> </ul> <p>If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.</p>
Other Natural Areas and No Natural Habitat Remaining	Production	No desired state or management objective is provided for ONA or NNR.

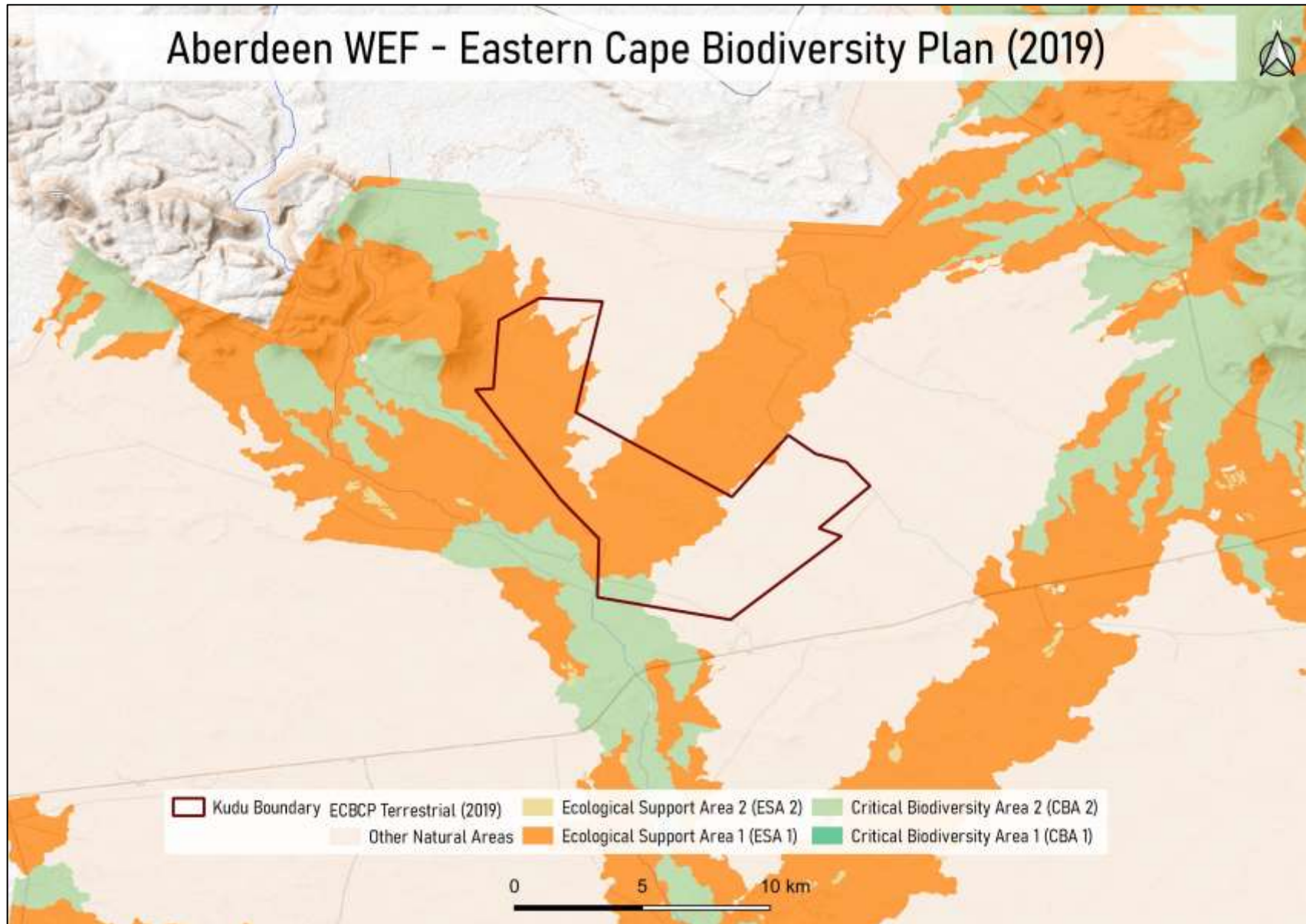


Figure 7: Critical Biodiversity and Protected Areas (ECBCP, 2019).

### Implications:

- The northern and central portions of the site intersect with ECBCP (2019) designated Ecological Support Areas (ESA 1) and a small area of Critical Biodiversity Area 2 (CBA 2) along the southern boundary.
- The proposed activity can be compatible with the management objective of ESA's and to some extent with CBA's, provided that appropriate design and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, replacement of stripped topsoil and revegetation are enforced. Design and mitigation will be required to address issues of connectedness, an important consideration in Ecological Support Areas.
- Approximately 380 meters of access road to WEF turbine S18 will pass through designated CBA 2 area, the impact thereof being negligible in terms of loss to a vegetation unit that has low transformation levels as well as any disruptions to ecological processes.
- The minimal roads and turbines of the optimised layout that are situated within designated ESA are unlikely to result in significant fragmentation.

## 2.1.5 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

## 2.1.6 Strategic Water Source Areas

Strategic water source areas (Figure 8) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas can be regarded as natural "water factories", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem. Development of this site is unlikely to have an impact on any Strategic Water Source area (Figure 8).



### Implications:

- The sites fall outside any designated SWSA areas, being associated rather with the mountainous catchments to the south of the site.
- The proposed activity (Wind Energy Facility) is unlikely to result in any significant impacts to any critical water supply to downstream economies and urban centres because of development of this site, as long as measures are implemented to not significantly alter water flows. Since much of the Kudu site is an alluvial area, specific challenges are likely to require specific design and mitigation measures.

## 2.1.7 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland, and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or 'FEPAs'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

- Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of special concern (e.g., very restricted distributions in South Africa)
- River ecosystem types – 20% of total length per type
- Wetland ecosystem types – 20% of total area per type
- Wetland clusters – 20% of total area per wetland vegetation group
- Free-flowing rivers – 20% of total length per ecoregion group
- Priority estuaries – 100% of all priority estuaries, which already considered biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands, and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation, and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or “riparian habitat” along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter (“food”) in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its “riparian habitat” by a buffer area.

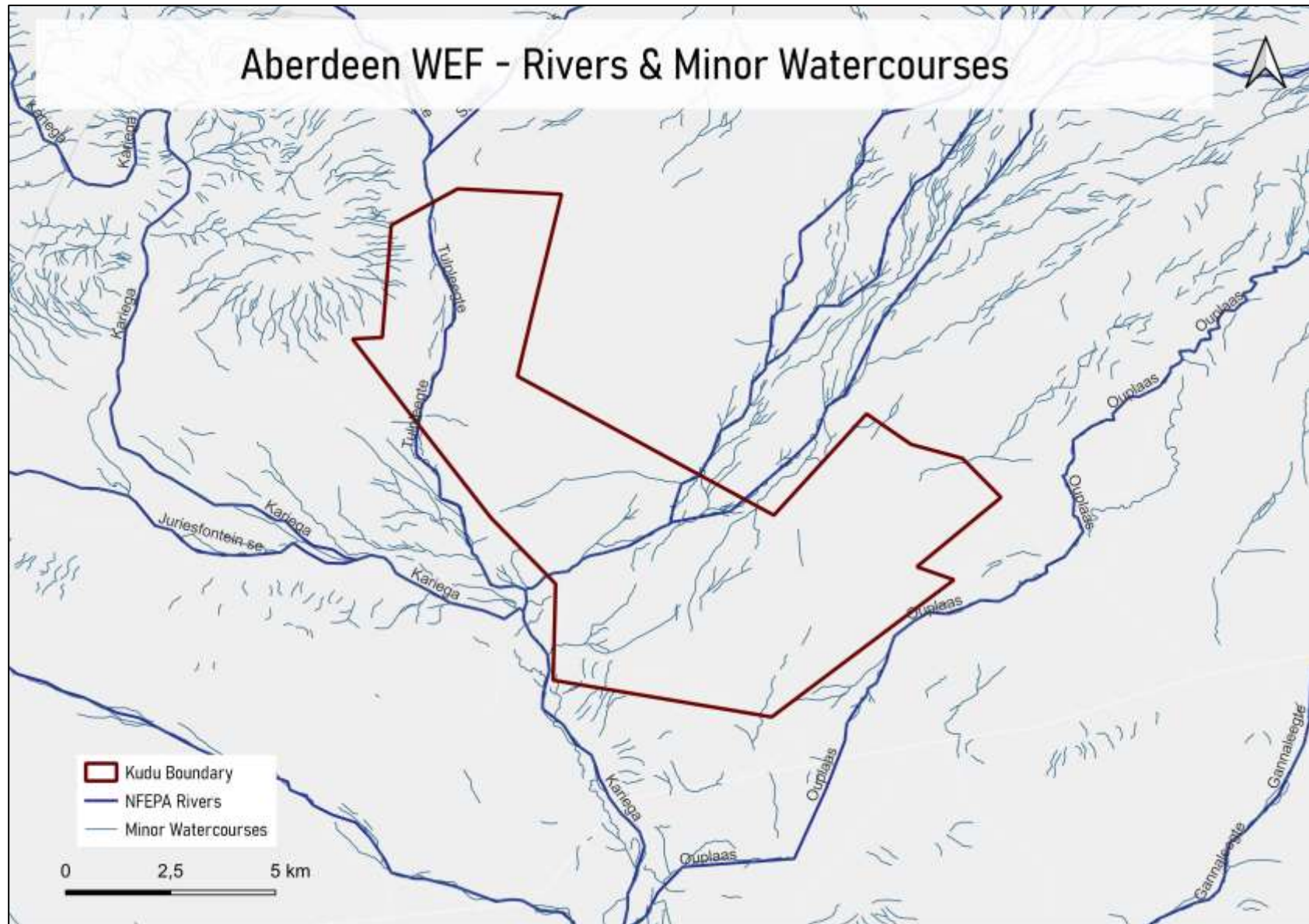


Figure 8: Rivers and Wetlands.

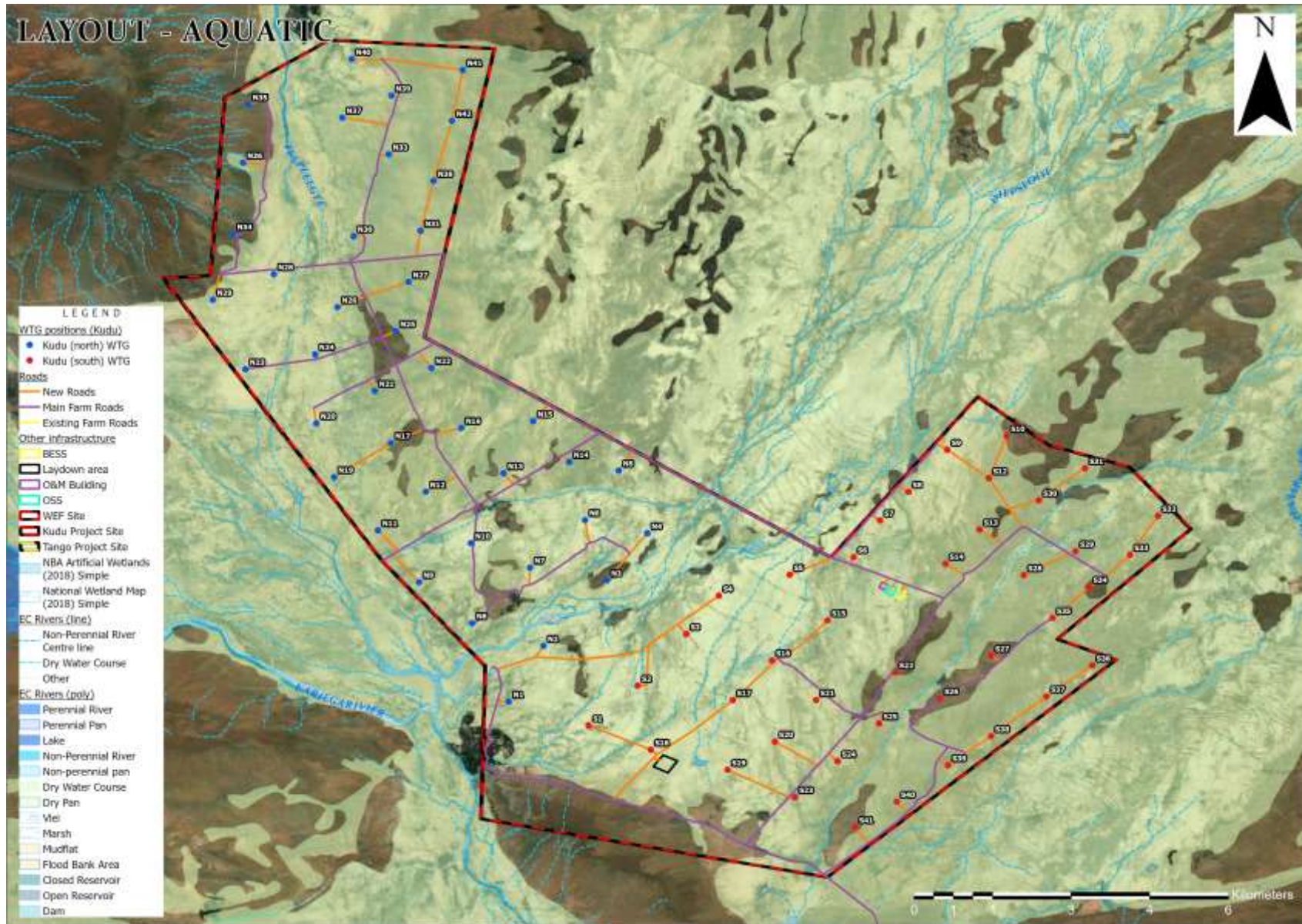


Figure 9: Mainstem Rivers & Minor Watercourses (1:50 000 Topographic) – Kudu.

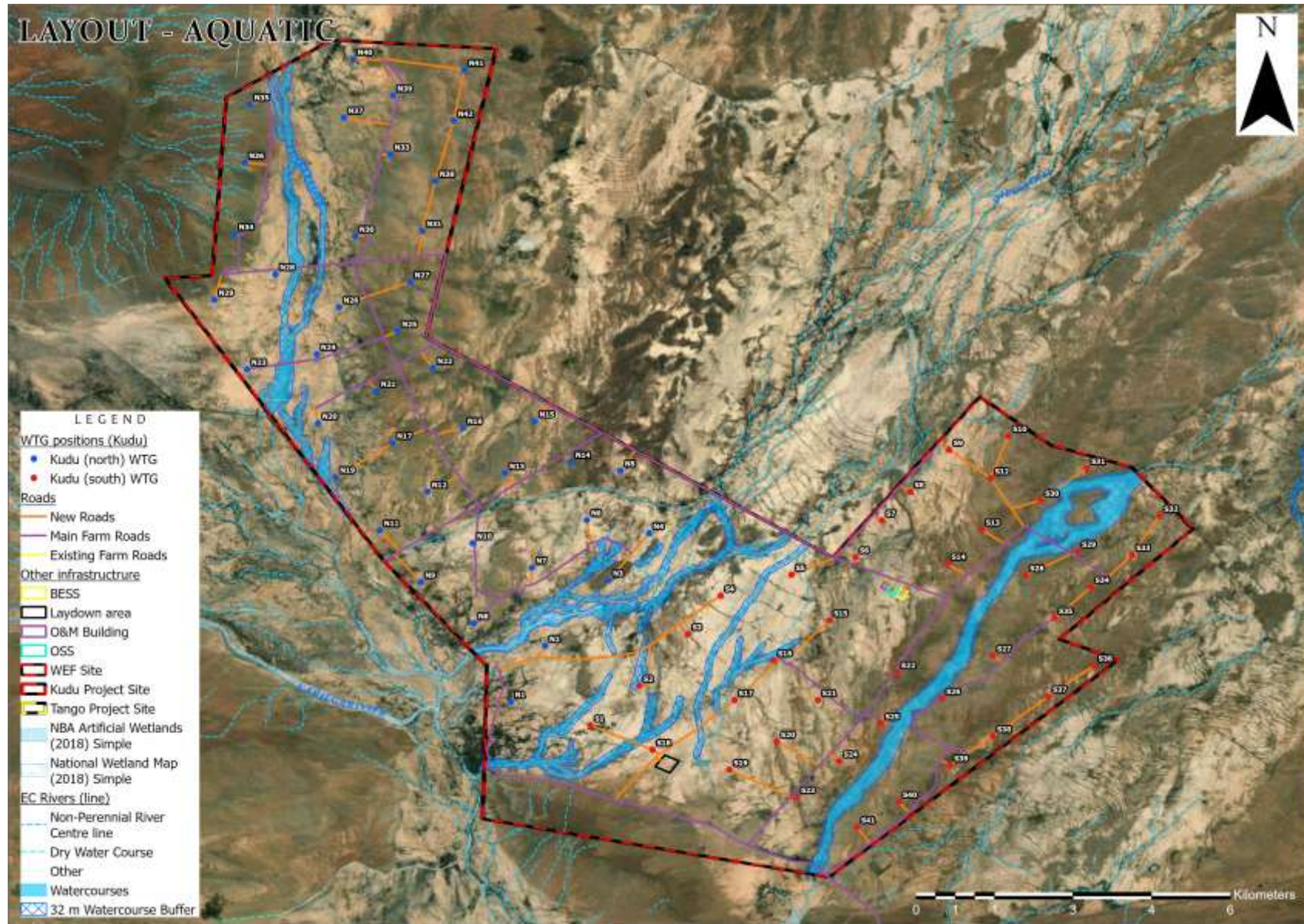


Figure 10: Delineated mainstem Rivers & Watercourses with 32 m buffers and recommended alluvial corridors – Kudu.

The sites are bisected by several non-perennial rivers and watercourses (Figure 8 to Figure 10).

The site is drained by an extensive network of unnamed non-perennial (dry) watercourses (Figure 9). Portions of the watercourses are braided within the site, creating an extensive alluvial fan landscape surrounding the watercourses. These drainage lines, which include associated aquatic features or aquatic functional zones within the property boundaries, form the upper catchment of several rivers, all part of the greater Kariega River and mostly deemed to have a Class C: Moderately Modified designation.

Due to the extent of the drainage line network coverage of the site, it is likely that development of any sizable footprint will require development in proximity to minor watercourses, most likely to accommodate the access road network. Refer to detailed aquatic assessment regarding recommendations and respective Water Use License application (WUL) requirements.

#### Implications:

- The site is situated within the upper catchment of the greater Kariega River perennial river (Class C: Moderately Modified & Class D: Largely Modified).
- Natural vegetation buffers around these riverine or aquatic features should be retained, and appropriate measures are likely to be required to not significantly disrupt ecological processes, which may include provision of measures to allow for lateral movement of water and sediment across road barriers.

### 2.1.8 Regional Hotspots and Centres of Endemism

The site is not situated within any Centre of Endemism.

### 2.1.9 Key Biodiversity Areas

#### Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.

- To gather new data regularly and monitor IBA's to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

The site is not within any current identified or known Important Bird Areas or Key Biodiversity Areas, the closest being the Karoo National Park IBA to the north-east. The National Screening Tool does identify several bird species that would require further assessment by avifaunal specialist.

#### Implications:

- Several bird species are identified as a sensitive receptor for the site; however, it is not situated within any designated IBA. Additional avifaunal assessment would be required, not covered in this assessment.

### 2.1.10 Protected Areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa. When projects are in legally protected and internationally recognized areas, it should be ensured that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

Table 3: List of Protected Areas in vicinity

NAME	DISTANCE
<b>FE Kudu Wind Energy Facility</b>	
Mountain Zebra-Camdeboo Protected Environment	< 20 km NE
Aberdeen Nature Reserve	> 30 km E
Steenbokkie Private Nature Reserve	> 60 km W
Camdeboo National Park	> 70 km NE

The Mountain Zebra-Camdeboo Protected Environment (>15 km North East) and the Aberdeen Nature Reserve (> 20 km East) are the protected areas nearest to the project footprints, the rest of the protected areas within the vicinity are more than 50 km away (Figure 11, Table 3). No other national protected areas or nature reserves are situated with 5 or 10 km of the site. No NPAES (National Protected



Figure 11: Protected Areas.

Area Expansion Area Strategy, 2010 & 2018) designated areas are in close proximity to the site. No Marine Protected Areas or RAMSAR sites are affected or in proximity to the site.

### *Implications:*

- The site is not situated in close proximity to any national parks, protected areas or NPAES areas.
- The activity will unlikely have any direct, indirect, or cumulative impact on any protected environment.

## 2.2 National Biodiversity Offset Guidelines

The National Biodiversity Offset Guidelines were published for implementation, under section 24J of the National Environmental Management Act, 1998 (Act No. 107 of 1998) on 23 June 2023.

### 2.2.1 Context

A Biodiversity Offset refers to the measurable outcome of compliance with a formal requirement contained in an environmental authorisation to implement an intervention that has the purpose of counterbalancing the residual negative impacts of an activity, or activities, on biodiversity, through increased protection and appropriate management, after every effort has been made to avoid and minimise impacts and rehabilitate affected areas.

The purpose of the published guideline is to indicate when biodiversity offsets are likely to be required as mitigation by any competent authority (CA), to lay down basic principles for biodiversity offsetting and to guide offset practice in the environmental authorisation (EA) application context.

The guideline is an implementation guideline contemplated in section 24J of the National Environmental Management Act, 1998 (NEMA). Guidelines published in terms of that section give guidance on, inter alia, the implementation, administration, and institutional arrangements of the Environmental Impact Assessment Regulations, 2014 (EIA Regulations) or subsequent regulations regarding the environmental impact assessment process. The guideline does not replace NEMA's provisions regarding EA processes, or the EIA Regulations. It guides the implementation of NEMA and the EIA Regulations in the context of mitigation of biodiversity impacts and use of biodiversity offsets and should therefore be read in conjunction with those laws. It should be noted that the published document is thus a guideline and not a law and should thus be used accordingly by the respective parties.

The guideline is applicable to applications for EA in terms of section 24 of NEMA. However, it may also be applicable to relevant authorities responsible for taking decisions in other regulatory contexts which may involve biodiversity offsetting. Those relevant authorities include the organs of state responsible for taking decisions regarding applications for EA in terms of section 24G of NEMA, emergency directives contemplated in section 30A of NEMA, applications for licences under the National Water Act, 1998, the National Forests Act, 1998 and the National Environmental Management: Waste Act, 2008, applications for development rights in terms of the Spatial Planning and Land Use Management Act, 2013 and requests for the de-proclamation, or the withdrawal of declarations, of protected areas in terms of provincial legislation or NEMPAA.



Biodiversity offsetting is a mitigation measure that is potentially applicable in all EA application processes regardless of the identity of the applicant. This guideline is therefore applicable to EA applications made by private persons or entities, as well as organs of state.

Biodiversity offsetting has the potential to encourage more rigorous consideration of feasible development alternatives which avoid and minimise negative impacts on biodiversity, to help remedy and counterbalance the degradation and loss of biodiversity through increased protection and appropriate management, and to help South Africa to meet its international biodiversity and protected area targets. Biodiversity offsetting can therefore play a role in ensuring that biodiversity and ecological infrastructure can continue to provide the ecosystem services on which people depend for their livelihoods and contribute to the achievement of the environmental right in section 24 of the Constitution.

In the environmental management context, biodiversity offsetting consists of actions that are taken to comply with biodiversity offset outcomes required in conditions in EAs, Biodiversity Offset Implementation Agreements and environmental management programmes (EMPrs). The environmental management system provided for by NEMA and the EIA Regulations provide for a CA to grant EAs subject to conditions. In appropriate circumstances, a CA may grant an EA subject to the condition that a measurable biodiversity offset is implemented by the EA holder.

As already noted above, this guideline is an implementation guideline contemplated in section 24J of NEMA. It must, in accordance with section 24O of NEMA and regulation 18 of the EIA Regulations, be considered by a CA when considering an application for an EA. It is therefore not absolutely binding and can be deviated from when justifiable under the circumstances.

### 2.2.2 Recommended Requirements

The Biodiversity Guidelines indicate that a biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of **medium or high significance**. These negative impacts could affect biodiversity patterns (e.g., threatened ecosystems, species, or special habitats), ecological processes (e.g., migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g., provision of clean water) or a combination of all three.

A residual biodiversity impact is the impact of an activity, or activities, on biodiversity that remains after all efforts have been made to avoid and minimise the impacts of the activity, or activities, and to rehabilitate the affected area to the fullest extent possible.

As part of an EIA, an EAP or a specialist is required to predict the possible negative impacts of an activity, or activities, on biodiversity, including direct impacts, indirect impacts (including the potential impacts of an activity on the climate, where climate change could have negative impacts on biodiversity), and cumulative impacts. After those impacts have been identified, the EAP or specialist must investigate alternative project locations, designs, technologies, scales and layouts to determine if and how potentially significant negative impacts on biodiversity could be avoided or minimised. The EAP or specialist must also determine if, to what extent, and how successfully, impacted areas could be rehabilitated.

It is possible that biodiversity offsets could be required as conditions to the granting of authorisations other than EA, such as licences in terms of the National Forests Act, 1998, which imposes restrictions on development in natural forest ecosystems.

If predictions in the EIA state that all negative impacts on biodiversity cannot be avoided, and/or that impact minimisation and rehabilitation of the affected area cannot, with a high degree of certainty, fully mitigate the impacts of the activity, or activities, on biodiversity, the proposed development would have residual negative biodiversity impacts. The mitigation hierarchy (Avoid>Minimise>Rehabilitate>Offset), as set out in section 2(4)(a)(i) of NEMA, and applicable guidelines, should be followed to determine if there will likely be residual impacts.

Where residual negative biodiversity impacts are evaluated to be of medium or high significance, a biodiversity offset would be required. Biodiversity offsets are unlikely to be required when the residual negative impacts of a proposed activity, or activities, on biodiversity are evaluated to be of low significance. Biodiversity offsets are not appropriate when an activity, or activities, will have residual impacts on biodiversity of very high significance, including when residual negative impacts will result in loss of irreplaceable biodiversity. As already indicated, those developments are fatally flawed and should be avoided.

The impact assessment has determined that no residual impacts above low are anticipated, due to the minimal overall project footprint and layout planning, hence Biodiversity Offsets would not be required.

### 2.2.3 Determining the basic offset ratio

The standard approach to determining a basic biodiversity offset ratio is based on biodiversity targets. Those targets are, in turn, based on Ecosystem Extent, Ecosystem Protection Level and Ecosystem Threat Status of the various ecosystem types identified in the ecosystem assessment conducted as part of the determination of ecosystems that are threatened and in need of protection in terms of the National Environmental Management: Biodiversity Act, 2004. The proposed applicable ratios are listed in the look-up table, provided in the Biodiversity Offset Guidelines. The standard approach is shortly as follows:

1. If the Remaining Ecosystem Extent (REE) is less than or equal to 30%, the precautionary principle demands that a 30:1 ratio must be applied.
2. If the remaining Ecosystem Extent is between 30 and 70%, the ratios provided for in the look-up table in the Biodiversity Guidelines, which takes into consideration Ecosystem Extent and Ecosystem Protection Level (EPL), should be applied. The ratios in that range of Ecosystem Extent vary between 1:22 to 1:1 depending on the extent of the ecosystem remaining and how much of the relevant ecosystem type is protected. In the table below, ratios were assigned to 6 different “bands” based on remaining ecosystem extent and ecosystem protection level.
3. Remaining Ecosystem Extents above 70 % are allocated an offset ratio of nil (0) at all protection levels, indicating that no Biodiversity Offset is required.
4. Taking into consideration the Ecosystem Threat Status (ETS): it is recommended that the following ratios are applied for the different ecosystem threat statuses:
  - a. Critically Endangered: 30:1.
  - b. Endangered: 10:1.
  - c. Vulnerable: 5:1.
  - d. Least Concern: Nil

5. Following the precautionary approach, it is recommended that the highest of the two ratios described in 2 and 4 above is selected as the starting ratio.

It should be noted that a biodiversity offset could still be required for an activity, or activities, that are likely to have a significant residual negative impact on an ecosystem of Least Concern with an Ecosystem Extent of greater than 70%. In those cases, the starting ratio would be based on the information before the decision-maker, such as the reasons why the biodiversity offset is (or isn't) required.

One of the factors influencing the standard approach was to consider biodiversity spatial plans. This was integrated so as to support the achievement of the biodiversity targets set in those plans. The biodiversity targets set in those plans are not based purely on Ecosystem Extent and Ecosystem Threat Status. Other factors also influence the identification of Critical Biodiversity Areas and Ecological Support Areas, such as the presence of species or important ecological infrastructure.

Biodiversity spatial plans in South Africa usually identify Critical Biodiversity Areas (CBAs) in their respective planning domains (they are ordinarily done at Provincial level). CBAs are areas that must stay in, or be rehabilitated to, a largely natural ecological condition to ensure that a viable representative sample of all ecosystem types and species can persist. In most biodiversity spatial plans, there are two sub-categories of CBAs: CBA 1 and CBA 2. In most of those spatial biodiversity plans, CBA 1 sites are selected because there are no other options in the relevant planning domain for the relevant target to be met. They are therefore sometimes called CBA: Irreplaceable. The selection of CBA 2 sites is based on a range of factors, including spatial efficiency, complementarity, connectivity, avoidance of conflict with other land uses, and alignment with socio-economic opportunities for conservation if these are known. They are often known as CBA: Optimal.

It is recommended in the Guideline that significant negative impacts on biodiversity in CBA 1's are avoided because of the irreplaceability of those sites. For this reason, a punitive 30:1 ratio is applied to all CBA 1 sites. For significant residual negative impacts on biodiversity in CBA 2's, it is recommended that the Starting Offset Ratio (D) is multiplied by a factor of 1.5. The rationale for the latter recommendation is that whilst CBA 2's represent the best locations to meet conservation targets, the sites are not irreplaceable and as such, the application of a punitive 30:1 ratio cannot be justified.

Ideally, a site should only be selected as a CBA if it is currently in good ecological condition. However, in some circumstances it may be necessary to select a site in fair ecological condition as a CBA. Only in exceptional circumstances, when biodiversity targets for representation cannot otherwise be met, will a site that is severely modified be selected as a CBA. It is therefore not always the case that only areas in good ecological condition are selected as CBAs. CBA 1 and CBA 2 mean different things in some biodiversity spatial plans. For example, in the Western Cape Biodiversity Spatial Plan (2017), CBA 1's areas are CBA's in good ecological condition and CBA 2's are CBA's in fair or modified ecological condition.

It is emphasised here that the standard approach is not binding, but a guide based on relevant scientific information on ecosystems. Competent authorities must apply their minds to each case, which would involve considering additional factors, such as the size of the historical extent of the ecosystem measured against the extent of the residual negative impact (if a large percentage of the extent of the ecosystem would be impacted on, a higher ratio would be justified) and the cumulative residual negative impact of the activity, or activities, on biodiversity.

Some provincial conservation authorities or CAs have adopted, or may in future adopt, province-specific approaches to determining biodiversity offset ratios, based on province-specific biodiversity targets. Those approaches take precedence over the standard approach provided for in this guideline provided that they are scientifically defensible.

Consideration also needs to be given to how ratios are determined for development in the urban setting. It is likely that there would be good reasons for adjusting biodiversity offset ratios down for activities in the urban setting given the relative scarcity of space and natural areas in those areas. In this regard, consideration should be given to approaches for determining biodiversity offset ratios for development in the urban environment.

Biodiversity offsets require that ecosystems are considered, protected and managed within their landscape and functional context. Some ecosystems, namely forests and wetlands, require a slightly different approach to determining the size of offsets from the standard approach described above. For these ecosystems, historical guidance, mitigation practice, and/or specific legal protection, necessitate this different approach. However, it is desirable for there to be alignment between the different approaches to biodiversity offsetting wherever possible. The approach for natural forests is discussed below.

#### 2.2.4 Wetland Ecosystem Types

Wetland ecosystems require mitigation for the loss of biodiversity (i.e. wetland ecosystem type and wetland species), and for impacts on wetland (hydrological) functioning. The standard approach described in the Biodiversity Offset Guidelines (2023) also applies to wetlands. However, the negative impacts of an activity, or activities, on wetland functioning need to be addressed through the rehabilitation of degraded wetland systems, careful location of biodiversity offset sites in the wider hydrological landscape, and/or the removal, reversal or curbing of activities or processes threatening their effective functioning. Increasing wetland offset area is often not a suitable substitute for improving wetland functioning as an offset. *Wetland Offsets: A Best Practice Guideline for South Africa (2016)* provides more guidance on wetland offsets, which should be read in conjunction with this guideline.

#### 2.2.5 Forest Ecosystem Types

Activities which have residual negative impacts on forest ecosystems often require both an EA and a licence in terms of the National Forests Act, 1998 (NFA). The NFA, the primary law for the protection of natural forests in South Africa, provides that natural forests must not be destroyed save in **exceptional circumstances**. This implies that the target for conserving remaining forests is the remaining extent of the forest ecosystem type (i.e., they constitute irreplaceable biodiversity). Where an activity would have the effect of negatively impacting on a natural forest, and the “exceptional circumstances” referred to in the NFA are present, ecological compensation would be required. This compensation may include, but is not necessarily limited to, removing or reducing the activities or processes that impede or threaten forest regeneration, or that result in ongoing loss of that forest type, or a nearby related type. The strong protection given to natural forests by the National Forests Act, 1998 due to the rarity of the biome and its high ecosystem services, in practice means that any impacts on such forests are regarded as serious, and in the case of endangered forest types, as fatally flawed.

As already stated, an offset may well be required where a listed or specified activity would involve the removal of one or more protected tree species, despite the fact that application of this guideline’s

approach for determining when an offset is required suggests that no biodiversity offset is required. In such instances, the biodiversity offset requirements should involve an offset area to maintain or increase viable populations of the same tree species as those impacted or involve reducing or removing other activities or processes that threaten the persistence, recruitment or survival of protected trees, or both.

#### Implications:

- The impact assessment has determined that no residual impacts above low are anticipated, due to the minimal overall project footprint and layout planning, hence Biodiversity Offsets would not be required.

## 2.3 Vegetation and Ecological Processes and Corridors

### 2.3.1 Critical/Important Terrestrial Habitats

Critical or Important Terrestrial habitats include areas that are rare within a region, or which support important species, ecosystems, or ecological processes. Species of Special Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal, or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (ToPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such red data species that are under threat of extinction.

#### Rocky Outcrops

Rocky outcrops can provide habitat for geophytic species that often have limited distributions. Rocky areas may be present in higher lying areas within the grassland, most likely in areas that have not been cultivated, as they would have marginal suitability for agriculture. Rocky outcrops can be present in several forms from flat pavement like outcrops with little to know soil cover, areas covered in gravel and small boulder material, quartz patches, calcrete lenses, and several forms of larger outcrops that may also have faunal associations (such as for example Dassies or Karoo Padloper).

Rocky areas are present within the site, but not well-defined rocky outcrops. Rocky habitat, which includes primarily gravel patches, is not the type preferred by the Karoo Padloper.

#### Wetland habitat

Wetlands are special habitats as they provide a refuge for birds and other organism, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. No wetland habitat has been identified, but this aspect is be dealt with in a separate aquatic assessment (Refer to separate aquatic specialist assessment). Where observational comments in this report contradict any made in aquatic assessment report, the aquatic specialist will supersede those made in this report. None are deemed to

have any significant flora, and any fauna is unlikely to be affected by the proposed activity. Wetlands or Estuaries are protected by various pieces of legislation, such as:

- The *National Water Act* (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.
- The *NEMA* in terms of principle (r) and the listed activities (Section 24).
- The *Conservation of Agricultural Resources Act* (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.
- The *Integrated Coastal Management Act* (ICMA) 24 of 2008 requires the preparation of Estuary Management Plans by municipalities, unless managed by another Authority e.g., SANParks.

Natural wetlands include extensive unchanneled valley bottom wetlands, and depressions, will be assessed in further detail as per the aquatic assessment.

### Priority Estuaries

No Estuaries are affected by the proposed activity.

### Forest

No forest is present.

### Fynbos

No Fynbos is associated with the area.

### Colonies or Populations of Threatened or Protected Species

Further assessment would be required including surveys for populations of terrestrial fauna and flora species of concern.

#### Implications:

- Wetland habitat and various forms of rocky outcrops are present and would require further investigation and delineation to determine possible species of conservation concern, aquatic processes, and overall sensitivity.
- Faunal species as identified by the Screening Tool are likely to require further investigation, but suitable habitat within the footprint for the Karoo Padloper is limited.
- Further information is provided in the species assessment section.

## 3 Biodiversity Risk Identification and Assessment

### 3.1 Baseline Biodiversity Description

#### 3.1.1 Habitat Overview

The FE Kudu Wind Energy Facility site is situated between Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape province, slightly northwest of the R61 district road. The site is situated within a commercial livestock and game farming area (Refer to Figure 1), generally comprising dryland grazing. The portion assessed is approximately 9 000 Ha in extent. The area falls within a low, predominantly summer rainfall area. The proposed activity will be to construct a Wind

Energy facility, which will most likely feed into the national grid, being accessible in proximity to the site. The area falls within a low, predominantly summer rainfall area. Refer to Figure 12 for an aerial photo of the site.

The site is drained by several non-perennial watercourses with an extensive network of drainage lines forming an extensive alluvial fan network, some with notable channels but others without distinctive channels. Vegetation around the watercourses and drainage lines tend to be shrubbier than the surrounding landscape and lower order watercourses, being more defined, tend to have an associated tree fringe. Several man-made impoundments (dams) are present as well as what appear to be constructed canals to drain standing water from the alluvial fan and pan areas. The alluvial areas generally have poor vegetation cover, limited to a few species due to elevated salinity and occasional standing water, including several saltbush (*Salsola*) species.

The landscape surrounding these low lying alluvial areas is comprised of slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g., *Chrysocoma ciliata*, *Eriocephalus ericoides*) with rare low trees (e.g., *Euclea undulata*), sometimes having dense stands of drought-resistant grass (*Stipagrostis*, *Aristida*) cover (especially after abundant rains) on broad sandy bottomlands (Figure 13).

Elevated slopes and hills have a rockier substrate generally having a shrubby vegetation, while lower lying non alluvial grassy areas are prevalent in sandier substrates. In general flora diversity is low to moderate, based on the seasonal sampling undertaken, which is deemed to be adequate for the site. Several distinct habitats or communities are likely to provide a range of faunal habitat. Further details regarding the various communities and landscapes are described below.

### 3.1.2 Mapped Vegetation

Vegetation has provisionally been mapped from most recent available aerial photography (Figure 13) supported by site observations made during both of the site visits, and is comprised of the following broad categories:

#### Riverine

Natural vegetation surrounding watercourses, generally comprising a fringe of medium sized trees, primarily *Acacia karoo* and shrubs with some typical riparian elements (sedges and reeds), usually where standing water is present for extended periods. Grassland elements tend to be lush along lower order watercourses or where wet conditions persist longer than surrounding areas, where the thicket is absent or sparser. Vary in size from deeply incised watercourses with dense thicket fringe, to shallow channels with grasses and or a fringe of low shrubs. It is likely that over time the course of the shallower watercourses and drainage lines will move or migrate to some extent within the flat alluvial fan/floodplain area. Occasional sedges do occur, more prevalent where standing water persists (such as around the fringes of dams or pools within the watercourses) but are not the norm.

Riverine areas should not be developed other than for crossings of linear features (access roads), including a 32 m watercourse. Where turbines may be in proximity to watercourses or buffers, the laydown areas should be orientated away from rather than toward the watercourse (or buffer).



### *Alluvial*

Areas where watercourses become braided forming alluvial fan like features in extensive flat low-lying area surrounding the watercourses, having low shrubs predominantly *Salsola* spp. Comprises an extensive proportion of the Kudu site. Bare often silty or clayey areas are extensive, with elevated salinity to the west of Kudu, where a denser shrubby *Salsola* dominated vegetation is characteristic and where vegetative (including grass) growth is poor. Appears to have alluvial properties (visible cracking



with fine clayey sediments and evidence of standing water, most likely for several days possibly weeks after rainfall).





While vegetation composition and coverage are poor, such areas are likely to provide important seasonal habitat for birds and other fauna during rainy periods. Seasonally persistent wet conditions and clayey soils would likely pose some challenges during the construction phase due to waterlogged soils and slippery conditions. Absence of any riparian indicators suggest that this is not wetland habitat, standing water is unlikely to persist for sufficient periods of time.

### Transitional

Areas with above alluvial properties but also with more well developed grassy and shrubby Karoid elements become more prevalent. The transition from alluvial to karroid is often gradual and can extend over distance and the boundaries indicated in the mapping may not reflect or be differentiated on the ground as an exact or clearly differentiable boundary. Some smaller areas share characteristics of grassy Karoid vegetation described below and there may be some overlap in mapping with alluvial delineation due to the transitional nature.



### Karoid (Grassy)

Natural/Near Natural vegetation in low-lying sandy areas surrounding and dispersed within the above alluvial and transitional vegetation communities. Some small typical karroid shrubs may be present but are not dominant and typical alluvial shrubs such as *Salsola* spp, are also occasionally present, but also not dominant.



### *Karoid (Rocky/Shrubby)*

Rockier areas, often on slopes or slightly raised hills, with poor or non-sandy soils generally dominated by shrubs and herbaceous species with occasional grasses occurring. Rocky/Shrub community is not well represented on the site and restricted to a few peripheral areas. Several rocky community variations are present, the most prevalent being rocky gravel patches with small boulders and rocks. Rocky pavements (flat areas with soil mostly absent) are also present but uncommon.



Such rocky karroid areas generally have a more dominant succulent species composition. While rocky habitat is known to be habitat for reptiles such as the Karoo padloper, larger rocks that provide suitable cracks and crevices are not present, hence the area is likely unsuitable for the Karoo Padloper tortoise. This community is not differentiated from grassy karroid vegetation above in terms of the vegetation mapping, and there is likely some overlap with the transitional delineation.

## Transformed

Transformed areas are minimal within the site, comprising a few areas of old lands or other areas that have been transformed and would include roads and other cleared areas such as dwellings. More prevalent in areas surrounding the site such as dwellings and currently cultivated lands.

## Dams

Man made impoundments. Several farm dams are present, often having a fridge of sedges and or reeds present. Will have standing water for extended periods and likely to provide faunal habitat for a range of faunal species. Being within an arid area, such dams or small impoundments should be avoided.

A breakdown of the *approximate* areas of the above vegetation communities (habitat) is provided below (Table 4).

Table 4: Vegetation community areas (Kudu site).

SITE	VEGETATION	AREA (HA)
Kudu	Alluvial	4 290.2
Kudu	Transitional	2 376.7
Kudu	Karroid	2 018.6
Kudu	Watercourse	459.0
Kudu	Old Lands	16.7
Kudu	Transformed	3.5
	<b>Total Area</b>	<b>9 164.7</b>

Only the higher order watercourses have been delineated, smaller drainage lines have not been delineated, due to the large number within the alluvial fan areas. Final delineation and sensitivity of these minor watercourses will be subject to the findings of the aquatic assessment, as in terms of terrestrial composition and processes the minor watercourses are not a significant priority. In terms of ecological processes, these minor drainage liens should still be avoided as far as possible.

This landscape offers suitable habitat for a limited suite of animal species due to homogenous nature of the vegetation, although animals may have been displaced by to some extent in the grassland areas.

The optimum approach is to limit loss of more sensitive habitat, and/or where unavoidable representative areas should be retained as ecological corridors.

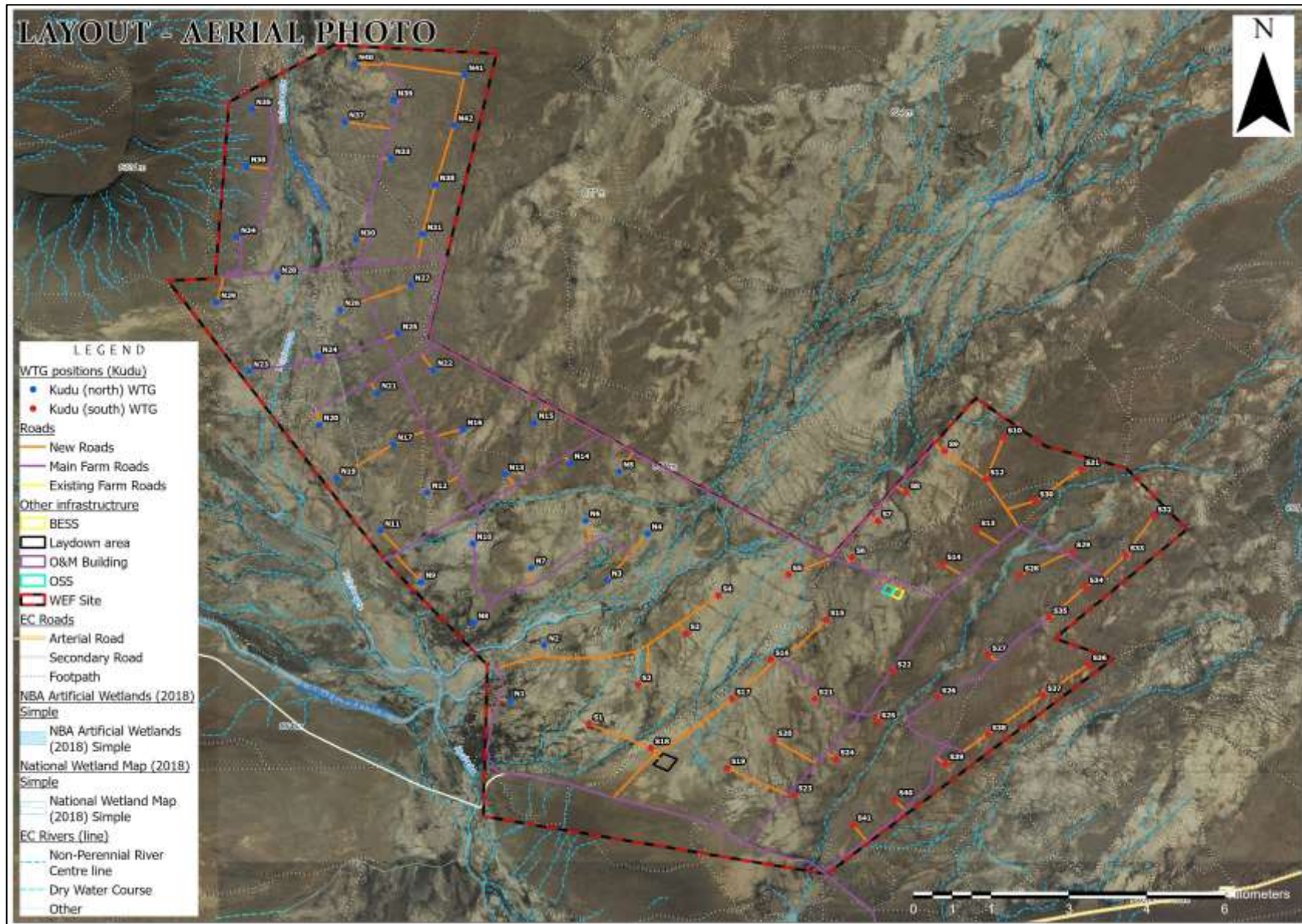


Figure 12: Aerial Photo of the FE Kudu Wind Energy Facility site with layout indicated.

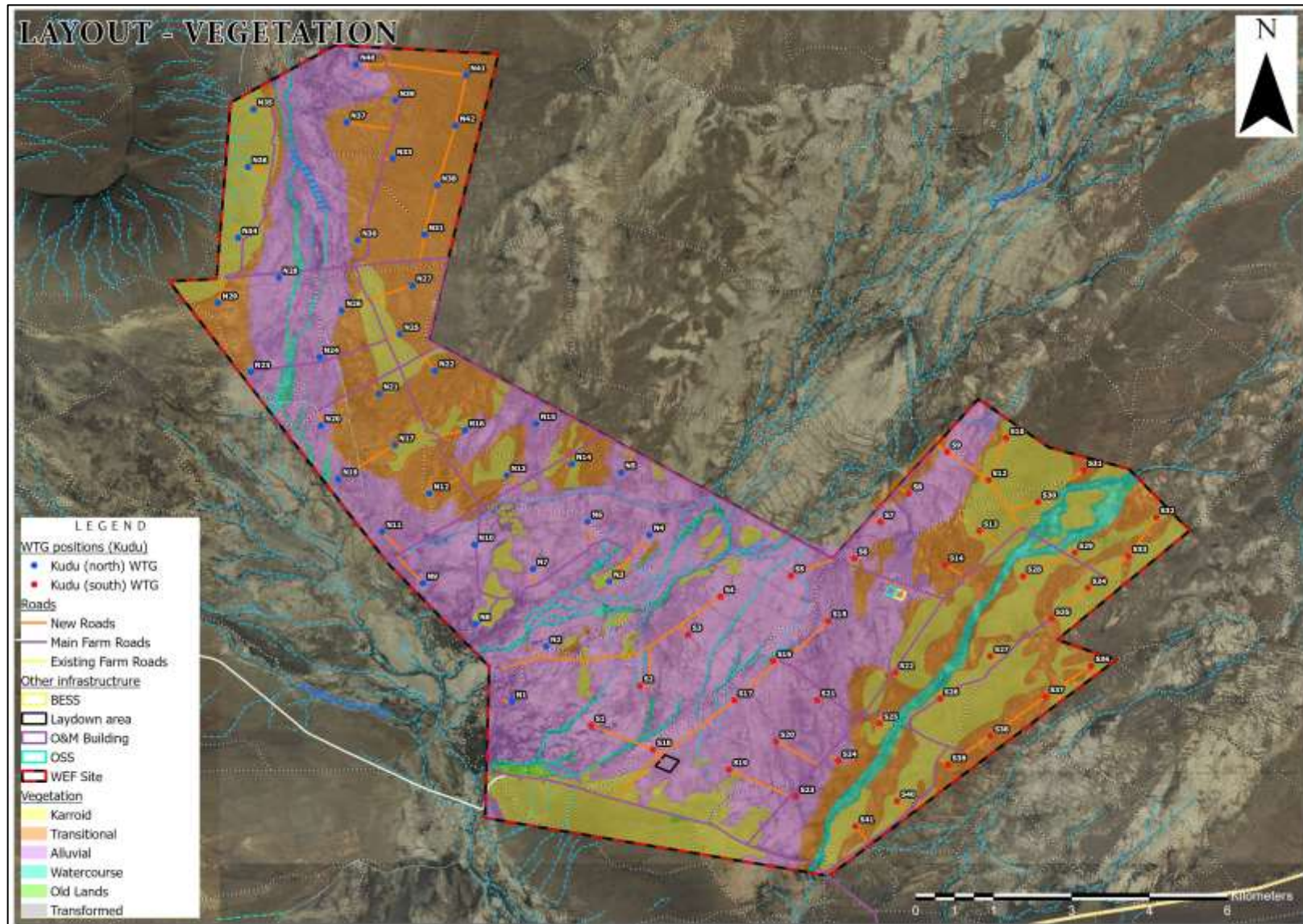


Figure 13: On-site mapped vegetation communities and/or habitat units.



## Vegetation and Flora

Vegetation is typical and representative of the vegetation unit. Exact composition and levels of disturbance would require a comprehensive site survey and assessment.

Due to having a low conservation status, the *vegetation units present* would in principle provide a suitable footprint for the proposed activity, bearing in mind the potential risks associated with altering flow patterns within a largely aquatic driven ecosystem, where additional guidance from the aquatic assessment will be required regarding the aquatic processes at play and measures that will be required to accommodate the respective ecological processes and connectivity. Significant fill will likely be required to accommodate the access roads and WEF footprints, which could indirectly alter flooding and movement of sediments. This could result in more widespread ecological changes as well as changes in both flora and fauna species composition due to changes in flooding patterns.

### 3.1.3 Flora

#### Red Listed, Endemic and Protected Flora

Several flora species are listed in terms of the National Environmental Screening Tool as potentially occurring (per Table 5). Several protected, endemic, range restricted or threatened species are known from the surrounding area and further seasonal assessment would determine which species. Due to the localised nature of the impact, and low to moderate plant overall species sensitivity, the risk of a species being present is at the lower end of the risk scale.

Table 5: Flora including Species of Special Concern.

SCIENTIFIC NAME	FAMILY	STATUS <sup>5</sup>	COMMENT/PRESENCE <sup>6</sup>
<i>Albuca setosa</i>	Hyacinthaceae	LC, PNCO	NKI 2
<i>Aloinopsis rubrolineata</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Amphiglossa callunoides</i>	Asteraceae	VU	AZi 6
<i>Aridaria noctiflora subsp. straminea</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Boophone disticha</i>	Amaryllidaceae	LC, PNCO	Gh 1
<i>Chasmatophyllum nelii</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Chasmatophyllum stanleyi</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Cliffortia arborea</i>	Rosaceae	VU A2cd; C2a(i)	Gh 1
<i>Cliffortia montana</i>	Rosaceae	NEST (M), Rare	A habitat specialist known from two disjunct areas in the Western and Eastern Cape. A very poorly known and rarely collected species with an unusually disjunct distribution. It is possibly overlooked and more common and widespread than collections indicate. No threats known, although inappropriate fire management could negatively affect this species. Possibly present, unconfirmed.

<sup>5</sup> IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species.

<sup>6</sup> NKI 1 - Gamka Karoo, NKI 2 - Eastern Lower Karoo, AZi 6 - Southern Karoo Riviere

SCIENTIFIC NAME	FAMILY	STATUS <sup>5</sup>	COMMENT/PRESENCE <sup>6</sup>
<i>Crassula corallina</i>	Crassulaceae	LC, PNCO	NKI 2
<i>Crassula muscosa</i>	Crassulaceae	LC, PNCO	NKI 1, NKI 2
<i>Cylindrophyllum calamiforme</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Delosperma congestum</i>	Aizoaceae	LC, PNCO	Gh 1
<i>Delosperma gramineum</i>	Aizoaceae	LC, PNCO	Gh 1
<i>Dierama grandiflorum</i>	Iridaceae	NEST (M), EN B1ab(iii), PNCO	An Eastern Cape endemic (EOO 3444 km <sup>2</sup> ), known from two confirmed locations and possibly still extant at three other locations where it is known from historical records. It is declining due to ongoing habitat degradation. Range is from Graaff-Reinet and Somerset East. An extremely rare and localized endemic known from less than 10 collections. Recent observations of subpopulations on the Bosberg indicate that plants occur in small, sparsely scattered clumps of fewer than 100 plants. Possibly present, Not recorded.
<i>Drimia anomala</i>	Hyacinthaceae	LC, PNCO	NKI 2
<i>Drimia intricata</i>	Hyacinthaceae	LC, PNCO	NKI 1, NKI 2
<i>Drosanthemum lique</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2, AZi 6
<i>Drosanthemum subspinosum</i>	Aizoaceae	DDT, PNCO	NKI 2
<i>Erica caespitosa</i>	Ericaceae	LC, PNCO	Gh 1
<i>Erica caffrorum</i> var. <i>caffrorum</i>	Ericaceae	LC, PNCO	Gh 1
<i>Erica passerinoides</i>	Ericaceae	NEST (M), EN B1ab(iii), PNCO	This species is known from between three and five locations and has an extent of occurrence (EOO) of 4312 km <sup>2</sup> . It is continuing to decline due to expanding forestry plantations and alien invasive encroachment. This species is endemic to the mountains of the Eastern Cape interior, where it is known from a few scattered subpopulations in the Sneeberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. It occurs on south-facing slopes in karoo-grassland ecotones. The Kamdeboo Mountain subpopulation is large and healthy, with two distinct large stands having been monitored on different summits within the range in the past 10 years. Possibly present, Not recorded.
<i>Erica woodii</i>	Ericaceae	LC, PNCO	Gh 1
<i>Eucomis autumnalis</i> subsp. <i>autumnalis</i>	Hyacinthaceae	NE, PNCO	Gh 1
<i>Galenia fruticosa</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Galenia glandulifera</i>	Aizoaceae	NT B1ab (iii,iv,v), PNCO	NKI 1
<i>Galenia sarcophylla</i>	Aizoaceae	LC, PNCO	NKI 1

SCIENTIFIC NAME	FAMILY	STATUS <sup>5</sup>	COMMENT/PRESENCE <sup>6</sup>
<i>Galenia secunda</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Haemanthus humilis</i> subsp. <i>humilis</i>	Amaryllidaceae	LC, PNCO	Gh 1
<i>Haworthia decipiens</i> var. <i>cyanea</i>	Asphodelaceae	Not Eval	NKI 2
<i>Haworthia greenii</i>	Asphodelaceae	PNCO	NKI 2
<i>Hereroa incurva</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Hereroa latipetala</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Hereroa odorata</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Hoodia dregei</i>	Apocynaceae	VU D2	NKI 1
<i>Isolepis expallesces</i>	Cyperaceae	VU D2	AZi 6
<i>Kniphofia acraea</i>	Asphodelaceae	Rare, PNCO	Gh 1
<i>Malephora uitenhagensis</i>	Aizoaceae	LC, PNCO	AZi 6
<i>Mestoklema tuberosum</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Moraea polystachya</i>	Iridaceae	LC, PNCO	NKI 1, NKI 2
<i>Nananthus vittatus</i>	Aizoaceae	PNCO, DDT (Data Deficient, Taxonomically Problematic)	Not endemic to South Africa. Free State, Northern Cape, North-West provinces. Found on the edges of alluvial areas. Confirmed present in the Kudu site.
<i>Peersia frithii</i>	Aizoaceae	NEST (M), Vulnerable	A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km <sup>2</sup> . It has only been recorded seven times since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km <sup>2</sup> . Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range. Possibly present, Not recorded.
<i>Pleiospilos compactus</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Plinthus karooicus</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Psilocalon articulatum</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Psilocalon coriarium</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Rhinephyllum luteum</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Rhombophyllum nelii</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Ruschia beaufortensis</i>	Aizoaceae	VU D2, PNCO	NKI 1
<i>Ruschia cradockensis</i> subsp. <i>cradockensis</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Ruschia intricata</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Ruschia spinosa</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Ruschia vanderbergiae</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Salsola arborea</i>	Chenopodiaceae	Not Eval	AZi 6
<i>Salsola gemmifera</i>	Chenopodiaceae	Not Eval	AZi 6
<i>Salsola tuberculata</i>	Chenopodiaceae	DDT	NKI 1
<i>Senecio radicans</i>	Asteraceae	DDT	NKI 2
Sensitive Species 1039		NEST (M), Vulnerable	This taxon has a restricted distribution range, with an extent of occurrence (EOO) of 5 594

SCIENTIFIC NAME	FAMILY	STATUS <sup>5</sup>	COMMENT/PRESENCE <sup>6</sup>
			km <sup>2</sup> . It is known from eight locations and is declining for unknown reasons. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. Possibly present, Not recorded.
Sensitive species 1212		NEST (M), Vulnerable	EOO <7 000 km <sup>2</sup> , known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Willowmore to Beaufort West and Aberdeen. Possibly present, Not recorded.
<i>Stapelia engleriana</i>	Apocynaceae	DDT	NKI 1
<i>Syringodea pulchella</i>	Iridaceae	VU D2, PNCO	Gh 1
<i>Tetragonia microptera</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Trichodiadema barbatum</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Tridentea virescens</i>	Apocynaceae	NEST (M), Rare	A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species. Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape stretching east to Prince Albert and Aberdeen. Possibly present, Not recorded.
<i>Tripteris aghillana</i> var. <i>integrifolia</i>	Asteraceae	NE	Gh 1
<i>Tritonia tugwelliae</i>	Iridaceae	LC, PNCO	NKI 1
<i>Wahlenbergia sphaerica</i>	Campanulaceae	DDT	Gh 1

Several endangered and/or critically endangered species are flagged for the site, however none were found to be present during the site sampling periods. Based on site observations, suitable habitat is limited (i.e., areas outside of alluvial areas) for several of the species. Generally, the most likely species are succulent species that would potentially be amenable to relocation if required.

Several flora species, having protected status in terms of the respective Eastern Cape Conservation Ordinance are likely to be present, for which permits would be required. These are indicated in the table above.

### 3.1.4 Fauna

The habitats and microhabitats present on the project site are not unique and although highly fragmented, are widespread in the broader area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.

### Mammals

National Environmental Screening Tool identifies no mammal species. Black Footed Cat may be in the wider area. Riverine Rabbit is not anticipated to be present. Other species are likely to be widespread and or species not under threat.

### Avifauna and Bats

National Environmental Screening Tool identifies several bird species as possibly being in the area and an avifaunal assessment is likely to be required. Outside of the scope of this assessment.

### Reptiles

Reptiles such as lizards, snakes and tortoises may be present. National Environmental Screening Tool identifies *Chersobius boulengeri* (Karoo Padloper), as possibly occurring in the area. Initial site investigations suggest that this species is unlikely to be present due to unsuitability of habitat in the lower lying areas of the sites, where development would occur.

### Amphibians

National Environmental Screening Tool identifies no amphibian species of conservation concern as possibly being in the area. Amphibians are likely to be present due to the prevalence of watercourses and wetland areas, however no species of conservation concern are flagged for the site.

### Invertebrates

National Environmental Screening Tool identifies no invertebrate species of conservation concern as possibly being in the area. Site assessment not required but would be required to confirm.

### Red Listed and Protected Fauna

As per Table 6, Endangered or Critically terrestrial fauna species are flagged for the site. The site falls within the potential distribution range of a few faunal species of conservation concern. No further avifaunal investigations have been undertaken but the single reptile species that is has a significantly more widespread distribution than the site. Further assessment is likely to be required as the reptile is known to have specialised habitat rocky areas).

Table 6: Fauna Species of Special Concern

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>7</sup>	COMMENT/PRESENCE
<b>Mammals</b>			
None of concern			
<b>Birds</b>			
<i>Afrotis afra</i>	Southern Black Bustard	VU (A4bc), NEST (H, M)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<i>Cursorius rufus</i>	Burchell's Courser	LC (NEST, H)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<i>Neotis ludwigii</i>	Ludwig's Bustard	EN A4cd, NEST (H)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<i>Aquila verreauxii</i>	Verreaux's Eagle	VU A2c; C1, NEST (H)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.

<sup>7</sup> IUCN: LC – Least Concern; VU – Vulnerable; EN – Endangered; CR – Critically Endangered.

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>7</sup>	COMMENT/PRESENCE
<i>Polemaetus bellicosus</i>	Martial Eagle	EN A2cde ; C1, NEST (H)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<i>Circus maurus</i>	Black Harrier	EN C1+2a(ii), NEST (H, M)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<i>Ciconia nigra</i>	Black Stork	VU A2c; D1, NEST (M)	Outside the scope of this terrestrial assessment. Refer to avifaunal assessment.
<b>Reptiles</b>			
<i>Chersobius boulengeri</i>	Karoo Padloper	NEST (M), Endangered	Endemic to South Africa, occurring from Brintjieshoogte in the Eastern Cape to Touwsrivier in the Western Cape; the range in the Northern Cape extends north of Williston in the northwest and beyond Vosburg in the northeast. Occurs in association with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes. Not likely to be present due to absence of suitable habitat.
<b>Amphibians</b>			
None flagged	-	-	PNCO & ToPS listed species may be present.
<b>Invertebrates</b>			
None flagged			PNCO & ToPS listed species may be present.

None of the flagged species were found during the site visits, and there is limited suitable rocky habitat for the Karoo padloper within the site. While the species is known to have a preferred habitat, it does not exclude it from occasionally occurring in less favourable habitats. The alluvial and aquatic habitat, comprising a portion of the site is unlikely suitable due to periodic flooding, which is not suitable for slow moving tortoises.

### Alien Invasive Species

Alien invasive species are not prevalent on site other than the occasional Prickly Pear (*Opuntia ficus indica*), which is generally not problematic. Common local weed species are likely to proliferate during and after construction and a suitable weed management strategy must be implemented during construction and well as an after-care period (at least 2 years) during the operational phase.

### 3.1.5 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial, non-perennial watercourses, and wetlands are present in the wider area and aquatic features, or habitat is present within the site. Any aquatic habitat should be excluded from development.

Portions of the watercourses are braided within the site, creating an extensive alluvial fan landscape surrounding the watercourses. Seasonal flooding may provide aquatic function and ecological processes, as well as bird habitat, which could be altered due to road construction, which could affect alter sediment and flow patterns as well as seasonal flooding patterns, which may in turn alter ecological processes and species composition.

### 3.1.6 Terrestrial Vegetation Sensitivity Assessment

An overall desktop Terrestrial Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* in terms of overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

#### Intactness

Three basic classes are differentiated as follows:

- **Low:** > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate:** 25 - 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemism or highly localised distributions.
- **High:** < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemism and or high conservation status (endangered or critically endangered).

Intactness for the site is moderate to high, with evidence of historical degradation evident, most likely as a result of historical and ongoing livestock grazing.

#### Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.
- **Moderate:** individual clumps of invasives present but cover less than 50% of original area.
- **High:** dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is generally low in near-natural area, disturbed areas often have elevated weed populations.

#### Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

INTACTNESS	INVASION		
	LOW	MODERATE	HIGH
High	Pristine	Near Pristine	Moderately Degraded
Moderate	Near Pristine	Moderately Degraded	Severely Degraded
Low	Moderately Degraded	Severely Degraded	Transformed

Degradation is variable, but generally elevated due to historical overgrazing and since the area has been experiencing an extended drought in recent years. No significant transformation is present other than some areas having old, cultivated lands. Several small dams are present along drainage lines and several extensive erosion control berms are also present in flatter areas where poor vegetation cover and alluvial/sandy substrate elevate erosion risk. Such erosion management features serve a specific purpose within the degraded landscape and any activity should align with these management processes to minimise ongoing degradation.

### Overall Sensitivity score

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Severely degraded/ Transformed	Very Low	Low	Moderate	Moderate - High
Moderately degraded	Low	Moderate	High	High
Ecologically Pristine or near Pristine	Moderate	Moderate - High	High	Very High (No-Go area)

Refer to Figure 14 for overall sensitivity map and Table 7 for summary of the sensitivity of the respective vegetation units and habitats.

*Table 7: Sensitivity Summary for the site.*

SPECIES	INTACTNESS	SITE ECOLOGICAL IMPORTANCE			OVERALL SENSITIVITY
		ALIEN INVASION	DEGRADATION	STATUS	
Riverine Vegetation	High/Moderate	Low	Pristine	LC	High or Very High <sup>8</sup>
Intact/ Near Intact Alluvial/ Transitional	Moderate/ High	Low	Pristine	LC	Moderate/High <sup>9</sup>
Intact/Near Intact Karroid	Moderate/ High	Low	Near Pristine	LC	Moderate
Cultivated/Transformed	Very Low	Low	Transformed	LC	Very Low

Due to the low conservation status of the site, the general Gamka Karroo vegetation would be deemed to have a low to moderate sensitivity, while niche habitats (such as quartz patches, riverine, alluvial, pans and rocky outcrops) would be deemed to have an elevated (high or very high) sensitivity, which are not common within the specific site, other than the riverine areas.

- High sensitivity areas include confirmed major riverine watercourses with riparian thicket vegetation. These areas are noted to be important ecologically within an arid environment. Must be avoided other than strategic and necessary access road crossings.
- Moderate sensitivity areas include the general natural or near natural Karoid and Alluvial vegetation where national conservation status is not elevated.
- Low sensitivity areas for the purposes of the screening, include all transformed areas including lands or cultivated areas, and/or dwellings.

<sup>8</sup> Riverine and Riparian vegetation has a sensitivity elevated above the surrounding vegetation unit, due to its importance in terms of ecological processes and faunal habitat as well as aquatic processes outside the scope of this assessment.

<sup>9</sup> Alluvial areas have a sensitivity elevated above the surrounding vegetation unit, subject to change based on the findings of the aquatic assessment, specifically relating to ecological processes and risks resulting from the proposed activity.



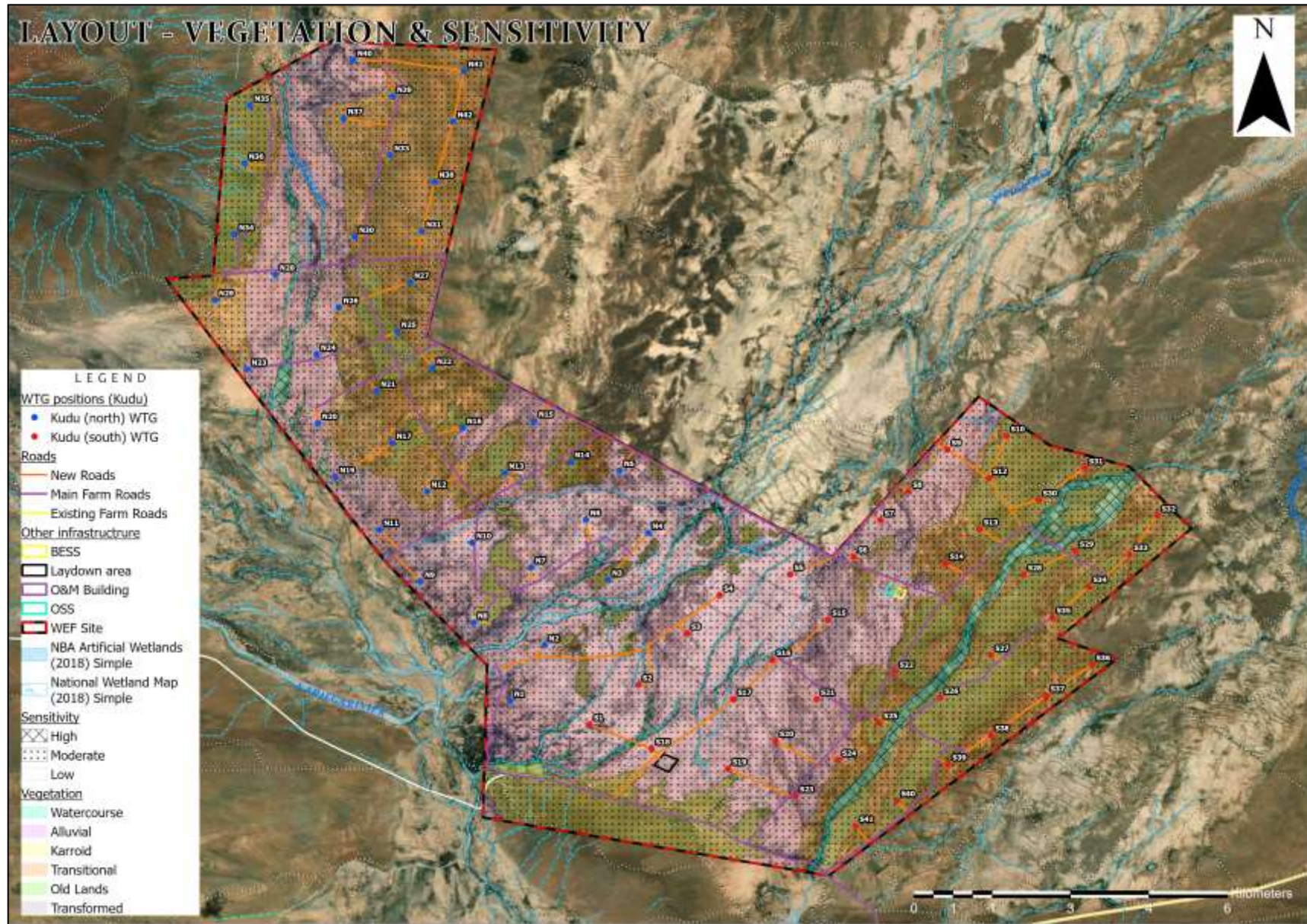


Figure 14: Overall Terrestrial Biodiversity Sensitivity Map (Kudu).

The vegetation sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation.

### 3.1.7 Critical Habitat

Possible Critical Habitat features including the following would require site verification to confirm:

1. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
2. Criterion 2: Habitat for Endemic or restricted-range species
3. Criterion 3: Habitat for Migratory or congregatory species
4. Criterion 4: Habitat for Highly threatened and/or unique ecosystems
5. Criterion 5: Habitat for Key evolutionary processes

Based on site investigations, no flora Species of Conservation Concern, being endemic or range restricted species or having an elevated conservation status were found to occur. The Karoo padloper is considered to be a habitat specialist, preferring rocky outcrop areas with adequate rocky crevices, but also occasionally occur outside of such habitat. Suitable habitat within the site, specifically the footprint areas are not preferred habitat.

### 3.1.8 No-Go Areas

The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted the least number of crossings required.

### 3.1.9 Potential Development Footprints

The FE Kudu Wind Energy Facility site is suitable for the proposed activity, notwithstanding accommodating the recommended corridors and No-Go areas.

### 3.1.10 Overall Sensitivity and Recommendations

The sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers, Figure 15) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted to one crossing per watercourse unless no other options are feasible. Additional alluvial corridor buffers have been delineated as per Figure 15, which align with the key braided watercourse network, and must be avoided as far as possible. Watercourse crossings should only traverse these areas where no other alternatives are technically feasible.

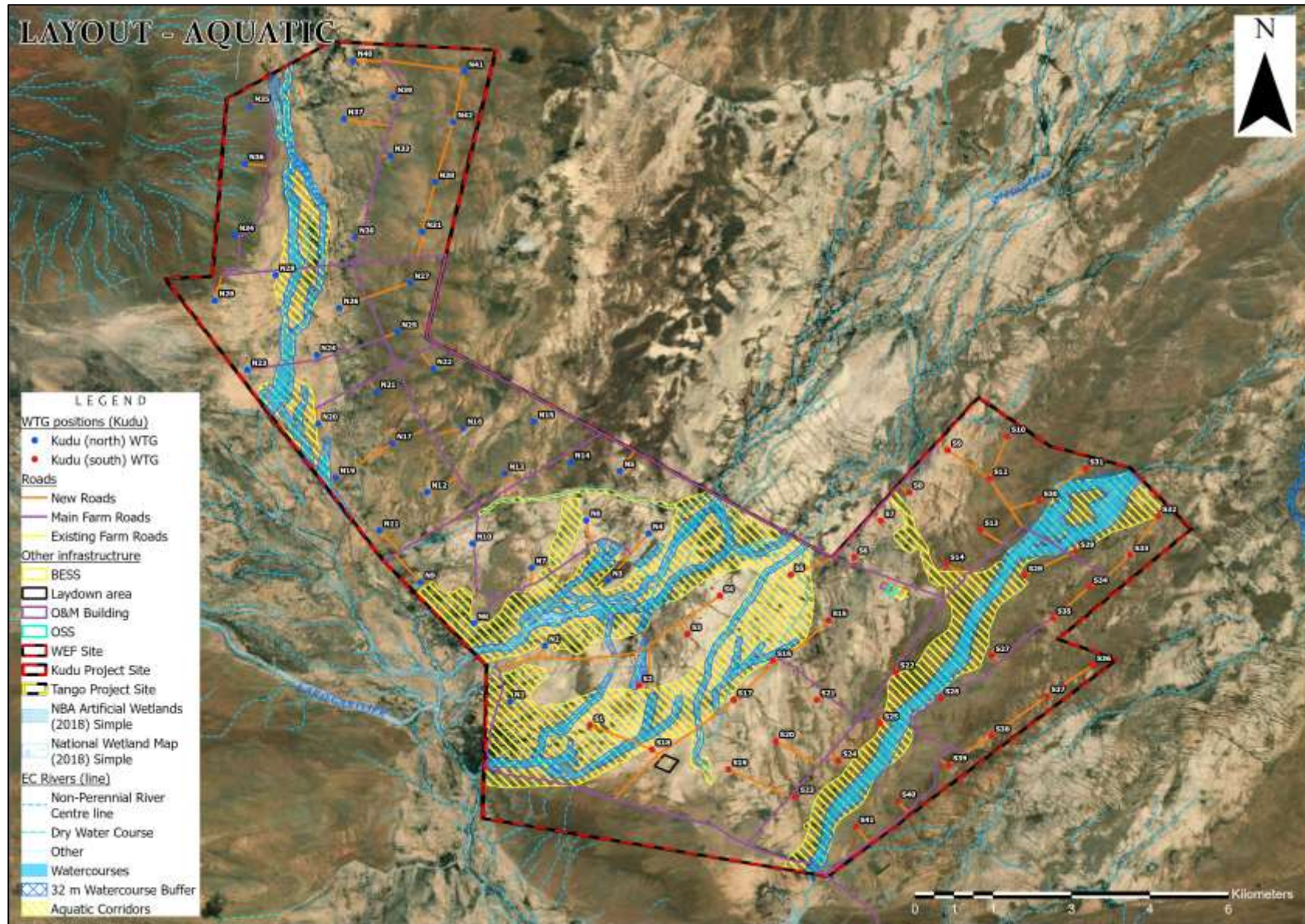


Figure 15: Mainstem Rivers & Minor Watercourses (Delineated)with 32 m Aquatic Buffers and recommended Alluvial Corridors.

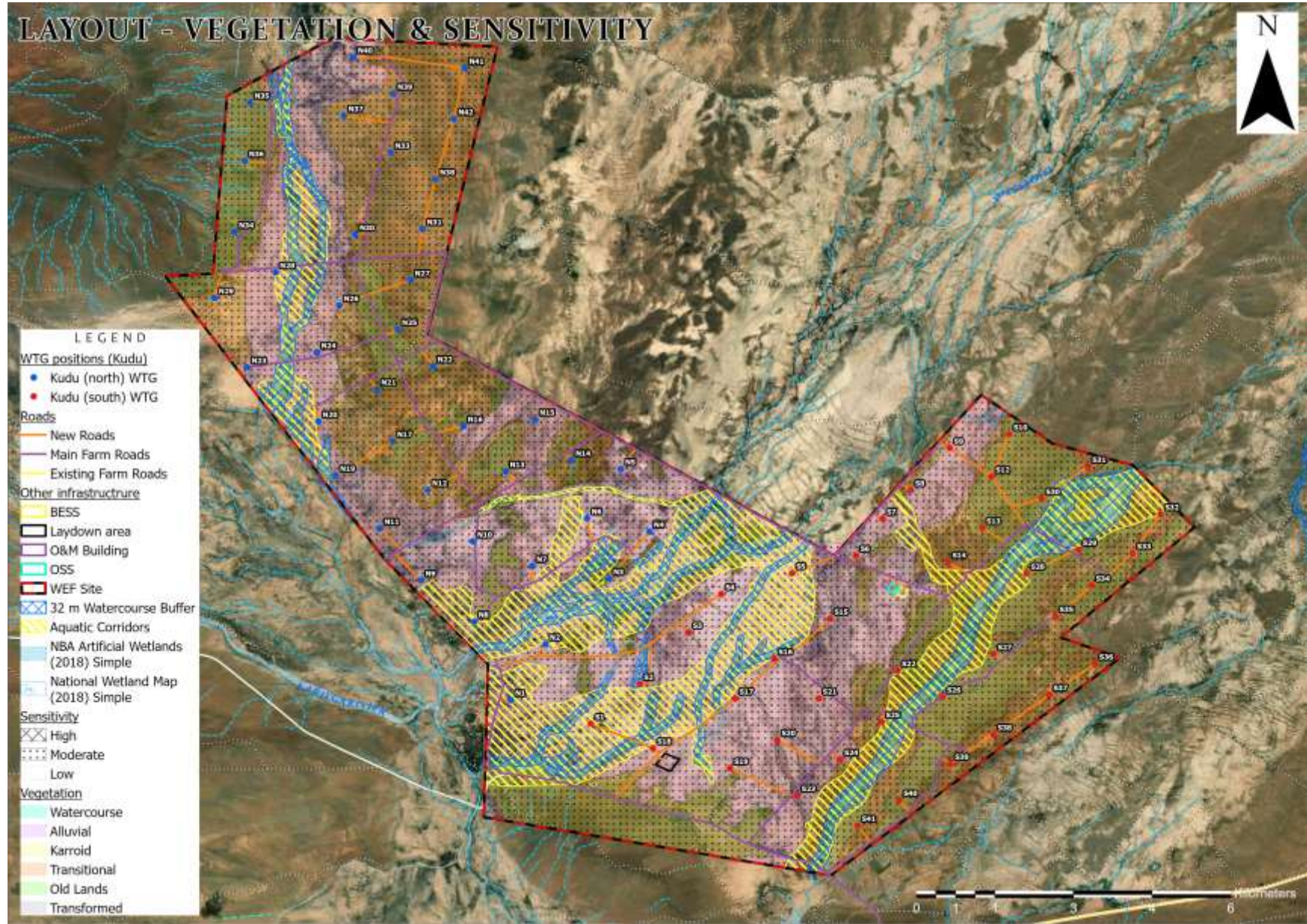


Figure 16 Terrestrial Vegetation & Sensitivity with recommended Aquatic Buffers and Alluvial Corridors.

As evident in the combined sensitivity map (Figure 15 & Figure 16), the optimised layout has largely accommodated the sensitivities and avoided as far as technically possible. Some residual crossings (road to WEF S18) and turbines (WEF S1, S5, N1 & N8) are within the recommended aquatic and ecological corridor, but these are unlikely to significantly compromise any ecological functioning since the remainder of the corridors are not affected and are thus deemed acceptable. No turbines are situated within the watercourse buffers and the mitigation strategy has eliminated several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable.

The aquatic and ecological corridor should be considered to be a refining or fine scale mapping of the designated ESA categorisation and would be considered to have a moderate sensitivity, where fragmentation should be kept to a minimum, such as required access roads, and should not be prioritised for placement of turbines, although some can be accommodated as long as they are isolated from other turbines within the same corridor. Any turbines sited along the edges should be designed in a way that the hard stand is orientated towards the outside of the recommended corridor.

## 3.2 Risks and Potential Impacts to Biodiversity

### 3.2.1 Potential Terrestrial Biodiversity Impacts (Direct)

The main impacts likely to result from the proposed activity are summarised in Table 8 below.

Table 8: Potential Impacts to Terrestrial Biodiversity

IMPACT	Nature of Impact
Vegetation	<u>Permanent or temporary loss of indigenous vegetation</u> cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	<u>Loss of flora species of special concern</u> during pre-construction site clearing activities.
Alien Invasive Species	<u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	<u>Susceptibility of some areas to erosion</u> because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	<u>Disturbances to ecological processes</u> : Activity may result in disturbances to ecological processes.
Aquatic and Riparian processes	<u>Aquatic and Riparian processes</u> : Aquatic habitat is present and could be affected.
Faunal Habitat	<u>Loss of Faunal Habitat</u> : Activity will result in the loss of habitat for faunal species.
Faunal Processes	Impacts to <u>faunal processes</u> because of the activity.

IMPACT	Nature of Impact
Faunal Species	<u>Loss of faunal SSC</u> due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

### 3.2.2 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low to medium for the general landscape but potentially high for the quartz patches and other specialised habitat but will require investigation of the potential faunal and flora species that may be present.

### 3.2.3 Residual Risks and Uncertainties

Any terrestrial biodiversity surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times and erratic rainfall. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data and the site surveys were undertaken during periods of favourable seasonal rainfall.

## 3.3 Assessment of Potential Impacts to Biodiversity

### 3.3.1 Assessment of Impact Methodology

Direct, indirect, and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment.
  - 2 is minor and will not result in an impact on processes.
  - 4 is low and will cause a slight impact on processes.
  - 6 is moderate and will result in processes continuing but in a modified way.
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not

happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium, or high; and
- the **status**, which will be described as either positive, negative, or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

- $S = (E + D + M)P$
- S = Significance weighting
- E = Extent
- D = Duration
- M = Magnitude
- P = Probability

The **significance weightings** for each potential impact are as follows:

- < **30 points: Low** (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points: Medium** (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > **60 points: High** (i.e., where the impact must have an influence on the decision process to develop in the area).

“**Mitigation**”, means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

“**Cumulative Impact**”, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

“**Residual Risk**”, means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).

### 3.4 Assessment of Impacts

In terms of the impact assessment hierarchy (*Avoid, Minimize, Rectify Reduce, Offset*), the proposed project underwent an initial sensitivity and screening process in order to inform the preliminary layout. After completion of this initial sensitivity screening, a sensitivity map was provided to the proponent and the layout was refined in order to avoid and minimise sensitivities as far as technically possible. The optimised layout being assessed includes measures to rectify and/or reduce the remaining or residual

impacts as far as possible. Further refining of the optimised layout may occur during finalisation of the draft reporting as well as during the pre-commencement walkdown once final footprints are determined. **Since the project is not within any critical or sensitive habitat that is under imminent threat, offsets are not anticipated nor included as any recommendations.** The significance before mitigation is this assessed based on a revised layout that has already undergone a refining process to avoid most sensitive habitat pertaining to terrestrial biodiversity.

### 3.4.1 Assessment of Direct Impacts

Assessment of impacts is summarised in the tables below. The rating values as per the criteria described above, as identified during the assessment.

<b>Nature:</b> Permanent or temporary loss of indigenous vegetation cover as a result of the activity.			
<b>Impact description:</b> Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.			
	<b>Rating</b>	<b>Motivation</b>	<b>Significance</b>
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan).	<b>Low Negative (25)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site.	
<b>Probability</b>	Definite (5)	The possibility of the impact high	
<b>Mitigation/Enhancement Measures</b>			
<b>Mitigation:</b>			
<ul style="list-style-type: none"> <li>Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place.</li> <li>Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place.</li> <li>Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.</li> </ul>			
<b>Post Mitigation/Enhancement Measures</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan).	<b>Low Negative (25)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of	



		natural vegetation are present surrounding the site.	
<b>Probability</b>	Definite (5)	The possibility of the impact is high	
<b>Cumulative impacts:</b>			
Since the proposed footprint has a minimal area, and is within vegetation units with very low levels of transformation, cumulative impact to terrestrial biodiversity locally and regionally will be negligible.			
<b>Residual Risks:</b>			
Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.			

<b>Nature:</b> Loss of flora species of conservation concern during pre-construction site clearing activities.			
<b>Impact description:</b> Species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population.			
	<b>Rating</b>	<b>Motivation</b>	<b>Significance</b>
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan).	<b>Low Negative (10)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. While present, species of conservation concern are not prevalent within the WEF footprint.	
<b>Probability</b>	Improbable (2)	The possibility of the impact is Low.	
<b>Mitigation/Enhancement Measures</b>			
<b>Mitigation:</b>			
<ul style="list-style-type: none"> <li>A search and rescue would be recommended before construction commences. Any flora search and rescue will likely include a few individuals of widespread, cosmopolitan or common but protected species.</li> <li>Respective permits to be obtained prior to construction commencing.</li> </ul>			
<b>Post Mitigation/Enhancement Measures</b>			
<b>Duration</b>	Long term (4)	Clearing of the site will be long term (± 25-year anticipated lifespan).	<b>Low Negative (10)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	All species are widespread species and removal will not result in any significant	

		impact to any flora species or population.	
<b>Probability</b>	Probable (2)	The possibility of the impact is Medium.	
<b>Cumulative impacts:</b>			
<p>Since the footprint has a limited area, cumulative impact to flora species locally and regionally will be negligible. All species confirmed present are widespread species and removal will not result in any significant impact to any flora species or population.</p>			
<b>Residual Risks:</b>			
<p>Residual risks include possible clearing of areas outside of the proposed footprint, or not relocating any species, but are likely to be negligible.</p>			

<b>Nature:</b> Loss of fauna species of conservation concern and potential loss of faunal habitat.			
<b>Impact description:</b> Faunal species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population. Species may include transient fauna species. Activities associated with site preparation and killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.			
	<b>Rating</b>	<b>Motivation</b>	<b>Significance</b>
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan). Fauna species may return to the project site once construction is completed, including transient species. The operation of the site is unlikely to pose any significant risk to such species.	<b>Low Negative (15)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site.	
<b>Probability</b>	Probable (3)	The possibility of the impact is Medium.	
<b>Mitigation/Enhancement Measures</b>			
<b>Mitigation:</b>			
<ul style="list-style-type: none"> <li>Blanket clearing of vegetation must be limited to the footprint.</li> <li>The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.</li> </ul>			

- Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.
- Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances.
- Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.
- A pre-commencement faunal search and rescue is recommended, but not necessarily required. Respective permits to be obtained beforehand.
- No animals are to be harmed or killed during the course of operations including use of snares.

**Post Mitigation/Enhancement Measures**

<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan). Fauna species may return to the project site once construction is completed, including transient species. The operation of the site is unlikely to pose any significant risk to such species.	<b>Low Negative (15)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site.	
<b>Probability</b>	Probable (3)	The possibility of the impact is Medium.	

**Cumulative impacts:**

Since the footprint has a limited area, cumulative impact to faunal species locally and regionally will be negligible. All fauna species are widespread species and removal will not result in any significant impact to any fauna species or population. Furthermore, it is likely that fauna species will return to the project footprint once construction is completed, hence cumulative impacts would be negligible. No species having an elevated conservation status were found to be present within the project footprint.

**Residual Risks:**

Residual risks include possible clearing of areas outside of the proposed footprint, killing of perceived harmful fauna during construction or not relocating any species, but are likely to be negligible.

**Nature:** Invasion by exotic and alien invasive species could occur as a result of construction.

**Impact description:** Exotic (weed) and alien invasive species may proliferate during and after construction in disturbed areas. Areas disturbed during construction, having no vegetation cover, including temporary

stockpile areas, are often susceptible to invasion by weedy and alien invasive species, which can not only become invasive but also prevent natural flora from becoming established.

	Rating	Motivation	Significance
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term ( $\pm$ 25-year anticipated lifespan). This risk is highest during and just after construction but can perpetuate for the duration of operations if not adequately managed.	<b>Low Negative (21)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (2)	The magnitude is generally proportionate to the level of disturbance and how well and quickly mitigation is implemented.	
<b>Probability</b>	Probable (3)	The possibility of the impact is Medium.	
<b>Mitigation/Enhancement Measures</b>			
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>• Alien species (including alien invasive trees) and weeds must be removed from the site as per CARA/NEMBA requirements.</li> <li>• A suitable weed management strategy to be implemented during construction and operation phases as outlined in the EMPr section of this report. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated.</li> <li>• After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.</li> </ul>			
<b>Post Mitigation/Enhancement Measures</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term ( $\pm$ 25-year anticipated lifespan). This risk is highest during and just after construction but can perpetuate for the duration of operations if not adequately managed.	<b>Low Negative (15)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (0)	The magnitude is generally proportionate to the level of disturbance and how well and quickly mitigation is implemented.	
<b>Probability</b>	Probable (3)	The possibility of the impact is Medium.	
<b>Cumulative impacts:</b>			

Disturbed areas are generally subject to weed proliferation, but with implementation of a weed management plan, cumulative impact is potentially negligible.

**Residual Risks:**

Residual risks are primarily related to inadequate initial and ongoing implementation of the weed management plan.

**Nature:** Disturbances to ecological processes may occur as a result of the activity.

**Impact description:** Activity may result in disturbances to ecological processes.

	Rating	Motivation	Significance
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term ( $\pm$ 25-year anticipated lifespan).	<b>Medium Negative (33)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site and local surrounding area only.	
<b>Magnitude</b>	Moderate (6)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site.	
<b>Probability</b>	Probable (3)	The possibility of the impact is low.	
<b>Mitigation/Enhancement Measures</b>			
<b>Mitigation:</b>			
<ul style="list-style-type: none"> <li>Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.</li> <li>Rehabilitation or revegetation should be implemented on completion of construction.</li> </ul>			
<b>Post Mitigation/Enhancement Measures</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term ( $\pm$ 25-year anticipated lifespan). Some revegetation to current levels will occur within the WEF footprint once construction is completed.	<b>Low Negative (27)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site only.	
<b>Magnitude</b>	Low (4)	The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site (to the north and east).	

<b>Probability</b>	Probable (3)	The possibility of the impact is Medium	
<b>Cumulative impacts:</b>			
Since the footprint is minimal, as well as being within vegetation units that have extensive coverages, cumulative impact to ecological processes both locally and regionally will be negligible.			
<b>Residual Risks:</b>			
Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.			

**Nature:** Ecological processes associated with Aquatic and Riparian habitat may be affected by the activity and erosion risk may be elevated.

**Impact description:** Diversion and increased velocity of surface water flows during construction and operation could alter the hydrological regime and result in changes to water quality as well as loss of riparian vegetation / aquatic habitat. Removal of vegetation cover and soil disturbance during construction may result in some areas being susceptible to soil erosion, in particular during unexpected heavy rainfall.

	<b>Rating</b>	<b>Motivation</b>	<b>Significance</b>
<b>Prior to Mitigation</b>			
<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan). Aquatic Features are present but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations.	<b>Medium Negative (33)</b>
<b>Extent</b>	Local (1)	The impact will be restricted to the site and immediate surrounds only.	
<b>Magnitude</b>	Moderate (6)	Aquatic Features are present but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations.	
<b>Probability</b>	Probable (3)	The possibility of the impact Medium	

**Mitigation/Enhancement Measures**

- Mitigation:**
- Stormwater discharge into watercourses to be protected against erosion.
  - Suitable measures must be implemented in areas that may be susceptible to erosion (such as slopes) and all Any excavations or excavated areas must be protected from erosion.
  - Topsoil must be stripped and stockpiled separately and protected from erosion and replaced on completion.
  - If natural vegetation re-establishment does not occur natural (bushveld typically regenerates well with minimal intervention), a suitable local grass seed mix must be applied.

**Post Mitigation/Enhancement Measures**

<b>Duration</b>	Long term (4)	Operation of the site will be long term (± 25-year anticipated lifespan). All aquatic features have been identified	<b>Low Negative (27)</b>
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		and are mostly excluded from the site footprint.	
<b>Extent</b>	Local (1)	The impact will be restricted to the site and immediate surrounds only.	
<b>Magnitude</b>	Low (4)	Aquatic Features are present but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations.	
<b>Probability</b>	Probable (3)	The possibility of the impact Medium	
<b>Cumulative impacts:</b>			
While the footprint falls within an area having aquatic features, these have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations in consultation with both the terrestrial and aquatic specialists. Cumulative impacts locally and regionally will thus be negligible.			
<b>Residual Risks:</b>			
Residual risks include inadequate protection from flooding or erosion (including stockpiles topsoil) as a result of unexpected heavy rainfall, mostly during construction and early after construction is completed (until vegetation cover is established).			

Disturbances to Ecological Processes and Aquatic and Riparian processes are considered to have a Medium Significance *before Mitigation* and Low *after Mitigation*. All other impacts are Low *before and after Mitigation*.

### 3.4.2 Assessment of Indirect Impacts

No Indirect Impacts of concern are anticipated.

### 3.4.3 Assessment of Cumulative Impacts

As per requirements of the EIA Regulations, specialists are required to assess the cumulative impacts. In this regard, please refer to the methodology below that will need to be used for the assessment of Cumulative Impacts.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

As indicated in Figure 17, several other WEF projects are proposed in the adjacent area. The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to

terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities and the overall footprint area is small in comparison to the total coverage area.

**Nature:** Activity may result in cumulative impacts to terrestrial ecology.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

**Confidence in findings:** High.

**Mitigation:**  
 Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place. Additional mitigation measures, as described in the tables above, are to be implemented.

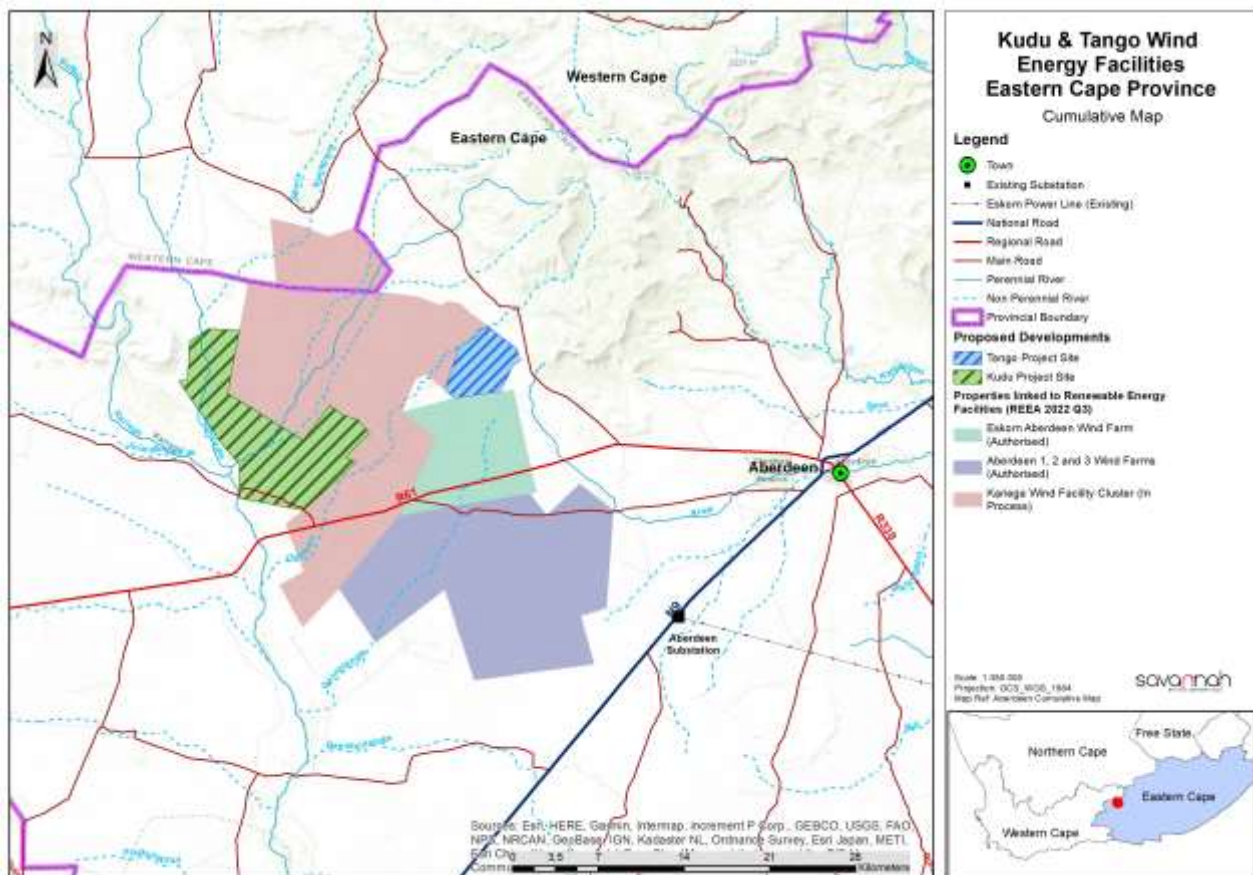


Figure 17: Map indicating potential cumulative impacts resulting from nearby renewable energy projects.



The cumulative impacts of the proposed WEF on the terrestrial environment are likely to be minimal and all are considered to be [low after mitigation](#).

### 3.4.4 Terrestrial Biodiversity Impact Reversibility

Karroid vegetation is generally not resilient and impacts, including hardening of surfaces or removal of topsoil will to some extent be irreversible without high rehabilitation costs. The vegetation represented on site, however, has extensive regional coverage and the local loss as a result of the proposed activity will be negligible.

### 3.4.5 Impacts and Risks to Irreplaceable Biodiversity Resources

The site is situated within vegetation types not having an elevated status (*Least Concern*) and has a limited footprint, hence risks to irreplaceable biodiversity resources will likely be low, in particular as the represented vegetation units and habitats represented are widespread. Several bird species and other faunal species may occasionally traverse the site, but with extensive, unfragmented, similar habitat in the surrounding area, this is not deemed to be irreplaceable, bearing in mind the anticipated limited footprint size. It is thus unlikely that the proposed activity and associated infrastructure would not provide any direct or indirect risk to any species or population.

### 3.4.6 Residual Risks and Uncertainties

No significant residual risks are anticipated, other than a low risk of a plant species not being located during the assessment phase. The final project walkdown that will be undertaken before commencement during finalising of the layout plan, will likely further limit this risk.

### 3.4.7 Implications of Biodiversity Offset Guidelines

Findings of the original terrestrial biodiversity assessment report of relevance can be summarised as follows:

- Affected Vegetation Units: Southern Karoo Riviere & Eastern Lower Karoo. No footprint associated with the WEF of associated infrastructure is situated within Gamka Karoo vegetation.
- Ecosystem Threat Status (RLE, 2022): Least Concern & Least Concern with low levels of transformation, no Biodiversity Offset triggered.
- Remaining Ecosystem Extents: 87 & 99 % - no Biodiversity Offset triggered.
- Critical Biodiversity Area 1 & 2: The site overlaps with a small area of CBA 2 along the southern boundary. Approximately 380 meters of access road to WEF turbine S18 will pass through designated CBA but will have a negligible terrestrial biodiversity risk or impacts and in light of the low levels of transformation and fragmentation regionally within the represented vegetation units, biodiversity offsets are not deemed to be applicable. Furthermore, no residual impacts on high or medium after mitigation are anticipated.
- Ecological Support Area 1 & 2: The site overlaps with an extensive area of designated ESA 1 along the main drainage areas, but the optimised layout has sought to avoid these areas as far as technically possible and thus the residual impact is deemed to be low and within acceptable limits.
- Other legislation: None applicable.

All impacts assessed are deemed to have a low significance after mitigation, hence no Biodiversity Offsets are deemed to be applicable. Refer to Table 9 for respective Biodiversity Offset information summary.

Table 9: Biodiversity Offset Guidelines Status for vegetation units represented.

Ecosystem Type	Southern Karoo Riviere	Eastern Lower Karoo
----------------	------------------------	---------------------

ETS <sup>10</sup>		LC	LC
REE <sup>11</sup> (%)		87 %	99 %
Transformation Band		4	4
A. TPC <sup>12</sup> Ratio	NP <sup>13</sup>		
	PP		
	MP		
	WP		
B. RE <sup>14</sup> & EPL <sup>15</sup> Ratios	NP		
	PP	0	0
	MP		
	WP		
C. ETS Ratios	NP		
	PP	0	0
	MP		
	WP		
D. Starting Ratios	NP		
	PP	0	0
	MP		
	WP		

### 3.5 Environmental Management Plan Recommendations

Refer also to [Section 7.7: Appendix F: Biodiversity Environmental Management Plan](#) for more comprehensive general recommendations for management of terrestrial biodiversity impacts.

Measures for inclusion in the draft Environmental Management Programme, which should be considered to be conditions of authorisation, are as detailed below, which are listed according to project phases for ease of implementation as follows:

- Pre-Construction Activities
- Bush Clearing and Site Preparation
- Construction Activities
- Site Rehabilitation and Closure
- Operations

#### 3.5.1 Planning & Design

**OBJECTIVE: Ensure that impacts to terrestrial biodiversity are minimise including fragmentation of corridors**

<b>Project component/s</b>	WEF
<b>Potential Impact</b>	Potential impacts include unnecessary fragmentation of corridors and siting of infrastructure in elevated sensitivity areas that can be avoided.

<sup>10</sup> Ecosystem Threat Status

<sup>11</sup> Remaining Ecosystem Extent

<sup>12</sup> Threshold of Potential Concern

<sup>13</sup> Not Protected, Poorly Protected, Moderately Protected & Well Protected.

<sup>14</sup> Remaining Extent

<sup>15</sup> Ecosystem Protection Levels

<b>Activity/risk source</b>	Pre-construction preparation activities		
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented during design to avoid sensitive areas and thus minimise impacts by avoidance during the planning and application phases.		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>Align WEF and other infrastructure in a manner that will minimise fragmentation and/or impacts to recommended buffers and/or sensitive features.</li> </ul>	Applicant	During application and final walkdown before commencement.	
<b>Performance Indicator</b>	Infrastructure within sensitive areas is minimised.		
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>Final plan is acceptable to respective specialists.</li> </ul>		
<b>OBJECTIVE: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment</b>			
<b>Project component/s</b>	WEF		
<b>Potential Impact</b>	Potential impacts include loss of flora and fauna species of conservation concern illegally.		
<b>Activity/risk source</b>	Pre-construction preparation activities		
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented before construction in particular before site clearing and grubbing commences in order to be compliant with applicable legislation.		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>Respective flora &amp; fauna permits to be obtained timeously before construction is to commence.</li> </ul>	ECO	At least 2 – 3 months before commencement of construction as delays can be expected.	
<b>Performance Indicator</b>	Permits obtained timeously		
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>Ensure flora permits are in place timeously (PNCO only) – allow at least 2 to 3 months before commencement.</li> </ul>		

### 3.5.2 Construction

<b>OBJECTIVE: Management of dust and emissions and damage to roads</b>			
<b>Project component/s</b>	WEF		
<b>Potential Impact</b>	Potential impacts include excessive dust during site clearing which may cause damage to vegetation.		
<b>Activity/risk source</b>	Site operations for duration of life cycle of the project including movement of vehicles on roads and areas cleared of vegetation during site preparation and construction.		
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented during construction to minimise dust		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of</li> </ul>	ECO	Duration of construction phase	

<p>footprint to take place, without express approval of ECO and or indicated in approved layout plans.</p> <ul style="list-style-type: none"> <li>• Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area.</li> <li>• If required, water spray vehicles should be used to control dust caused by strong winds during activities on the works.</li> <li>• No over-watering of the site or road surfaces.</li> <li>• Wind screens can be used to reduce wind and dust in open areas if required.</li> </ul>		
<b>Performance Indicator</b>	Construction monitoring of dust	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Monitor for excessive dust (daily).</li> </ul>	

**OBJECTIVE: Conservation of the existing soil resources within the site and in the adjacent areas**

<b>Project component/s</b>	WEF		
<b>Potential Impact</b>	Potential impacts include loss of topsoil due to incorrect storage during construction which will negatively affect rehabilitation, as well as erosion due to clearing and construction activities.		
<b>Activity/risk source</b>	Excessive dust due to poor dust management		
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented during construction to minimise loss of soil resources.		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>• Topsoil shall be removed from all areas where physical disturbance of the surface will occur.</li> <li>• All available topsoil shall be removed after consultation with the botanist and/or ECO prior to commencement of any operations and sufficient topsoil must be stored for later use during decommissioning.</li> <li>• The removed topsoil shall be stored on high ground within the site footprint outside the 1:100 flood level within demarcated areas.</li> <li>• Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.</li> <li>• The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds if necessary.</li> <li>• A suitable weed management strategy to be implemented on topsoil stockpiles.</li> </ul>	ECO	Duration of construction	
<b>Performance Indicator</b>	Excessive dust is not problematic		
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Monitoring of topsoils stockpiles for erosion and weeds (monthly and after significant rainfall events)</li> </ul>		

**OBJECTIVE: Minimise impact on Sensitive areas and plant species**

<b>Project component/s</b>	WEF	
<b>Potential Impact</b>	Potential impacts include excessive loss of vegetation and species of conservation concern and habitat outside of footprint.	
<b>Activity/risk source</b>	Site clearing activities (clearing and grubbing)	
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented on commencement of construction in particular site clearing and grubbing.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of footprint to take place, without express approval of ECO and or indicated in approved layout plans.</li> <li>Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area.</li> <li>Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.</li> <li>Search and rescue operations for Species of Conservation Concern <i>must</i> be undertaken before the commencement of site clearing activities.</li> <li>It is important that clearing activities are kept to the minimum and take place in a phased manner. This minimises wind and water erosion of the cleared areas.</li> <li>Workers are NOT allowed to collect any flora. All flora remain the property of the landowner and <i>must</i> not be disturbed, upset or used without their expressed consent.</li> <li>It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.</li> <li>No domestic animals are permitted on the sites.</li> <li>Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.</li> </ul>	ECO	Duration of site clearing and grubbing activities.
<b>Performance Indicator</b>	Excessive clearing outside of site footprint does not occur	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>Check delineated footprints area not exceeded (daily).</li> </ul>	

**OBJECTIVE: Protection of terrestrial fauna**

<b>Project component/s</b>	WEF	
<b>Potential Impact</b>	Potential impacts include faunal species mortalities, erosion and stormwater management.	
<b>Activity/risk source</b>	Construction activities may pose a risk to fauna	

<b>Mitigation:</b>	To ensure that mitigations are implemented before and during construction in particular before and during site clearing and grubbing.	
<b>Target/Objective</b>		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.</li> <li>Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances.</li> <li>No animals are to be harmed or killed during the course of operations.</li> <li>It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas.</li> <li>Workers are NOT allowed to collect or snare any faunal species. All fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.</li> </ul>	ECO	Duration of construction on site.
<b>Performance Indicator</b>	Faunal mortalities are not excessive	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>Regular checks on trenches and excavations for trapped animals (daily)</li> <li>Regular checks of fences for snares (monthly)</li> </ul>	

**OBJECTIVE: Appropriate handling and management of waste**

<b>Project component/s</b>	WEF	
<b>Potential Impact</b>	Terrestrial Biodiversity Impacts relating to improper or inadequate waste management procedures.	
<b>Activity/risk source</b>	Site clearing and construction activities	
<b>Mitigation:</b>	To ensure that mitigations are implemented to minimise waste and effectively manage waste.	
<b>Target/Objective</b>		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>Excavations may not be used for the dumping of construction wastes.</li> </ul>	ECO	Duration of construction.

<ul style="list-style-type: none"> <li>Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.</li> <li>All waste to be collected in an appropriate manner and disposed of correctly at the respective waste disposal facilities.</li> </ul>		
<b>Performance Indicator</b>	Waste is effectively managed	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>Ensure working plant has no oil or hydraulic leaks (daily &amp; weekly).</li> <li>Ensure all waste is disposed of correctly and not buried in any excavations.</li> </ul>	

**OBJECTIVE: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed**

<b>Project component/s</b>	WEF	
<b>Potential Impact</b>	Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration	
<b>Activity/risk source</b>	Site rehabilitation activities are not implemented in correct manner or timeously.	
<b>Mitigation: Target/Objective</b>	To ensure that mitigations are implemented completion of construction relating to rehabilitation	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>• A suitable weed management strategy to be implemented in construction phase.</li> <li>• Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements.</li> <li>• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.</li> <li>• Any topsoil stripped during site preparation must be replaced on completion in areas where rehabilitation is required.</li> <li>• If natural vegetation re-establishment does not occur, a suitable grass must be applied.</li> <li>• Stormwater discharge into watercourses to be protected against erosion.</li> </ul>	ECO	Completion of phased construction into operational phase for duration of aftercare period on completion of construction (2 years recommended)
<b>Performance Indicator</b>	Adequate vegetation cover is achieved, and erosion is effectively managed with no serious erosion incidents	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Check quality of topsoil and weed free.</li> <li>• Check for weed regrowth and manage timeously, before seed is set (monthly).</li> <li>• If natural revegetation does not occur, reseeding may be required (monitor for 6 – 12 months after completion of construction (depending on time of year that construction is completed, as regrowth will be poor over winter months)</li> </ul>	

### 3.5.3 Operation

**OBJECTIVE: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed**

<b>Project component/s</b>	WEF
<b>Potential Impact</b>	Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration
<b>Activity/risk source</b>	Site rehabilitation activities commencing during end phases of construction and continuing into operational phase



<b>Mitigation:</b>	To ensure that mitigations are implemented after construction relating to rehabilitation of disturbed areas.		
<b>Target/Objective</b>			
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>• A suitable weed management strategy to be implemented in construction phase.</li> <li>• Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements on an ongoing basis during operational phase.</li> <li>• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.</li> <li>• If natural vegetation re-establishment does not occur, a suitable grass must be applied.</li> <li>• Stormwater discharge into watercourses to be protected against erosion.</li> </ul>	ECO	Duration of aftercare period on completion of construction (recommended 2 years)	
<b>Performance Indicator</b>	Rehabilitation and vegetation regrowth is achieved in disturbed areas		
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Check for weed regrowth and manage timeously, before seed is set (quarterly during 2-year aftercare period then annually for duration of operations).</li> <li>• If natural revegetation does not occur during aftercare period, reseeding may be required (monitor for 6 – 12 months after completion of construction, depending on time of year that construction is completed, as regrowth will be poor over winter months)</li> </ul>		

### 3.6 Findings and Recommendations

The proposed activity will require the clearing of more than 300 m<sup>2</sup> of indigenous vegetation within a designated CBA area, depending on final WEF and access road configuration, and will require clearance of greater than 1 Ha of indigenous vegetation as well as activities in watercourses to construct access road crossings, hence as a minimum a Basic Assessment application process would be triggered. Due to the scale of the project and largely natural to near natural composition of the site, more than 20 Ha of indigenous vegetation will also require clearing. However, as the site is situated within a Renewable Energy Development Zone (REDZ), a Full Scoping & EIA process will not be required, as a Basic Assessment process can be followed.

The DFFE screening tool identifies Very High & Low Terrestrial Biodiversity, Medium & High Animal Species, Medium Plant Species, Low & Very High Aquatic and Medium & Low Agricultural Sensitivities within or in proximity to the site.

The vegetation units present, Southern Karoo Riviere, Eastern Lower Karoo and Gamka Karoo, have a *Least Concern* status, indicating that less than 40% has been transformed regionally and there will likely be minimal loss or disruptions to ecological functioning. Development of a portion of the site will thus not significantly affect conservation targets for the affected vegetation unit, as long as at least 24 % (i.e., the conservation target) is retained in a manner that supports connectivity.

A small portion of the site is designated CBA 2 along the southern boundary with more extensive ESA 1 across the site associated with the alluvial areas and watercourses. In terms of Regional Planning, a

footprint would be feasible that would minimise loss of CBA and disruption to corridors in ESA areas, which is largely avoided as a result of preliminary sensitivity mapping and layout revisions. The impact as a result of the proposed layout will be negligible, as only a small section of road (280 m) falls within designated CBA area. Conservation targets for the vegetation units will not be affected due to the extensive regional coverage and small development footprint of the proposed WEF. Biodiversity Offsets will NOT be triggered by the proposed activity based on the most recent Biodiversity Offset Guidelines as the residual impact after mitigation is deemed to be low.

The most significant potential risk to ecological processes, includes changes to water and sediment flow in the alluvial areas, as a result of fragmentation (or localised damming) as a result of construction of raised access roads, which could result in long-term changes to species composition and ecological processes. It is recommended that the proposed alluvial corridors are maintained with minimal roads bisecting, or in particular WEF footprint within, in order to minimise disruptions to alluvial connectivity and to minimise impact to flow and sediment processes. Measures such as culverts along roads may be required to facilitate natural water movement patterns. These risks have largely been mitigated through the layout revisions based on the preliminary sensitivity mapping and recommendations. Residual impacts in these areas is likely to be negligible.

Several aquatic features or aquatic functional zones are present including an extensive braided watercourse network, which could provide some technical challenges due to seasonal flooding. These areas have been accommodated on the FE Kudu Wind Energy Facility site, via the layout revisions based on the preliminary sensitivity mapping and recommendations. Any footprint within these areas will likely require careful planning in order to minimise changes to flows which could alter species composition and affect ecological processes. Furthermore, in general the braided watercourse areas align with the ESA designations. As a minimum any roads traversing these alluvial areas must accommodate lateral flows (interconnectivity) of water and sediment between watercourses and alluvial area where seasonal flooding occurs. It is noted that there is significant modification to natural flow paths present due to berms and other water diversion features that have been constructed on the broader site to manage flowing and runoff. Only the higher order, well defined watercourses have been delineated, smaller drainage lines and channels have not been delineated, due to the large number within the very flat alluvial landscape. In terms of terrestrial composition and processes the minor watercourses are not a significant priority, and would be deemed an acceptable loss, provided measures are implemented to accommodate flows as mentioned above. This could include box (or other) culverts under raised access roads to allow lateral movement of water and to minimise localised flooding and/or drying out.

The sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted to one crossing per watercourse unless no other options are feasible. Additional alluvial corridor buffers have been delineated as per Figure 15, which align with the key braided watercourse network, and must be avoided as far as possible. Watercourse crossings should only traverse these areas where no other alternatives are technically feasible.

The site verification determined that the site is generally typical of the expected vegetation units with species composition comprising a grassy community as well as a rocky community within the Karroid areas, with predominantly grassy vegetation in lower lying areas, but with overlap in species occurrence. From initial observations, rocky outcrop areas do not appear to be particularly diverse, and no specific species of conservation concern were identified, although additional seasonal sampling would be required. It should be noted that the species of concern represented are potentially suited to relocation, should such be required.

Several endangered and/or critically endangered species are flagged for the site, however none were observed during the site visits. Based on site observations, suitable habitat is limited (i.e., areas outside of alluvial areas). Generally, the most likely species are succulent species, and these would potentially be amenable to relocation if required. It is unlikely that the dispersed nature of the project development footprint will pose any significant risk and can be confirmed during the final walkdown before construction. The Karoo National Park which overlaps with a designated Important Bird Area (IBA), the Karoo National Park IBA, is situated more than 70 km to the north-east of the site and is thus not likely to pose any risk of significance. Preferred habitat for the Karoo Padloper tortoise is not prevalent within the site, or the proposed project area. It is not anticipated that the risk to any Karoo Padloper tortoise will be significant, although a final inspection should form part of the final walkdown processes before final plans are approved and construction commences.

The site sensitivity (Figure 14) can be summarised as follows:

- High sensitivity areas include confirmed major riverine watercourses with riparian thicket vegetation. These areas are noted to be important ecologically within an arid environment. Must be avoided other than strategic and necessary access road crossings.
- Moderate sensitivity areas include the general natural or near natural Karoid and Alluvial vegetation where national conservation status is not elevated.
- Low sensitivity areas for the purposes of the screening, include all transformed areas including lands or cultivated areas, and/or dwellings.
- No-go areas –specific no go-areas include the high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted the least number of crossings required.
- Cumulative impacts to terrestrial biodiversity due to the development of the site, are likely to be negligible due to the extensive local and regional coverage of the represented vegetation units as well as the limited footprint of the proposed WEF.

Due to having a low conservation status, the vegetation units present would in principle provide a suitable footprint for the proposed activity, bearing in mind the potential elevated sensitivity of the alluvial and floodplain areas, where additional guidance from the aquatic assessment will be required regarding the aquatic processes at play and measures that will be required to accommodate the respective ecological processes and connectivity. Fill material will be required to accommodate the access roads and WEF footprints, which could indirectly alter flooding and movement of sediments. This could result in more widespread ecological changes as well as changes in both flora and fauna species composition. The revised layout has largely avoided these sensitivities and residual impacts will be negligible.

Disturbances to Ecological Processes and Aquatic and Riparian processes are considered to have a Medium Significance before Mitigation and Low after Mitigation. All other impacts are Low before and after Mitigation, as outlined in Section 3.5: Environmental Management as well as in the general Environmental Management Plan (Section 7.7: Appendix F: Biodiversity Environmental Management Plan).

As evident in the combined sensitivity map (Figure 15 & Figure 16), the optimised layout has largely accommodated the sensitivities and avoided as far as technically possible. Some residual crossings (road to WEF S18) and turbines (WEF S1, S5, N1 & N8) are within the recommended aquatic and ecological corridor, but these are unlikely to significantly compromise any ecological functioning since the remainder of the corridors are not affected and are thus deemed acceptable. No turbines are situated within the watercourse buffers and the mitigation strategy has eliminated several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable.

Based on the site assessment, the proposed FE Kudu Wind Energy Facility site will be acceptable, providing the recommended watercourses buffers (other than for access roads, most being along existing roads) as well as avoiding significant footprints within the recommended alluvial and ecological corridors (other than minimal access road crossings, where measures must be implemented to allow lateral flow of water and sediment not only within the watercourse channel but across the broader alluvial area as well) are adhered to. Where any WEF footprint is in proximity to a buffer or watercourse, the laydown area portion should be orientated away from the watercourse/buffer/corridor rather than inwards. Based on the assessed optimised layout, these requirements have largely been accommodated as far as technically possible.

After completion of the initial sensitivity screening, a sensitivity map was provided to the proponent and the layout was refined in order to avoid and minimise sensitivities as far as technically possible. The optimised layout that has been assessed includes mitigation strategy measures to rectify and/or reduce the remaining or residual impacts as far as possible. Further refining of the optimised layout is likely during finalisation of the Basic Assessment reporting, as well as during the pre-commencement walkdown once final footprints are determined and detailed layouts compiled.

## 3.7 Implementation Plans

### 3.7.1 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- A pre-commencement flora relocation is recommended as several TNCO protected species are present within the proposed footprint.
- A pre-commencement fauna relocation is recommended. Several burrowing faunal species are present and will allow for relocation of less mobile species, although most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.
- Topsoil must be stripped and stockpiled for replacement after construction of the site. Additional measures should be implemented to stabilise eroded areas where necessary.

### 3.7.2 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable local grass seed mix, usually available from a local farmer co-op, if deemed to be required as vegetation is likely to re-establish without input, as is typical in Karoid areas. Species composition of such grass seed mixes is best determined by what local indigenous species are locally, cost effectively and readily available. A mix of several species is recommended rather than a single grass species.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.

### 3.7.3 Open Space Management/Conservation Plan

None are applicable for this project.

### 3.7.4 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the site for maintenance/replacement of defective components and repairs where applicable, which may include road, turbine footprint and buried infrastructure maintenance and excavation or infill within watercourse crossings.

All measures of this report, including the EMPr should be adhered for any such maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

## 4 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

## 5 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response
- Spill management and incident response
- Waste management and incident response
- Response to emergency site shutdown, including labour and protest actions.

## 6 Stakeholder Engagement

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Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement is undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

## 7 Appendices

### 7.1 Appendix A: References

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## 7.2 Appendix B: Site photos







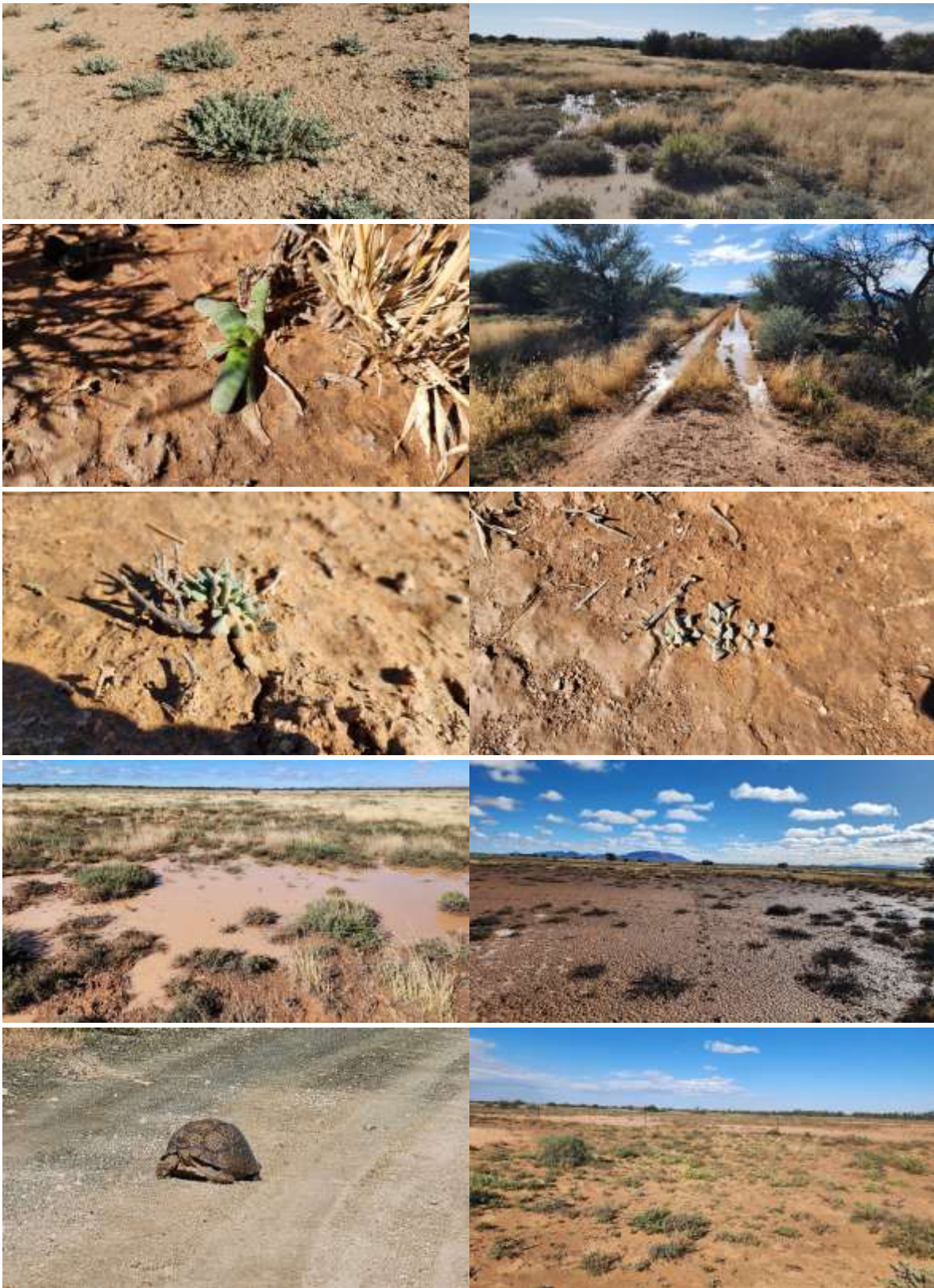




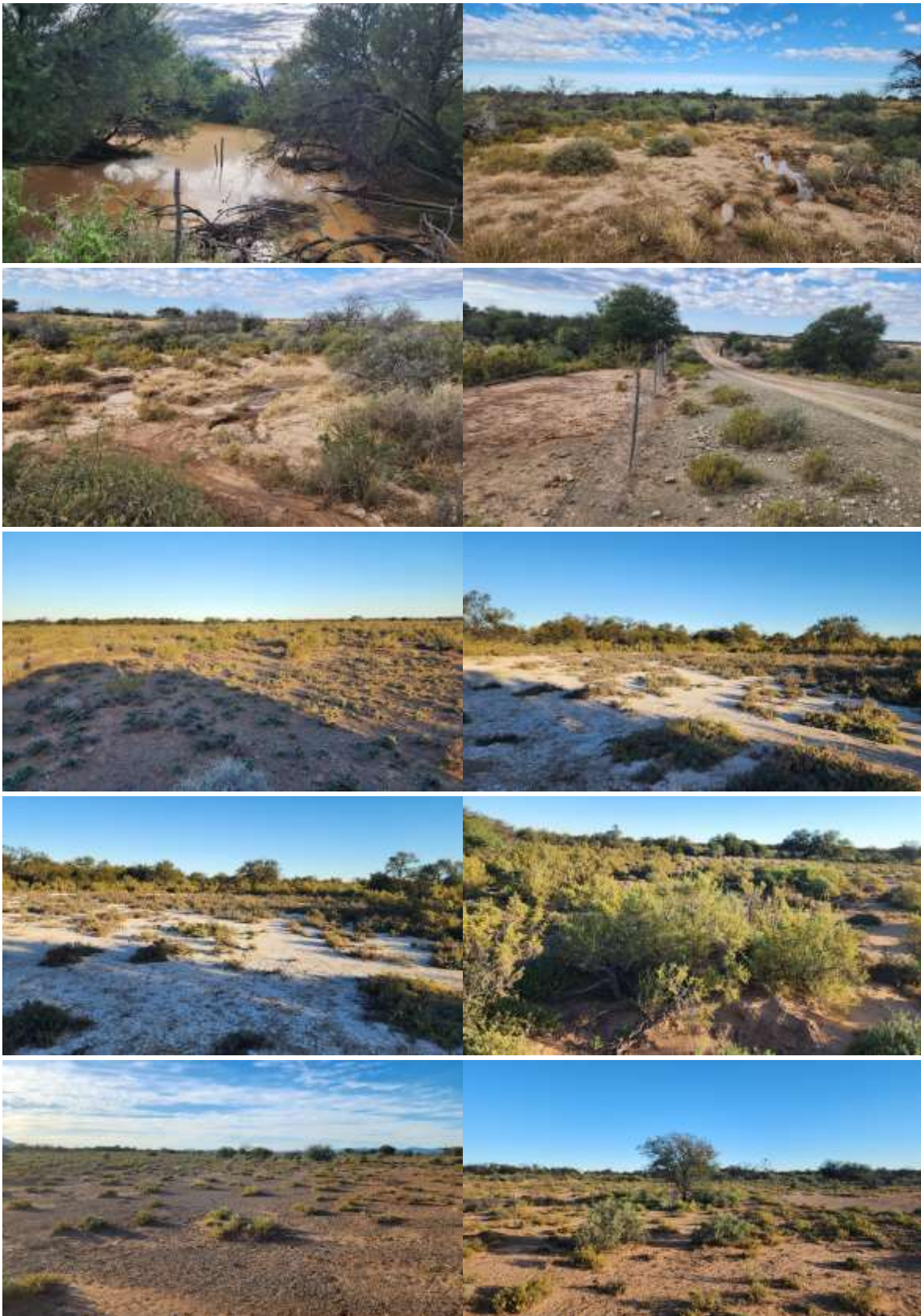














## 7.3 Appendix C: Flora and Fauna Species Lists

### 7.3.1 Flora

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Acacia karroo</i>	Fabaceae	LC	NKI 1, NKI 2, AZi 6
<i>Albuca setosa</i>	Hyacinthaceae	LC, PNCO	NKI 2
<i>Aloinopsis rubrolineata</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Amphiglossa callunoides</i>	Asteraceae	VU	AZi 6
<i>Anthospermum rigidum</i> subsp. <i>Pumilum</i>	Rubiaceae	LC	Gh 1
<i>Aptosimum elongatum</i>	Scrophulariaceae	LC	NKI 2
<i>Aptosimum indivisum</i>	Scrophulariaceae	LC	NKI 1
<i>Aridaria noctiflora</i> subsp. <i>straminea</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Aristida adscensionis</i>	Poaceae	LC	NKI 1, NKI 2
<i>Aristida congesta</i>	Poaceae	LC	NKI 1, NKI 2, Gh 1
<i>Aristida diffusa</i>	Poaceae	LC	NKI 1, Gh 1
<i>Asparagus burchellii</i>	Asparagaceae	LC	NKI 1
<i>Asparagus striatus</i>	Asparagaceae	LC	NKI 2, AZi 6
<i>Asparagus suaveolens</i>	Asparagaceae	LC	NKI 2
<i>Astroloba foliolosa</i>	Asphodelaceae	LC	NKI 2
<i>Atriplex semibaccata</i> var. <i>appendiculata</i>	Chenopodiaceae	LC	Gh 1
<i>Ballota africana</i>	Lamiaceae	LC	AZi 6
<i>Barleria pungens</i>	Acanthaceae	LC	NKI 2
<i>Bassia salsoloides</i>	Chenopodiaceae	LC	AZi 6
<i>Berkheya pinnatifida</i>	Asteraceae	LC	Gh 1
<i>Blepharis capensis</i>	Acanthaceae	LC	NKI 2
<i>Blepharis mitrata</i>	Acanthaceae	LC	NKI 1, NKI 2
<i>Boophone disticha</i>	Amaryllidaceae	LC, PNCO	Gh 1
<i>Cadaba aphylla</i>	Capparaceae	LC	NKI 1, NKI 2, AZi 6
<i>Carissa haematocarpa</i>	Apocynaceae	LC	NKI 2, AZi 6
<i>Cenchrus ciliaris</i>	Poaceae	LC	NKI 1, AZi 6
<i>Chamaesyce inaequilatera</i>	Euphorbiaceae	LC	NKI 1, NKI 2
<i>Chasmatophyllum nelii</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Chasmatophyllum stanleyi</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Cheilanthes bergiana</i>	Pteridaceae	LC	Gh 1
<i>Cheilanthes hirta</i>	Pteridaceae	LC	Gh 1
<i>Chloris virgata</i>	Poaceae	LC	NKI 2

<sup>16</sup> IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species.

<sup>17</sup> NKI 1 - Gamka Karoo, NKI 2 - Eastern Lower Karoo, AZi 6 - Southern Karoo Riviere & Gh 1 - Karoo Escarpment Grassland

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Chrysocoma ciliata</i>	Asteraceae	LC	NKI 1, NKI 2, Gh 1
<i>Cliffortia arborea</i>	Rosaceae	VU A2cd; C2a(i)	Gh 1
<i>Cliffortia montana</i>	Rosaceae	NEST (M), Rare	A habitat specialist known from two disjunct areas in the Western and Eastern Cape. A very poorly known and rarely collected species with an unusually disjunct distribution. It is possibly overlooked and more common and widespread than collections indicate. No threats known, although inappropriate fire management could negatively affect this species. Possibly present, unconfirmed.
<i>Convolvulus sagittatus</i>	Convolvulaceae	LC	NKI 2, Gh 1
<i>Crassula corallina</i>	Crassulaceae	LC, PNCO	NKI 2
<i>Crassula muscosa</i>	Crassulaceae	LC, PNCO	NKI 1, NKI 2
<i>Cylindrophyllum calamiforme</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Cymbopogon pospischilii</i>	Poaceae	LC	Gh 1
<i>Cynodon dactylon</i>	Poaceae	LC	Gh 1
<i>Cynodon incompletus</i>	Poaceae	LC	NKI 2, AZi 6, Gh 1
<i>Cyperus marginatus</i>	Cyperaceae	LC	AZi 6
<i>Delosperma congestum</i>	Aizoaceae	LC, PNCO	Gh 1
<i>Delosperma gramineum</i>	Aizoaceae	LC, PNCO	Gh 1
<i>Dianthus caespitosus</i> subsp. <i>caespitosus</i>	Caryophyllaceae	LC	Gh 1
<i>Diascia capsularis</i>	Scrophulariaceae	LC	Gh 1
<i>Dicoma capensis</i>	Asteraceae	LC	NKI 1
<i>Dierama grandiflorum</i>	Iridaceae	NEST (M), EN B1ab(iii), PNCO	An Eastern Cape endemic (EOO 3444 km <sup>2</sup> ), known from two confirmed locations and possibly still extant at three other locations where it is known from historical records. It is declining due to ongoing habitat degradation. Range is from Graaff-Reinet and Somerset East. An extremely rare and localized endemic known from less than 10 collections. Recent observations of subpopulations on the Bosberg indicate that plants occur in small, sparsely scattered clumps of fewer than 100 plants. Possibly present, Not recorded.
<i>Digitaria argyrograpta</i>	Poaceae	LC	NKI 1
<i>Dimorphotheca zeyheri</i>	Asteraceae	LC	Gh 1
<i>Diospyros austro-africana</i>	Ebenaceae	LC	Gh 1
<i>Diospyros lycioides</i>	Ebenaceae	LC	AZi 6
<i>Drimia anomala</i>	Hyacinthaceae	LC, PNCO	NKI 2
<i>Drimia intricata</i>	Hyacinthaceae	LC, PNCO	NKI 1, NKI 2
<i>Drosantherum lique</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2, AZi 6
<i>Drosantherum subspinosum</i>	Aizoaceae	DDT, PNCO	NKI 2
<i>Duvalia modesta</i>	Apocynaceae	LC	Gh 1

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Ehrharta calycina</i>	Poaceae	LC	Gh 1
<i>Elionurus muticus</i>	Poaceae	LC	Gh 1
<i>Elytropappus rhinocerotis</i>	Asteraceae	LC	Gh 1
<i>Enneapogon desvauxii</i>	Poaceae	LC	NKI 1, NKI 2
<i>Enneapogon scaber</i>	Poaceae	LC	NKI 1
<i>Eragrostis chloromelas</i>	Poaceae	LC	Gh 1
<i>Eragrostis curvula</i>	Poaceae	LC	NKI 2, Gh 1
<i>Eragrostis homomalla</i>	Poaceae	LC	NKI 1
<i>Eragrostis lehmanniana</i>	Poaceae	LC	NKI 1 NKI 2, Gh 1
<i>Eragrostis obtusa</i>	Poaceae	LC	NKI 1, NKI 2, Gh 1
<i>Erica caespitosa</i>	Ericaceae	LC, PNCO	Gh 1
<i>Erica caffrorum</i> var. <i>caffrorum</i>	Ericaceae	LC, PNCO	Gh 1
<i>Erica passerinoides</i>	Ericaceae	NEST (M), EN B1ab(iii), PNCO	This species is known from between three and five locations and has an extent of occurrence (EOO) of 4312 km <sup>2</sup> . It is continuing to decline due to expanding forestry plantations and alien invasive encroachment. This species is endemic to the mountains of the Eastern Cape interior, where it is known from a few scattered subpopulations in the Sneeuberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. It occurs on south-facing slopes in karoo-grassland ecotones. The Kamdeboo Mountain subpopulation is large and healthy, with two distinct large stands having been monitored on different summits within the range in the past 10 years. Possibly present, Not recorded.
<i>Erica woodii</i>	Ericaceae	LC, PNCO	Gh 1
<i>Eriocephalus ericoides</i> subsp. <i>ericoides</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Eriocephalus eximius</i>	Asteraceae	LC	Gh 1
<i>Eriocephalus microphyllus</i> var. <i>pubescens</i>	Asteraceae	LC	NKI 1
<i>Eriocephalus spinescens</i>	Asteraceae	LC	NKI 1
<i>Euclea undulata</i>	Ebenaceae	LC	AZi 6
<i>Eucomis autumnalis</i> subsp. <i>autumnalis</i>	Hyacinthaceae	NE, PNCO	Gh 1
<i>Euphorbia clavarioides</i> var. <i>clavarioides</i>	Euphorbiaceae	LC	Gh 1
<i>Euphorbia coerulans</i>	Euphorbiaceae	LC	NKI 2
<i>Euphorbia ferox</i>	Euphorbiaceae	LC	NKI 2
<i>Euphorbia mauritanica</i>	Euphorbiaceae	LC	Gh 1
<i>Euryops annae</i>	Asteraceae	LC	Gh 1
<i>Euryops anthemoides</i>	Asteraceae	LC	NKI 2
<i>Euryops anthemoides</i> subsp. <i>astrotrichus</i>	Asteraceae	LC	Gh 1
<i>Euryops candollei</i>	Asteraceae	LC	Gh 1

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Euryops dentatus</i>	Asteraceae	LC	Gh 1
<i>Euryops floribundus</i>	Asteraceae	LC	Gh 1
<i>Euryops oligoglossus</i> subsp. <i>oligoglossus</i>	Asteraceae	LC	Gh 1
<i>Euryops trilobus</i>	Asteraceae	LC	Gh 1
<i>Eustachys paspaloides</i>	Poaceae	LC	Gh 1
<i>Felicia filifolia</i> subsp. <i>filifolia</i>	Asteraceae	LC	NKI 1, Gh 1
<i>Felicia lasiocarpa</i>	Asteraceae	LC	NKI 1
<i>Felicia muricata</i>	Asteraceae	LC	NKI 1, NKI 2, NKI 2, Gh 1
<i>Felicia muricata</i> subsp. <i>cinerascens</i>	Asteraceae	LC	NKI 1
<i>Fingerhuthia africana</i>	Poaceae	LC	NKI 1
<i>Galenia fruticosa</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Galenia glandulifera</i>	Aizoaceae	NT B1ab (iii,iv,v), PNCO	NKI 1
<i>Galenia sarcophylla</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Galenia secunda</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Galium capense</i> subsp. <i>capense</i>	Rubiaceae	LC	Gh 1
<i>Garuleum bipinnatum</i>	Asteraceae	LC	NKI 1
<i>Garuleum latifolium</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Gazania krebsiana</i>	Asteraceae	LC	NKI 2
<i>Gazania krebsiana</i> subsp. <i>krebsiana</i>	Asteraceae	LC	Gh 1
<i>Gazania lichtensteinii</i>	Asteraceae	LC	NKI 1
<i>Gomphocarpus filiformis</i>	Apocynaceae	LC	NKI 1
<i>Grewia robusta</i>	Malvaceae	LC	NKI 2, AZi 6
<i>Gymnosporia buxifolia</i>	Celastraceae	LC	AZi 6
<i>Haemanthus humilis</i> subsp. <i>humilis</i>	Amaryllidaceae	LC, PNCO	Gh 1
<i>Haworthia decipiens</i> var. <i>cyanea</i>	Asphodelaceae	Not Eval	NKI 2
<i>Haworthia greenii</i>	Asphodelaceae	PNCO	NKI 2
<i>Hebenstretia dentata</i>	Scrophulariaceae	LC	Gh 1
<i>Helichrysum asperum</i> var. <i>albidulum</i>	Asteraceae	LC	Gh 1
<i>Helichrysum dregeanum</i>	Asteraceae	LC	Gh 1
<i>Helichrysum lucilioides</i>	Asteraceae	LC	NKI 1, Gh 1
<i>Helichrysum niveum</i>	Asteraceae	LC	Gh 1
<i>Helichrysum nudifolium</i> var. <i>nudifolium</i>	Asteraceae	LC	Gh 1
<i>Helichrysum rosum</i>	Asteraceae	LC	Gh 1
<i>Helichrysum scitulum</i>	Asteraceae	LC	Gh 1
<i>Helichrysum sessile</i>	Asteraceae	LC	Gh 1
<i>Helichrysum tysonii</i>	Asteraceae	LC	Gh 1
<i>Helichrysum zeyheri</i>	Asteraceae	LC	NKI 2, Gh 1
<i>Hereroa incurva</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Hereroa latipetala</i>	Aizoaceae	LC, PNCO	NKI 1



SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Hereroa odorata</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Hermannia cuneifolia</i>	Malvaceae	LC	NKI 2
<i>Hermannia desertorum</i>	Malvaceae	LC	NKI 1
<i>Hermannia grandiflora</i>	Malvaceae	LC	NKI 1
<i>Hermannia spinosa</i>	Malvaceae	LC	NKI 1
<i>Heteropogon contortus</i>	Poaceae	LC	Gh 1
<i>Hoodia dregei</i>	Apocynaceae	VU D2	NKI 1
<i>Indigofera sessilifolia</i>	Fabaceae	LC	NKI 2, Gh 1
<i>Isolepis expallesces</i>	Cyperaceae	VU D2	AZi 6
<i>Jamesbrittenia tenuifolia</i>	Scrophulariaceae	LC	NKI 1
<i>Karoochloa purpurea</i>	Poaceae	LC	Gh 1
<i>Kleinia longiflora</i>	Asteraceae	LC	NKI 1
<i>Kniphofia acraea</i>	Asphodelaceae	Rare, PNCO	Gh 1
<i>Lasiospermum bipinnatum</i>	Asteraceae	LC	Gh 1
<i>Lepidium africanum</i> subsp. <i>africanum</i>	Brassicaceae	LC	NKI 1, NKI 2, Gh 1
<i>Lepidium desertorum</i>	Brassicaceae	LC	NKI 1
<i>Lessertia pauciflora</i> var. <i>pauciflora</i>	Fabaceae	LC	NKI 1
<i>Leysera tenella</i>	Asteraceae	LC	NKI 1
<i>Limeum aethiopicum</i>	Molluginaceae	LC	NKI 1, NKI 2, Gh 1
<i>Lithospermum diversifolium</i>	Boraginaceae	LC	Gh 1
<i>Lycium cinereum</i>	Solanaceae	LC	NKI 1, NKI 2, AZi 6
<i>Lycium hirsutum</i>	Solanaceae	LC	AZi 6
<i>Lycium oxycarpum</i>	Solanaceae	LC	NKI 1, NKI 2, AZi 6
<i>Lycium schizocalyx</i>	Solanaceae	LC	NKI 1, NKI 2
<i>Malephora uitenhagensis</i>	Aizoaceae	LC, PNCO	AZi 6
<i>Manulea karrooica</i>	Scrophulariaceae	LC	NKI 1
<i>Melianthus comosus</i>	Melianthaceae	LC	AZi 6
<i>Melica decumbens</i>	Poaceae	LC	Gh 1
<i>Melolobium candicans</i>	Fabaceae	LC	NKI 1
<i>Merxmullera disticha</i>	Poaceae	LC	Gh 1
<i>Mestoklema tuberosum</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Microloma armatum</i>	Apocynaceae	LC	NKI 1, NKI 2
<i>Monechma spartioides</i>	Acanthaceae	LC	NKI 1
<i>Moraea polystachya</i>	Iridaceae	LC, PNCO	NKI 1, NKI 2
<i>Nananthus vittatus</i>	Aizoaceae	PNCO, DDT (Data Deficient, Taxonomically Problematic)	Not endemic to South Africa. Free State, Northern Cape, North-West provinces. Found on the edges of alluvial areas. Confirmed present in the Kudu site.
<i>Nemesia fruticans</i>	Scrophulariaceae	LC	Gh 1
<i>Oropetium capense</i>	Poaceae	LC	NKI 1
<i>Osteospermum microphyllum</i>	Asteraceae	LC	NKI 1
<i>Oxalis depressa</i>	Oxalidaceae	LC	Gh 1
<i>Pachypodium succulentum</i>	Apocynaceae	LC	NKI 2
<i>Panicum stapfianum</i>	Poaceae	LC	Gh 1

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Passerina montana</i>	Thymelaeaceae	LC	Gh 1
<i>Peersia frithii</i>	Aizoaceae	NEST (M), Vulnerable	A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km <sup>2</sup> . It has only been recorded seven times since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km <sup>2</sup> . Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range. Possibly present, Not recorded.
<i>Pegolettia retrofracta</i>	Asteraceae	LC	NKI 2
<i>Pentaschistis cirrhulosa</i>	Poaceae	LC	Gh 1
<i>Pentaschistis microphylla</i>	Poaceae	LC	Gh 1
<i>Pentzia cooperi</i>	Asteraceae	LC	Gh 1
<i>Pentzia incana</i>	Asteraceae	LC	NKI 1, NKI 2, AZi 6
<i>Pentzia pinnatisecta</i>	Asteraceae	LC	NKI 1
<i>Phragmites australis</i>	Poaceae	LC	AZi 6
<i>Phymaspermum parvifolium</i>	Asteraceae	LC	NKI 2
<i>Piaranthus comptus</i>	Apocynaceae	LC	NKI 1, NKI 1
<i>Pleiospilos compactus</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Plinthus karooicus</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Polygala seminuda</i>	Polygalaceae	LC	NKI 1, NKI 2
<i>Psilocaulon articulatum</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Psilocaulon coriarium</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Pteronia adenocarpa</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Pteronia glauca</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Pteronia sordida</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Pteronia viscosa</i>	Asteraceae	LC	NKI 1
<i>Rhigozum obovatum</i>	Bignoniaceae	LC	NKI 1, NKI 2
<i>Rhinephyllum luteum</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Rhombophyllum nelii</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Rhus burchellii</i>	Anacardiaceae	LC	NKI 1
<i>Rhus lancea</i>	Anacardiaceae	LC	AZi 6
<i>Rhus lucida</i>	Anacardiaceae	LC	Gh 1
<i>Rosenia humilis</i>	Asteraceae	LC	NKI 1, NKI 2
<i>Rumex lanceolatus</i>	Polygonaceae	LC	Gh 1
<i>Ruschia beaufortensis</i>	Aizoaceae	VU D2, PNCO	NKI 1
<i>Ruschia cradockensis subsp. cradockensis</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Ruschia intricata</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Ruschia spinosa</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Ruschia vanderbergiae</i>	Aizoaceae	LC, PNCO	NKI 2
<i>Salsola aphylla</i>	Chenopodiaceae	LC	AZi 6
<i>Salsola arborea</i>	Chenopodiaceae	Not Eval	AZi 6
<i>Salsola geminiflora</i>	Chenopodiaceae	LC	AZi 6

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Salsola gemmifera</i>	Chenopodiaceae	Not Eval	AZi 6
<i>Salsola tuberculata</i>	Chenopodiaceae	DDT	NKI 1
<i>Sarcocaulon camdeboense</i>	Geraniaceae	LC	NKI 2
<i>Sarcocaulon patersonii</i>	Geraniaceae	LC	NKI 1, NKI 2
<i>Schoenoxiphium rufum</i> var. <i>dregeanum</i>	Cyperaceae	LC	Gh 1
<i>Selago albida</i>	Scrophulariaceae	LC	Gh 1
<i>Selago bolusii</i>	Scrophulariaceae	LC	Gh 1
<i>Selago fruticosa</i>	Scrophulariaceae	LC	NKI 2
<i>Selago geniculata</i>	Scrophulariaceae	LC	NKI 1
<i>Selago saxatilis</i>	Scrophulariaceae	LC	Gh 1
<i>Senecio acutifolius</i>	Asteraceae	LC	NKI 2
<i>Senecio asperulus</i>	Asteraceae	LC	Gh 1
<i>Senecio burchellii</i>	Asteraceae	LC	Gh 1
<i>Senecio radicans</i>	Asteraceae	DDT	NKI 2
Sensitive Species 1039		NEST (M), Vulnerable	This taxon has a restricted distribution range, with an extent of occurrence (EOO) of 5 594 km <sup>2</sup> . It is known from eight locations and is declining for unknown reasons. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. Possibly present, Not recorded.
Sensitive species 1212		NEST (M), Vulnerable	EOO <7 000 km <sup>2</sup> , known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Willowmore to Beaufort West and Aberdeen. Possibly present, Not recorded.
<i>Sericocoma avolans</i>	Amaranthaceae	LC	NKI 1
<i>Sesamum capense</i>	Pedaliaceae	LC	NKI 1
<i>Sisyndite sparteae</i>	Zygophyllaceae	LC	NKI 1
<i>Stapelia engleriana</i>	Apocynaceae	DDT	NKI 1
<i>Stipagrostis ciliata</i>	Poaceae	LC	NKI 1
<i>Stipagrostis namaquensis</i>	Poaceae	LC	AZi 6
<i>Stipagrostis obtusa</i>	Poaceae	LC	NKI 1, NKI 2
<i>Sutera halimifolia</i>	Scrophulariaceae		NKI 2
<i>Sutera pinnatifida</i>	Scrophulariaceae	LC	Gh 1
<i>Syringodea pulchella</i>	Iridaceae	VU D2, PNCO	Gh 1
<i>Tamarix usneoides</i>	Tamaricaceae	LC	AZi 6
<i>Tetrachne dregei</i>	Poaceae	LC	Gh 1
<i>Tetragonia microptera</i>	Aizoaceae	LC, PNCO	NKI 1
<i>Themeda triandra</i>	Poaceae	LC	Gh 1

SCIENTIFIC NAME	FAMILY	STATUS <sup>16</sup>	COMMENT/PRESENCE <sup>17</sup>
<i>Thesium hystrix</i>	Santalaceae	LC	NKI 2
<i>Thesium lineatum</i>	Santalaceae	LC	NKI 1
<i>Tragus berteronianus</i>	Poaceae	LC	NKI 1, NKI 2
<i>Tragus diffusa</i>	Poaceae		NKI 2
<i>Tragus koelerioides</i>	Poaceae	LC	NKI 1, NKI 2, Gh 1
<i>Tragus racemosus</i>	Poaceae	LC	NKI 2
<i>Tribulus terrestris</i>	Zygophyllaceae	LC	NKI 1, NKI 2
<i>Trichodiadema barbatum</i>	Aizoaceae	LC, PNCO	NKI 1, NKI 2
<i>Tridentea parvipuncta</i> <i>subsp. parvipuncta</i>	Apocynaceae	LC	NKI 1
<i>Tridentea virescens</i>	Apocynaceae	NEST (M), Rare	A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species. Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape stretching east to Prince Albert and Aberdeen. Possibly present, Not recorded.
<i>Tripteris aghillana</i> var. <i>integrifolia</i>	Asteraceae	NE	Gh 1
<i>Tripteris sinuata</i> var. <i>linearis</i>	Asteraceae	LC	NKI 1
<i>Tritonia tugwelliae</i>	Iridaceae	LC, PNCO	NKI 1
<i>Ursinia nana</i>	Asteraceae	LC	NKI 1
<i>Wahlenbergia albens</i>	Campanulaceae	LC	Gh 1
<i>Wahlenbergia sphaerica</i>	Campanulaceae	DDT	Gh 1
<i>Zygophyllum microcarpum</i>	Zygophyllaceae	LC	NKI 1
<i>Zygophyllum microphyllum</i>	Zygophyllaceae	LC	NKI 1, NKI 2

### 7.3.2 Fauna

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<b>MAMMALS</b>			
<i>Aethomys namaquensis</i>	Namaqua Rock Mouse	LC	
<i>Antidorcas marsupialis</i>	Springbok	LC (2016)	
<i>Canis mesomelas</i>	Black-backed Jackal	LC (2016)	
<i>Caracal caracal</i>	Caracal	LC (2016)	
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC (2016)	
<i>Chlorocebus pygerythrus</i> <i>pygerythrus</i>	Vervet Monkey (subspecies <i>pygerythrus</i> )	LC (2008)	
<i>Cistugo lesueuri</i>	Lesueur's Wing-gland Bat	LC (2016)	
<i>Connochaetes gnou</i>	Black Wildebeest	LC (2016)	

<sup>18</sup> IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species, Not Threatened – Not an IUCN category.

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Crocidura cyanea</i>	Reddish-gray Musk Shrew	LC (2016)	
<i>Crocidura flavescens</i>	Greater Red Musk Shrew	LC (2016)	
<i>Cynictis penicillata</i>	Yellow Mongoose	LC (2016)	
<b><i>Damaliscus pygargus pygargus</i></b>	<b>Bontebok</b>	<b>Vulnerable (2016)</b>	
<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	LC (2016)	
<i>Elephantulus edwardii</i>	Cape Elephant Shrew	LC (2016)	
<i>Elephantulus sp.</i>	Elephant Shrews		
<i>Eptesicus (Eptesicus) hottentotus</i>	Long-tailed Serotine	LC	
<i>Felis nigripes</i>	Black-footed Cat	Vulnerable (2016)	
<i>Felis silvestris</i>	Wildcat	LC (2016)	
<i>Genetta genetta</i>	Common Genet	LC (2016)	
<i>Gerbilliscus paeba</i>	Paeba Hairy-footed Gerbil	LC (2016)	
<i>Herpestes ichneumon</i>	Egyptian Mongoose	LC (2016)	
<i>Herpestes pulverulentus</i>	Cape Gray Mongoose	LC (2016)	
<b><i>Hippotragus niger niger</i></b>		<b>Vulnerable (2016)</b>	
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	
<i>Ictonyx striatus</i>	Striped Polecat	LC (2016)	
<b><i>Leptailurus serval</i></b>	<b>Serval</b>	<b>Near Threatened (2016)</b>	
<i>Lepus capensis</i>	Cape Hare	LC	
<i>Lepus saxatilis</i>	Scrub Hare	LC	
<i>Macroscelides proboscideus</i>	Short-eared Elephant Shrew	LC (2016)	
<i>Macroscelides sp.</i>	Round-eared Sengi		
<i>Malacothrix typica</i>	Large-eared African Desert Mouse	LC (2016)	
<i>Mellivora capensis</i>	Honey Badger	LC (2016)	
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC (2016)	
<i>Mus (Mus) musculus</i>	House Mouse	LC	
<i>Mus (Nannomys) minutoides</i>	Southern African Pygmy Mouse	LC	
<i>Myosorex varius</i>	Forest Shrew	LC (2016)	
<i>Neoromicia capensis</i>	Cape Serotine	LC (2016)	
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	LC (2016)	
<i>Oreotragus oreotragus</i>	Klipspringer	LC (2016)	
<i>Orycteropus afer</i>	Aardvark	LC (2016)	
<i>Oryx gazella</i>	Gemsbok	LC (2016)	
<i>Otocyon megalotis</i>	Bat-eared Fox	LC (2016)	
<i>Otomys sp.</i>	Vlei Rats		
<i>Otomys unisulcatus</i>	Karoo Bush Rat	LC (2016)	
<b><i>Panthera pardus</i></b>	<b>Leopard</b>	<b>Vulnerable (2016)</b>	
<i>Papio ursinus</i>	Chacma Baboon	LC (IUCN, 2016)	
<i>Parotomys brantsii</i>	Brants's Whistling Rat	LC (2016)	
<i>Pedetes capensis</i>	South African Spring Hare	LC (2016)	
<i>Procavia capensis capensis</i>	Cape Rock Hyrax	LC (2015)	
<i>Pronolagus rupestris</i>	Smith's Red Rock Hare	LC (2016)	

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Rabbit	LC (2016)	
<i>Proteles cristata</i>	Aardwolf	LC (2016)	
<i>Raphicerus campestris</i>	Steenbok	LC (2016)	
<i>Redunca fulvorufula</i>	Mountain Reedbuck	LC	
<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	LC (2016)	
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	LC (2016)	
<b><i>Rhinolophus hildebrandtii</i></b>	<b>Hildebrandt's Horseshoe Bat</b>	<b>Near Threatened</b>	<b>Refer to Bat Assessment</b>
<i>Sauromys petrophilus</i>	Roberts's Flat-headed Bat	LC (2016)	
<i>Suricata suricatta</i>	Meerkat	LC (2016)	
<i>Sylvicapra grimmia</i>	Bush Duiker	LC (2016)	
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC (2016)	
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC (2016)	
<i>Vulpes chama</i>	Cape Fox	LC (2016)	
<i>Xerus inauris</i>	South African Ground Squirrel	LC	
<b>BIRDS<sup>19</sup></b>			
Refer to Avifaunal Assessment			
<b>REPTILES</b>			
<i>Acontias meleagris</i>	Cape Legless Skink	LC (SARCA 2014)	
<i>Afroedura karroica</i>	Karoo Flat Gecko	LC (IUCN 2018)	
<i>Agama aculeata aculeata</i>	Common Ground Agama	LC (SARCA 2014)	
<i>Agama atra</i>	Southern Rock Agama	LC (SARCA 2014)	
<i>Bitis arietans arietans</i>	Puff Adder	LC (SARCA 2014)	
<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon	LC (SARCA 2014)	
<i>Chersina angulata</i>	Angulate Tortoise	LC (SARCA 2014)	
<b><i>Chersobius boulengeri</i></b>	<b>Karoo Padloper</b>	<b>EN A4ace, NEST (M), PNCO</b>	<b>Habitat destruction and degradation nearly 50% of the range of <i>C. boulengeri</i> is either moderately or severely degraded, which may explain maps of South Africa (Hoffman et al. 1999) show that the species' decline. <i>Chersobius boulengeri</i> is associated with rocky outcrops in specific vegetation types, qualifying it as a habitat specialist, which increases its risk of extinction.</b>
<i>Chondrodactylus angulifer</i>	Giant Ground Gecko	LC (IUCN 2009)	
<i>Chondrodactylus bibronii</i>	Bibron's Gecko	LC (SARCA 2014)	
<i>Cordylus cordylus</i>	Cape Girdled Lizard	LC (SARCA 2014)	
<i>Dispholidus typus typus</i>	Boomslang	LC (SARCA 2014)	

<sup>19</sup> BLSA – Birdlife South Africa

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Homopus femoralis</i>	Greater Padloper	LC (SARCA 2014)	
<i>Homopus sp.</i>			
<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	LC (SARCA 2014)	
<i>Lamprophis aurora</i>	Aurora House Snake	LC (SARCA 2014)	
<i>Naja nivea</i>	Cape Cobra	LC (SARCA 2014)	
<i>Nucras livida</i>	Karoo Sandveld Lizard	LC (SARCA 2014)	
<i>Pachydactylus capensis</i>	Cape Gecko	LC (SARCA 2014)	
<i>Pachydactylus latirostris</i>	Quartz Gecko	LC (SARCA 2014)	
<i>Pachydactylus maculatus</i>	Spotted Gecko	LC (SARCA 2014)	
<i>Pachydactylus mariquensis</i>	Marico Gecko	LC (SARCA 2014)	
<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	LC (SARCA 2014)	
<i>Pedioplanis laticeps</i>	Karoo Sand Lizard	LC (SARCA 2014)	
<i>Pedioplanis lineocellata pulchella</i>	Common Sand Lizard	LC (SARCA 2014)	
<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard	LC (SARCA 2014)	
<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	
<i>Psammobates tentorius subsp. ?</i>	Tent Tortoise (subsp. ?)	LC (SARCA 2014)	
<i>Psammobates tentorius tentorius</i>	Karoo Tent Tortoise		
<i>Psammophis notostictus</i>	Karoo Sand Snake	LC (SARCA 2014)	
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC (SARCA 2014)	
<i>Pseudaspis cana</i>	Mole Snake	LC (SARCA 2014)	
<i>Pseudocordylus microlepidotus fasciatus</i>	Karoo Crag Lizard	LC (SARCA 2014)	
<i>Ptenopus garrulus maculatus</i>	Spotted Barking Gecko	LC (SARCA 2014)	
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC (SARCA 2014)	
<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC (SARCA 2014)	
<i>Trachylepis capensis</i>	Cape Skink	LC (SARCA 2014)	
<i>Trachylepis homalocephala</i>	Red-sided Skink	LC (SARCA 2014)	
<i>Trachylepis occidentalis</i>	Western Three-striped Skink	LC (SARCA 2014)	
<i>Trachylepis sulcata</i>	Western Rock Skink		
<i>Trachylepis sulcata sulcata</i>	Western Rock Skink	LC (SARCA 2014)	
<i>Trachylepis variegata</i>	Variegated Skink	LC (SARCA 2014)	
<i>Trachylepis variegata</i>	Variegated Skink (subsp. ?)		
<i>Varanus albigularis albigularis</i>	Rock Monitor	LC (SARCA 2014)	
<b>AMPHIBIANS</b>			
<i>Amietia fuscigula</i>	Cape River Frog	LC (2017)	
<i>Amietia poyntoni</i>	Poynton's River Frog	LC (2017)	
<i>Cacosternum boettgeri</i>	Common Caco	LC (2013)	
<i>Cacosternum nanum</i>	Bronze Caco	LC (2013)	
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	
<i>Poyntonophrynus vertebralis</i>	Southern Pygmy Toad	LC	

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Pyxicephalus adspersus</i>	Giant Bull Frog	Near Threatened	
<i>Sclerophrys capensis</i>	Raucous Toad	LC	
<i>Strongylopus grayii</i>	Clicking Stream Frog	LC	
<i>Tomopterna delalandii</i>	Cape Sand Frog	LC	
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	
<i>Vandijkophrynus gariepensis gariepensis</i>	Karoo Toad (subsp. gariepensis)		
<i>Xenopus laevis</i>	Common Platanna	LC	
<b>INVERTEBRATES</b>			
<b>SCORPIONS</b>			
<i>Opisthophthalmus carinatus</i>		ToPS	
<i>Opisthophthalmus crassimanus</i>		ToPS	
<i>Opisthophthalmus karrooensis</i>		ToPS	
<i>Opisthophthalmus pictus</i>		ToPS	
<i>Parabuthus capensis</i>		ToPS	
<i>Parabuthus schlechteri</i>		ToPS	
<i>Uroplectes carinatus</i>		ToPS	
<b>SPIDERS</b>			
<i>Argiope australis</i>	Common garden orb-web spiders		
<i>Argiope sp.</i>	Garden orb-web spiders		
<i>Caerostris sp.</i>	Bark spiders		
<i>Cyclosa sp.</i>	Garbage-line web spiders		
<i>Harpactira namaquensis</i>		ToPS	
<i>Harpactirella sp.</i>			
<i>Latrodectus geometricus</i>	Common brown button spiders		
<i>Leucauge sp.</i>	Silvr vlei or silver swamp spiders		
<i>Mexcala rufa</i>	Scaly mexcala ant-like jumping spiders		
<i>Nephila senegalensis</i>	Banded-legged golden orb-web spider		
<i>Oxyopes sp.</i>	Grass lynx spiders		
<i>Palystes sp.</i>	Rain spiders		
<i>Synema imitator</i>	Tree African mask crab spiders		
<b>BUTTERFLIES</b>			
<i>Acanthovalva focularia</i>		Not Threatened	
<i>Acanthovalva inconspicuaria</i>		Not Threatened	
<i>Acraea horta</i>	Garden acraea	LC (SABCA 2013)	
<i>Aeropetes tulbaghia</i>	Table mountain beauty	LC (SABCA 2013)	
<i>Aloeides damarensis damarensis</i>	Damara russet	LC (SABCA 2013)	
<i>Aloeides depicta</i>	Depicta russet	LC (SABCA 2013)	
<i>Aloeides pierus</i>	Veined russet	LC (SABCA 2013)	



SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Aloeides trimeni trimeni</i>	Brown russet	LC (SABCA 2013)	
<i>Anthene amarah amarah</i>	Black-striped ciliate blue	LC (SABCA 2013)	
<i>Anthene definita definita</i>	Steel-blue-ciliate blue	LC (SABCA 2013)	
<i>Anthene dulcis dulcis</i>	Mashuna ciliate blue	LC (SABCA 2013)	
<i>Argyraspodes argyraspis</i>	Warrior silver-spotted copper	LC (SABCA 2013)	
<i>Azonus jesous</i>	Topaz babul blue	LC (SABCA 2013)	
<i>Azonus moriqua</i>	Black-bordered babul blue	LC (SABCA 2013)	
<i>Azonus ubaldus</i>	Velvet-spotted babul blue	LC (SABCA 2013)	
<i>Belenois aurota</i>	Pioneer caper white	LC (SABCA 2013)	
<i>Belenois creona severina</i>	African caper white	LC (SABCA 2013)	
<i>Brephidium metophis</i>	Tinktinkie pygmy blue	LC (SABCA 2013)	
<i>Cacyreus marshalli</i>	Common geranium bronze	LC (SABCA 2013)	
<i>Cassionympha camdeboo</i>	Camdeboo dull brown	LC (SABCA 2013)	
<i>Catopsilia florella</i>	African migrant	LC (SABCA 2013)	
<i>Chiasmia inaequilinea</i>			
<i>Chilades trochylus</i>	Grass jewel blue	LC (SABCA 2013)	
<i>Chlorerythra rubriplaga</i>		Not Threatened	
<i>Chrysothis beaufortia beaufortia</i>	Beaufort opal	LC (SABCA 2013)	
<i>Chrysothis chrysaor</i>	Burnished opal	LC (SABCA 2013)	
<i>Chrysothis plutus</i>	Plutus opal	LC (SABCA 2013)	
<i>Cigaritis phanes</i>	Silvery silverline	LC (SABCA 2013)	
<i>Colias electo electo</i>	African clouded yellow	LC (SABCA 2013)	
<i>Colotis euippe omphale</i>	Southern round-winged orange tip	LC (LC)	
<i>Crudaria leroma</i>	Silver-spotted grey	LC (SABCA 2013)	
<i>Danaus chrysippus orientis</i>	African plain tiger	LC (SABCA 2013)	
<i>Deudorix antalus</i>	Brown playboy	LC (SABCA 2013)	
<i>Dira clytus eurina</i>	Cape autumn widow	LC (SABCA 2013)	
<i>Durbaniella clarki clarki</i>	Little rocksitter	LC (SABCA 2013)	
<i>Eicochrysops messapus messapus</i>	Cupreous ash blue	LC (SABCA 2013)	
<i>Gomalia elma elma</i>	Green-marbled skipper	LC (SABCA 2013)	
<i>Grammodes stolidia</i>			
<i>Hypolimnas misippus</i>	Common diadem	LC (SABCA 2013)	
<i>Junonia hierta cebrene</i>	Yellow pansy	LC (SABCA 2013)	
<i>Kedestes barberae bonsa</i>	Freckled ranger	LC (SABCA 2013)	
<i>Lampides boeticus</i>	Pea blue	LC (SABCA 2013)	
<i>Lepidochrysops ortygia</i>	Koppie giant cupid	LC (SABCA 2013)	
<i>Leptomyrina lara</i>	Cape black-eye	LC (SABCA 2013)	
<i>Leptotes pirithous pirithous</i>	Common zebra blue	LC (SABCA 2013)	
<i>Loxostege frustalis</i>			
<i>Lycaena clarki</i>	Eastern sorrel copper	LC (SABCA 2013)	
<i>Mylothris agathina agathina</i>	Eastern dotted border	LC (SABCA 2013)	
<i>Oraidium barberae</i>	Dwarf blue	LC (SABCA 2013)	

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>18</sup>	COMMENT/PRESENCE
<i>Papilio demodocus demodocus</i>	Citrus swallowtail	LC (SABCA 2013)	
<i>Pinacopteryx eriphia eriphia</i>	Zebra white	LC (SABCA 2013)	
<i>Pontia helice helice</i>	Southern meadow white	LC (SABCA 2013)	
<i>Pseudonympha magoides</i>	False silver-bottom brown	LC (SABCA 2013)	
<i>Rhabdosia vaninia</i>			
<i>Spialia agylla agylla</i>	Grassveld sandman	LC (SABCA 2013)	
<i>Spialia ferax</i>	Striped sandman	LC (SABCA 2013)	
<i>Spialia nanus</i>	Dwarf sandman	LC (SABCA 2013)	
<i>Stugeta bowkeri bowkeri</i>	Bowker's marbled sapphire	LC (SABCA 2013)	
<i>Stygionympha robertsoni</i>	Koppie hillside brown	LC (SABCA 2013)	
<i>Tarsocera fulvina</i>	Karoo spring widow	LC (SABCA 2013)	
<i>Thestor camdeboo</i>	Camdeboo skolly	LC (SABCA 2013)	
<i>Torynesis magna</i>	Large veined widow	LC (SABCA 2013)	
<i>Trimenia macmasteri macmasteri</i>	Karoo silver-spotted copper	LC (SABCA 2013)	
<i>Tylopaedia sardonix sardonix</i>	King copper	LC (SABCA 2013)	
<i>Vanessa cardui</i>	Painted lady	LC (SABCA 2013)	
<i>Ypthima asterope hereroica</i>	African three-ring	LC (SABCA 2013)	
<i>Zizeeria knysna knysna</i>	African grass blue	LC (SABCA 2013)	

## 7.4 Appendix D: Systematic Conservation Planning

### 7.4.1 Vegetation of Southern Africa

#### Eastern Lower Karoo (NKL 2)

VT 30 Central Lower Karoo (43%), VT 26 Karroid Broken Veld (31%) (Acocks 1953). LR 54 Central Lower Nama Karoo (94%) (Low & Rebelo 1996). Grassy Dwarf Shrublands of the Camdebo and Aberdeen plains, Dwarf Shrublands (typicum) of the Camdebo & Succulent Dwarf Shrubland (Palmer 1991a).

**Distribution** Eastern Cape and Western Cape Provinces: Plains east of the Kariega and Buffels Rivers in the area south of the Camdebo Mountains and the line of mountains linking to the Coetzeeberge encompassing Aberdeen, Graaff-Reinet and Pearston (region called Camdebo) and plains south of Aberdeen to Klipplaat and Miller. Contains some higher elevation islands of Camdebo Escarpment Thicket, Groot Thicket and Lower Karoo Gwarrieveld. Altitude varies mostly from 500–1 100 m.

**Vegetation & Landscape Features** Plains interrupted by some dolerite dykes, butts and mesas. The dominating vegetation is low to middle-height microphyllous shrubland with drought-resistant ‘white’ grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families Aizoaceae and Crassulaceae can also be encountered.

**Geology & Soils** Flat or gently sloping pediments composed of mudstone and resistant sandstones of the Beaufort Group (Adelaide Subgroup), Ecca sediments and Dwyka tillites in the south, with some Jurassic dolerite intrusions in the north. About half the area has red-yellow, apedal, freely drained soils, <300 mm deep, with a high base status (Ag land type). Also, shallow Glenrosa and/or Mispah soils (Fc land type).

**Climate** Rainfall is mostly in late summer and early autumn, with main peak in March. MAP ranges from about 150 mm in the west to 350 mm in the east. Mean maximum and minimum monthly temperatures for Graaff-Reinet are 38.6 °C and –0.3 °C for January and July, respectively.

**Important Taxa** Small Trees: *Acacia karroo*. Tall Shrubs: *Lycium cinereum* (d), *L. oxycarpum* (d), *Cadaba aphylla*, *Carissa haematocarpa*, *Grewia robusta*, *Lycium schizocalyx*, *Rhigozum obovatum*. Low Shrubs: *Eriocephalus ericoides* subsp. *ericoides* (d), *Felicia muricata* (d), *Pentzia incana* (d), *Rosenia humilis* (d), *Aptosimum elongatum*, *Asparagus striatus*, *A. suaveolens*, *Barleria pungens*, *Blepharis capensis*, *B. mitrata*, *Chrysocoma ciliata*, *Euryops anthemoides*, *Felicia muricata*, *Galenia secunda*, *Garuleum latifolium*, *Helichrysum zeyheri*, *Hermannia cuneifolia*, *Indigofera sessilifolia*, *Limeum aethiopicum*, *Microlooma armatum*, *Pegolettia retrofracta*, *Phymaspermum parvifolium*, *Plinthus karooicus*, *Polygala seminuda*, *Pteronia adenocarpa*, *P. glauca*, *P. sordida*, *Selago fruticosa*, *Senecio acutifolius*, *Sutera halimifolia*, *Zygophyllum microphyllum*. Succulent Shrubs: *Ruschia cradockensis* subsp. *cradockensis* (d), *Astroloba foliolosa*, *Crassula corallina*, *Drosanthemum lique*, *D. subspinosum*, *Euphorbia ferox*, *Mestoklema tuberosum*, *Pachypodium succulentum*, *Rhombophyllum nelii*, *Sarcocaulon camdeboense*, *S. patersonii*, *Trichodiadema barbatum*. Semiparasitic Shrub: *Thesium hystrix*, Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *Tragus berteronianus* (d), *T. koelerioides* (d), *T. racemosus* (d), *A. diffusa*, *Chloris virgata*, *Cynodon incompletus*, *Enneapogon desvauxii*, *Eragrostis curvula*, *Stipagrostis obtusa*. Herbs: *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Gazania krebsiana*, *Lepidium africanum* subsp. *africanum*, *Tribulus terrestris*. Succulent Herbs: *Crassula muscosa*, *Psilocaulon articulatum*, *P. coriarium*, *Senecio radicans*. Geophytic Herbs: *Albuca setosa*, *Drimia anomala*, *D. intricata*, *Moraea polystachya*.

**Endemic Taxa** Succulent Shrubs: *Aloinopsis rubrolineata*, *Chasmatophyllum nelii*, *Cylindrophyllum calamiforme*, *Euphorbia coerulans*, *Ruschia vanderbergiae*. Succulent Herbs: *Haworthia decipiens* var. *cyanea*, *H. greenii*.

**Conservation** Least threatened. Target 16%. Some of patches statutorily conserved in Aberdeen and Karoo Nature Reserves as well as in private reserves such as Minnawill Game Farm. Between 1% and 2% transformed by alien infestation. Erosion is high (45%) and moderate (45%).

**Remarks** Vegetation structure of the Eastern Lower Karoo differs from the Gamka Karoo with its higher proportion of succulent dwarf shrubs (species of *Ruschia*) and higher frequency of larger woody shrubs (*Diospyros*, *Euclea*, *Lycium*, *Rhus*) associated with rocky outcrops and other mesic patches.

**References** Acocks (1953, 1988), Palmer (1988, 1989, 1991a, c), Hoffman (1989a, b), Du Toit (1996).

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Including Mesic Riparian Bush & Xeric Riparian Bush (Van der Walt 1980), Riparian Thicket (Palmer 1991), *Lycium cinereum*-*Salsola aphylla* Shrubland & *Acacia karroo*-*Stipagrostis namaquensis* Riparian Woodland (Rubin & Palmer 1996), *Becium burchellianum*-*Acacia karroo* Woodland (Brown & Bezuidenhout 2000).

**Distribution** Western and Eastern Cape Provinces: Alluvia of the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega, and Sundays Rivers and their tributaries), east of Laingsburg as far west as Graaff-Reinet and Jansenville. This vegetation unit is embedded within the Koedoesberge-Moordenaars Karoo, Prince Albert Succulent Karoo, Gamka Karoo, Eastern Lower Karoo, and southern parts of the Eastern Upper Karoo as well as some parts of the Albany Thicket Biome south of Cradock. Altitude ranging from 250–1 550 m.

**Vegetation & Landscape Features** Narrow riverine flats supporting a complex of *Acacia 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 (see Van der Walt 1980: Table 4) may also contain *Leucosidea sericea*, *Rhamnus prinoides* and *Ehrharta erecta*.

**Geology, Soil & Hydrology** 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.

**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 18.3 °C (upper reaches of Sundays River). Frost occurs frequently in winter.

**Important Taxa:** *Riparian thickets:* Small Trees: *Acacia karroo* (d), *Rhus 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).

**Endemic Taxon:** *Alluvial shrublands & herblands:* Graminoid: *Isolepis expallescens*.

**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*.

**Remark 1:** Due to the lingering taxonomic problems, the identity of South African species of *Salsola* sect. *Caroxylon* cited in various papers (see below), should be approached with caution.

**Remark 2:** Plants of drainage lines may be resistant to damage by hailstorms. At the Tierberg Karoo Research site, 36 of the 44 species in drainage lines were undamaged after a hailstorm, with the remaining species only slightly damaged (Milton & Collins 1989). This contrasted with much higher levels of damage to plants of the surrounding habitats (flats and heuweltjies).

References Acocks (1979), Van der Walt (1980), Palmer (1988, 1989, 1991), Milton (1990), Rubin & Palmer (1996), Brown & Bezuidenhout (2000).

### Gamka Karoo (NKL 1)

VT 26 Karroid Broken Veld (76%) (Acocks 1953). LR 53 Great Nama Karoo (70%) (Low & Rebelo 1996). BHU 91 Gamka Broken Veld (Cowling & Heijnis 2001).

**Distribution** Western Cape and Eastern Cape Provinces and marginally into the Northern Cape Province: Large basin between the Great Escarpment (Nuweveld Mountains) in the north and northwest and Cape Fold Belt Mountains (mostly Swartberg Mountains) in the south. From approximately the edge of the Gamka basin catchment area (i.e. of the Dwyka River tributary) in the west to about the Kariega River in the east. Altitude varies mostly from 500–1 100 m.

**Vegetation & Landscape Features** Extremely irregular to slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g. *Chrysocoma ciliata*, *Eriocephalus ericoides*) with rare low trees (e.g. *Euclea undulata*). Dense stands of drought-resistant grasses (*Stipagrostis*, *Aristida*) cover (especially after abundant rains) broad sandy bottomlands.

**Geology & Soils** Mudstones and sandstones of the Beaufort Group (Adelaide Subgroup) with some Ecca (Fort Brown Formation) shales supporting very shallow and stony soils of the Glenrosa and/or Mispah forms, typical of Fc land type.

**Climate** One of the most arid units of the Nama-Karoo Biome. Rainfall mainly in autumn and summer, with a marked peak in March and low levels of cyclonic rain in winter. This region is in the rain shadow of Cape Fold Belt mountains in the south, MAP ranging from about 100 mm in some areas between the Dwyka and Gamka Rivers to about 240 mm against the Great Escarpment. Mean maximum and minimum monthly temperatures in Beaufort West are 38.7 °C and –3.2 °C for January and July, respectively. Strong northwesterly winds occur in winter.

**Important Taxa** Tall Shrubs: *Lycium cinereum* (d), *L. oxycarpum* (d), *Rhigozum obovatum* (d), *Acacia karroo*, *Cadaba aphylla*, *Lycium schizocalyx*, *Rhus burchellii*, *Sisyndite spartea*. Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Felicia muricata* (d), *Galenia fruticosa* (d), *Limeum aethiopicum* (d), *Pentzia incana* (d), *Pteronia adenocarpa* (d), *Rosenia humilis* (d), *Aptosimum indivisum*, *Asparagus burchellii*, *Blepharis mitrata*, *Eriocephalus microphyllus* var. *pubescens*, *Felicia filifolia* subsp. *filifolia*, *F. muricata* subsp. *cinerascens*, *Galenia secunda*, *Garuleum bipinnatum*, *G. latifolium*, *Gomphocarpus filiformis*, *Helichrysum lucilioides*, *Hermannia desertorum*, *H. grandiflora*, *H. spinosa*, *Melolobium candicans*, *Microloma armatum*, *Monechma spartioides*, *Pentzia pinnatisecta*, *Plinthus karroicus*, *Polygala seminuda*, *Pteronia glauca*, *P. sordida*, *P. viscosa*, *Selago geniculata*, *Sericocoma avolans*, *Zygophyllum microcarpum*, *Z. microphyllum*. Succulent Shrubs: *Ruschia intricata* (d), *Aridaria noctiflora* subsp. *straminea*, *Crassula muscosa*, *Drosanthemum lique*, *Galenia sarcophylla*, *Kleinia longiflora*, *Ruschia spinosa*, *Salsola tuberculata*, *Sarcocaulon patersonii*, *Trichodiadema barbatum*, *Tripteris sinuata* var. *linearis*. Semiparasitic Shrub: *Thesium lineatum*. Herbs: *Gazania lichtensteinii* (d), *Chamaesyce inaequilatera*, *Dicoma capensis*, *Galenia glandulifera*, *Lepidium africanum* subsp. *africanum*, *L. desertorum*, *Lessertia pauciflora* var. *pauciflora*, *Leysera tenella*, *Osteospermum microphyllum*, *Sesamum capense*, *Tetragonia microptera*,

*Tribulus terrestris*, *Ursinia nana*. Geophytic Herbs: *Drimia intricata*, *Moraea polystachya*. Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Fingerhuthia africana* (d), *Stipagrostis ciliata* (d), *S. obtusa* (d), *Aristida adscensionis*, *Cenchrus ciliaris*, *Digitaria argyrograpta*, *Enneapogon desvauxii*, *Enneapogon scaber*, *Eragrostis homomalla*, *E. lehmanniana*, *E. obtusa*, *Tragus berteronianus*, *T. koelerioides*.

**Biogeographically Important Taxa** (\*Endemic to Great Karoo Basin) Succulent Shrubs: *Hereroa latipetala*\* (also found in Prince Albert Succulent Karoo), *H. odorata*\* (also found in Koedoesberge-Moordenaars Karoo), *Pleiospilos compactus* (southern and western limits of distribution), *Rhinephyllum luteum*\*, *Stapelia engleriana*\*. Geophytic Herb: *Tritonia tugwelliae*\*. Low Shrub: *Felicia lasiocarpa*\*. Succulent Herbs: *Piarranthus comptus*\*, *Tridentea parvipuncta* subsp. *parvipuncta*\*. Graminoid: *Oropetium capense* (westernmost limit of distribution).

**Endemic Taxa** Succulent Shrubs: *Chasmatophyllum stanleyi*, *Hereroa incurva*, *Hoodia dregei*, *Ruschia beaufortensis*. Low Shrubs: *Jamesbrittenia tenuifolia*. Herb: *Manulea karrooica*. Succulent Herb: *Piarranthus comptus*.

**Conservation** Least threatened. Target 16%. About 2% statutorily conserved in the Karoo National Park and some in private reserves, such as Steenbokkie Private Nature Reserve (near Beaufort West). Only small part has undergone transformation. The alien *Salsola kali* is a serious infestation problem locally. Erosion is moderate (78%), low (11%) and high (11%).

**References** Acocks (1953, 1979, 1988), Du Toit (1996), Low & Rebelo (1996, 1998), Rubin & Palmer (1996), Cowling & Heijnis (2001).

#### 7.4.2 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019)

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was undertaken in this assessment. Some of the many good reasons for this include: an updated land cover map, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the province that require integration. In addition, significant strides have been made with respect to defining and mapping biodiversity pattern and biodiversity processes, which have been standardised to ensure a level of consistency throughout the country (SANBI, 2017). The ECBCP (2019) will replace the ECBCP (2007) in its entirety.

*The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans".*

*The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in Table 2.*

Table 10: Linking CBA categories to management objectives.

CBA Map Category	Desired State	Land management objective
Protected Areas	Natural	Protected Areas are managed through Protected Area Management Plans and are therefore not managed through the ECBCP (2019).
Critical Biodiversity Area 1	Natural	Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA 1, the following objectives must apply: <ul style="list-style-type: none"> <li>Ecosystem and species must remain intact and undisturbed.</li> <li>Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met.</li> </ul>

CBA Map Category	Desired State	Land management objective
		<ul style="list-style-type: none"> <li>• Important: these biodiversity features are at, or beyond, their limits of acceptable change.</li> </ul> <p>If land use activities are unavoidable in these areas and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented.</p>
Critical Biodiversity Area 2	Natural	<p>Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:</p> <p>For areas classified as CBA 2, the following objectives must apply:</p> <ul style="list-style-type: none"> <li>• Ecosystem and species must remain intact and undisturbed.</li> </ul> <p>There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA 2 area may elevate other CBA 2 areas to a CBA 1 category.</p> <ul style="list-style-type: none"> <li>• These biodiversity features are at risk of reaching their limits of acceptable change.</li> </ul> <p>If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.</p>
Ecological Support Area 1	Functional	<p>Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.</p> <p>For areas classified as ESA 1, the following objectives apply:</p> <ul style="list-style-type: none"> <li>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.</li> <li>• These systems may vary in condition and maintaining function is the main objective, therefore: <ul style="list-style-type: none"> <li>◦ Ecosystems still in natural, near natural state should be maintained.</li> <li>◦ Ecosystems that are moderately disturbed/degraded should be restored.</li> </ul> </li> </ul>
Ecological Support Area 2	Functional	<p>Maintain current land use with no intensification.</p> <p>For areas classified as ESA 2, the following objectives apply:</p> <ul style="list-style-type: none"> <li>• These areas have already been subjected to severe and/or irreversible modification.</li> <li>• These areas are not required to meet biodiversity targets, but they may still perform some function with respect to connectivity, ecosystem service delivery and climate change resilience.</li> <li>• Objective is to maintain remaining function, therefore: <ul style="list-style-type: none"> <li>◦ Areas should not undergo any further deterioration in ecological function.</li> <li>◦ Opportunities to change land use practices to improve ecological function (i.e., cultivation agriculture to livestock grazing agriculture) are desirable in ESA 2 areas.</li> </ul> </li> </ul>

CBA Map Category	Desired State	Land management objective
Other Natural Areas and No Natural Habitat Remaining	Production	No desired state or management objective is provided for ONA or NNR.

### Description of land use types and activities

A range of various land use types and activities associated with the Eastern Cape are described below. These have been derived from SPLUMA land use categories, municipal zoning scheme definitions and predominant land uses, and practices present in the Eastern Cape. Each category has been expressly linked to corresponding SPLUMA land use category for the purposes of facilitating the integration of the CBA map land use guidelines into other spatial planning products such as Spatial Development Frameworks. These land uses are described in more detail in *Table 11* below.

*Table 11: Description of Land Use Types and Activities.*

<b>Environmental Conservation</b>
<p>Environmental Conservation is where land uses are primarily involved with conservation activities. These include:</p> <ul style="list-style-type: none"> <li>• Conservation management activities in formal protected areas and informal conservation areas managed for biodiversity (wildlife conservation and recreational/educational tourism).</li> <li>• Low-intensity eco-tourism activities (such as hiking trails).</li> </ul> <p>Subject to appropriate controls, planning and management, these land use activities can be accommodated in CBAs and ESAs. It is the preferred land use in CBAs and ESAs.</p> <p>This land use zone corresponds to the SPLUMA scheduled land use purpose ‘conservation’. This land use activity provides for the following:</p> <ul style="list-style-type: none"> <li>• Protection of the natural environment and natural processes for their cultural, historic, scientific, scenic, biodiversity, habitat or economic.</li> </ul> <p>Sustainable delivery of ecosystem services to the community.</p>
<b>Tourism</b>
<p>The Tourism and Accommodation land use covers broad range of tourist and recreational facility types, inclusive of tourism, recreation and accommodation facilities. Tourism and Accommodation is divided into two sub-categories depending on the level of intensity of development and types of activities involved:</p> <p><u>Low impact tourism, recreation and accommodation</u></p> <p>This includes low impact facilities that include camp sites and “rondavels” or traditional homestead structures, hiking trails, ablutions, gift/coffee shops, cultural centres. Sustainable rural tourism, rural businesses and communities that provide for the rural recreational and leisure needs of urban and rural dwellers, could be allowed in CBAs and ESAs provided that the development is in keeping with the management objective of the CBA or ESA and is subject to the appropriate biodiversity-related controls being in place.</p> <p>The SPLUMA land use purpose for this activity would be ‘Residential’ but would have an equivalent classification in a municipal zoning scheme of ‘Low density Special/Resort Zone’.</p>
<b>High-impact tourism facilities</b>
<p>This includes developments such as lodges, hotels, large resorts, golf courses and estates.</p> <p>High-impact tourism and accommodation facilities should only be considered in ESA 2 or ONA’s. In all cases, the current state of ESA 2 areas must be maintained (e.g., pineapple field converted to golf-course would maintain connectivity in the landscape). The location of infrastructure must be placed outside of natural areas (CBAs and ESAs), must be clustered and be located adjacent to existing urban development.</p> <p>The SPLUMA land use purpose for this activity would be ‘Residential’ but would have an equivalent classification in a municipal zoning scheme of ‘Special/Resort Zone’.</p>
<b>Municipal commonage</b>
<p>The municipal commonage areas provide for the implementation of the Municipal Commonage Policy of the National Government and the relevant municipality, and to promote and facilitate local agri-economic development. This land use corresponds to the SPLUMA scheduled land use purpose ‘agriculture’ and is often used for extensive unmanaged grazing, which is not compatible with land management objectives of CBAs but may (under management) be permitted in ESAs.</p> <p>Commonage is typically covered by natural vegetation. These areas therefore have the potential to contribute towards biodiversity conservation if managed appropriately and may be instrumental for retaining ecological connectivity across landscapes.</p>
<b>Rural residential</b>
<p>The rural residential land use type includes a range of residential and recreational activities. It is divided into two sub-types described below.</p>



The SPLUMA land use purpose would be ‘Residential’ but may be associated with a municipal zoning scheme equivalent of ‘low density/special/resort’.

#### Low density rural housing and eco-estates

This land use type is associated with low density residential and eco-estate development. Low density is defined here as covering 0.2% (please see text box below for clarification) or less of a property. It makes provision for rural housing development such as low-density, lifestyle estates, multi-ownership of reserves, eco-estates (but excluding golf estates). Land uses in this zone can be compatible in CBAs and ESAs, although impacts should be carefully assessed and managed. NOTE: It is important to clarify how the 0.2% was derived. Several zoning schemes throughout South Africa enforce a land use policy on agricultural land which restricts the development of dwelling units on agricultural land. The number of units typically permitted is 1 per 10 ha. This has been used as the basis for what can be considered rural development. For the purposes of the ECBCP (2019) land use guidelines this policy (1 dwelling unit per 10 ha) was adapted and converted to an area-based unit. This was done by determining a reasonable area of influence of a single rural dwelling unit (200 m<sup>2</sup> including household gardens). This area was then multiplied by the number of units permitted in terms of the policy to be developed on 100 ha in a rural area (e.g., 10 units in 100 ha) in order to determine the development footprint on 100 ha. The ECBCP (2019) therefore defines rural housing and eco-estates as development footprints that cover 200 m<sup>2</sup> per 10 ha or 0.2 ha per 100 ha or 2 ha per 1000 ha, irrespective of the number of units.

#### Traditional/Communal and Low-medium density rural development

This land use type may range in density from low to medium density and describes rural housing development. Low-medium density is defined here as a development footprint (including gardens, agricultural fields and parking areas) covering between 0.2-10% of a designated area/property. It includes infrastructure associated with rural landscapes, including the villages, recreational and service facilities and agricultural fields/gardens. This land use type may result in impacts not in keeping with the land use management objectives of CBAs but may be in keeping with ESAs on a case-by-case basis and under specific authorisation conditions.

The following conditions should be observed for all rural development applications:

- Intensive recreational developments (e.g., golf and polo estates) which result in significant habitat loss, and which represent urban development outside the urban edge, are not compatible with CBA management objectives.
- Any infrastructural developments in CBAs should be avoided with respect to Traditional Communal Areas (Existing) and Rural Communal Settlements (New).
- Rural residential development (houses and infrastructure) within CBAs and ESAs MUST be clustered into distinct residential precincts.

Residential developments within ESAs must consider the functionality of the ESA, which may be related to connectivity and their role as biodiversity corridors. In these cases, residential houses and infrastructure should not disrupt or fragment the corridor or establish impermeable fences or boundaries to disrupt movement of fauna.

#### **High density urban residential development**

Urban residential development is described as the use of land primarily for human habitation, and comprises a dwelling house, group housing, hotels, hostels or flats, where more than 10% of the property area is developed. This land use zone corresponds to the SPLUMA scheduled land use purpose ‘residential’ associated with a municipal zoning scheme equivalent of medium to high density (such as Residential 1 or 2).

Urban residential land uses are generally not compatible with the land management objectives of CBAs or ESAs.

#### **Other urban influences**

*“Other Urban Influences” is a collective term for several urban related activities defined by SPLUMA including land use purposes for: commercial (light industrial), educational, institutional, business and recreation and mixed used developments. In all cases, the land uses permitted in these zones are not compatible with CBAs or ESAs.*

#### **Agriculture**

A range of agricultural activities have been considered in this land use type, including:

- Extensive game and livestock farming (where ‘extensive’ means low stocking rates over large areas, with minimal additional food supplementation).
- Intensive livestock and game ranching.
- Agricultural infrastructure, including agri-industrial facilities, agri-villages, buildings, houses, sheds and intensive animal production facilities (e.g., feedlots); and
- Arable land, including cultivation of irrigated and dryland crops, woodlots, orchards and multi-cropping systems.

This land use zone corresponds to the SPLUMA scheduled ‘agricultural’ land use purpose.

Many agricultural activities may impact on, and are largely incompatible with, biodiversity conservation objectives. If poorly managed, they may accelerate degradation by causing habitat loss, soil erosion and hydrological changes. Associated impacts vary from moderate to severe depletion of natural biota and disturbance of ecosystem function. However, agriculture may also contribute to the overall functionality of a landscape by maintaining connectivity necessary for the movement and foraging of animals.

Extensive Game and Livestock Farming

Extensive Livestock and Game farming is the utilisation of large areas of natural (unimproved) rangelands with the commercial objective of producing livestock or game animals (excluding feedlots and game breeding farms). This land use is considered to be compatible with biodiversity objectives of some CBAs and ESAs, under certain conditions, including:

- A biodiversity and veld condition assessment should underpin the calculation of carrying capacity.
- Game and livestock stocking rates should not exceed the recommended carrying capacity. Overgrazing, which results in a loss or degradation of an ecosystem, is in conflict with NEMA principals and is governed by Section 28 of NEMA which regulates the 'Duty of care and remediation of environmental damage'.
- Give preference to stocking game species that fall within their natural distribution range in the province.
- Sensitive habitats and species-rich areas should be set-aside for the purposes of biodiversity conservation.
- Ecologically and economically sustainable management is applied.

#### Intensive Game Breeding

Game breeding involves the subdivision of grazing veld into small camps (less than 100 ha) using fencing that does not allow free movement of naturally occurring wildlife (e.g., small mammals, reptiles, etc.).

Game breeding involves supplemental feeding of animals allowing stocking rates in excess of recommended carrying capacities and is considered a form of feedlot production. The forms of fencing used create impenetrable barriers to wildlife movement in the landscape.

Game breeding should not be permitted in CBAs or ESAs as is not considered compatible with the land management objectives for these categories.

#### Feedlots and agri-processing

Feedlots and agri-processing facilities are intensive farming operations which involve high animal densities and almost exclusive supplemented feeding and include piggeries, broiler houses, dairies, aquaculture and livestock feedlots. These facilities produce waste streams that require treatment and disposal and should be operated in line with authorisation conditions. Since pollution may be felt beyond the direct footprint of the land use activity itself, this land use activity may impact on ecosystem functionality.

Feedlots and agri-processing activities are not compatible with land management objectives for CBAs. They may be considered within Terrestrial ESAs (i.e., ESA 2 areas with imposed restrictions), but should not be considered in aquatic ESAs associated with CBA rivers.

#### Cultivation

A number of different types of cultivation have been aggregated into this land use type and is fundamentally used to describe any earth-turning activity or a replacement of natural vegetation, including:

- Irrigated crop cultivation
- Dryland crop cultivation (e.g., orchards, pastures, groves, plantation forestry)

Cultivation is not considered compatible with the land management objectives of CBAs and ESA 1.

#### **Open Space**

Open space areas, either public or private, are sites easily accessible for recreational purposes and activities for local and designated communities. These include parks, botanical gardens, and other open spaces as well as corridor linkages between open areas for passive recreational purposes.

This land use may correspond to either of SPLUMA's scheduled land use purposes under 'Public' or 'Community'.

The land use could potentially be compatible with the management objectives of CBAs and ESAs if it secures significant areas of natural habitat and manages human activities within them

#### **Low, high and general industry**

This land use encompasses industrial land use activities, such as low impact industry, general industry, and high impact industry. This land use zone corresponds to the SPLUMA scheduled 'Industrial' land use purpose. These land uses are not compatible with biodiversity conservation and should not be located in CBAs or ESAs.

#### **Transport Services**

This land use accommodates transportation service functions and land uses such as airports, railway stations, petro-ports and truck stops, bus and taxi ranks and other transport depots. These activities correspond to the SPLUMA scheduled 'Transport' land use purpose.

The permitted land uses in this category are not compatible with CBAs and most ESAs.

#### **Roads and railways**

**Roads and railways include all existing and future planned linear infrastructure, such as hardened roads and railways. This land use zone corresponds to the SPLUMA scheduled 'Transport' land use purpose. These land uses are not consistent with the land management objectives of CBAs and ESAs. In cases where technical options are limited, these activities may only take place in CBAs and ESAs under specific conditions of authorisation and contingent on biodiversity offsets.**

#### **Other utilities**

'Other utilities' describes a range of services such as water and sewage treatment work, associated pipeline reticulation, and other linear infrastructure including canals and power lines. Utility land uses generally fall within the 'Government' land use

purpose of SPLUMA where it is defined as “use of land by national, provincial or municipal government to give effect to its governance role.” This may, in some cases, be extended to parastatal companies such as water service boards and Eskom. In the case of renewable energy on private land, municipal zoning schemes are used. The different types of utilities have been discussed separately below.

#### Linear Structures: Pipelines, Canals, Catchment Transfers and Power Lines

These activities include large bulk water transfer schemes and catchment transfers, power lines, canals, pipelines (including oil and gas).

Activities involving catchment transfers and canals will affect flow regimes in rivers and wetlands. For this reason, they are not compatible with the management objective for CBA rivers.

Power lines, substations and pipelines can be compatible with the management objective of CBAs, and ESAs provided that appropriate design (above-ground pipelines, below-ground power lines, etc) and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, bird collision and electrocution avoidance are enforced.

#### Water projects and power stations

Activities involving water damming will affect flow regimes in rivers, wetlands and estuaries. For this reason, they are not compatible with the management objective for CBA rivers. Small scale damming of river systems in free flowing/flagship rivers or upstream and instream of fish sanctuaries should not be permitted.

Power stations are accompanied by the need for significant volumes of water and the generation of wastewater (thermal and chemical pollution) and air pollution emissions. This land use activity is therefore undesirable in CBAs and ESAs. Considering the need for water, avoiding rivers, coastline buffers or estuarine buffers may not be feasible.

In both cases, infrastructure located within CBAs must be accompanied by biodiversity offset design and implementation.

#### Waterworks and Wastewater Treatment Works (WWTW)

This category includes installations serving rural and urban areas including water and wastewater treatment and includes associated reticulation infrastructure e.g., pump stations and pipelines. Water and WWTW's should not be located in CBAs or ESAs. WWTW's may have significant impacts on water quality, therefore discharge of effluent into Aquatic CBA 1 rivers should not be considered.

#### Renewable Energy

Renewable energy generation in the Eastern Cape mainly includes wind and solar (photovoltaic-PV). Other types of renewable energy generation include smaller biomass conversion (biogas and gasification) and generation of biodiesels from recycled oils.

Although the footprint of wind energy facilities is relatively small, the impact on bird and bat biodiversity may be considerable. Since the CBA map has been informed by these taxonomic groups it will reflect important areas for birds and bats. Considering that wind energy facilities are subject to the South African best practice guidelines for the monitoring of both taxonomic groups, wind energy facility may be considered in CBAs and ESAs in line with monitoring recommendations for birds and bats. Consideration of development, subject to expert studies of other biodiversity, in CBAs will require the development and implementation of biodiversity offsets.

Solar PV facilities are area-hungry activities which typically require considerable landscaping and the clearance of indigenous vegetation. Even if vegetation is left intact, a change in sunlight regime may alter the natural species composition. This activity is, therefore, not appropriate in CBA's or ESA's. In some cases, it may be acceptable to utilise ESAs, provided that connectivity is maintained in the development design.

Technologies such as biogas (reactors), gasification and biodiesel plants are typically undertaken on relatively small development footprints. The main impacts that need to be managed relate to air emissions and waste streams. These technologies are, therefore, not compatible with CBA land/water management objectives, especially with respect to CBA rivers.

#### **Quarrying and Mining**

The quarrying and mining include all forms of mineral extraction and is sub-divided into three sub- categories:

- Prospecting and underground mining.
- Quarrying and opencast mining (includes strip mining, surface mining, dumping and dredging); and
- Associated mining infrastructure: residential areas, waste dumps, settling ponds and disposal sites, urban waste sites and landfill sites.

This land use zone corresponds to the SPLUMA scheduled 'mining' land use purpose.

None of the activities associated with these activities are compatible with biodiversity conservation and they should not be located in CBAs or ESAs.

The following additional conditions should be observed:

- Buffer widths should be determined and implemented using available policy and guidelines for all biodiversity features present; and

Any environmental management plan should align with the Mining and Biodiversity Guidelines (2014).

### 7.4.3 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

### 7.4.4 Strategic Water Source Areas

Strategic water source areas (Figure 18) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural “water factories”, supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

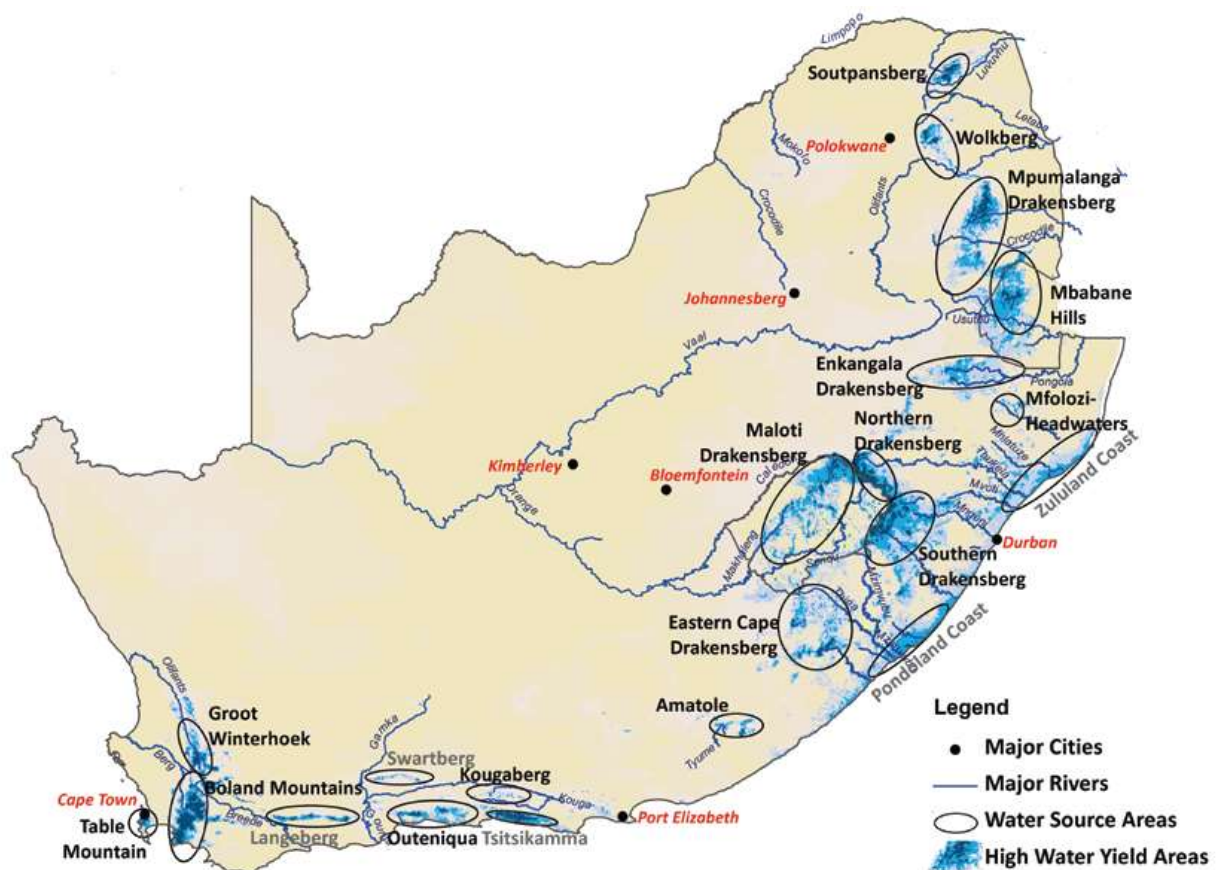


Figure 18: South Africa Water Source Areas [Source: Nel, et al, 2013]

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country’s surface water resources extremely limited – South Africa is

considered to be one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

Overloading with nutrients and other pollutants from urban, agricultural and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five per cent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

#### 7.4.5 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or 'FEPAs'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

- Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of Conservation Concern (e.g., very restricted distributions in South Africa)
- River ecosystem types – 20% of total length per type
- Wetland ecosystem types – 20% of total area per type
- Wetland clusters – 20% of total area per wetland vegetation group
- Free-flowing rivers – 20% of total length per ecoregion group
- Priority estuaries – 100% of all priority estuaries, which already took into account biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or “riparian habitat” along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter (“food”) in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its “riparian habitat” by a buffer area.

## 7.4.6 Key Biodiversity Areas

### Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all of the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
- To gather new data regularly and monitor IBA's in order to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

## 7.5 Vegetation and Ecological Processes and Corridors

### 7.5.1 Critical Biodiversity Areas

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged. The following issues need to be considered when considering development within a CBA:

- Are there alternative areas within the site but outside of the CBA that could be developed?
- Does the project undermine the overall ecological functioning of the broad CBA area?
- Can mitigation measures reduce the impact of the development on ecological processes?

### 7.5.2 Ecosystem Processes

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots.

### 7.5.3 Ecosystem Services

“Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling”. (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide<sup>20</sup>:

- buffers against natural hazards such as fire and floods<sup>®</sup>
- carbon sequestration (storage), important for reducing the impacts of climate change<sup>®</sup>
- regulation of water supply<sup>®</sup>
- grazing for wild animals and livestock<sup>®</sup>
- natural spaces for recreation & tourism<sup>®</sup>
- the air we breathe<sup>®</sup>
- spiritual, ritual and ceremonies<sup>®</sup>
- horticultural & wildflower industries
- natural heritage<sup>®</sup>
- food, timber, fibre and medicinal plants<sup>®</sup>
- Rivers are central to human welfare and economic development. They provide:
  - water for agricultural, industrial and domestic uses<sup>®</sup>
  - flood attenuation and regulation<sup>®</sup>
  - food and medicinal plants<sup>®</sup>
  - transport and/or purification of biodegradable wastes<sup>®</sup>
  - tourism, recreational and cultural use<sup>®</sup>
- enhanced property values

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use and craft materials
- enhanced property values

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

- support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g., fire, pollination, seed dispersal), in response to global climate change.
- are important areas for storing carbon to reduce the impacts of global climate change.
- are important areas for regulating water supply (e.g., filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments)
- supply good quality water from mountain catchment areas, both surface and groundwater.

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<sup>20</sup> Within the study area, terrestrial ecosystem services are marked (®).

- the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services).
- are of important scenic value, contributing to tourism and the ‘sense of place’.<sup>®</sup>
- Coastal & marine areas
- Subsistence & commercial fishing (food)
- Medicinal & Cosmetic resources e.g., kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
- Mining (sand and heavy mineral)
- Recreational value (sport and fishing)
- Retail value (market-value of housing)<sup>®</sup>

Net Primary production<sup>®</sup>: This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations’ ability to maintain this ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production: In more arid areas, many municipalities and towns rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges: Global climate change is undoubtedly a threat in the coming decades. A key action to mitigate its effects is the maintenance of species’ ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climatic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

#### 7.5.4 Ecological Support Areas

These include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. The ESA’S are not well defined in the ECBCP (refer to Section 2.1.4). ESAs are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.



## 7.5.5 Critical/Important Terrestrial Habitats

Special Habitats include areas that are rare within a region, or which support important species, ecosystems or ecological processes. Species of Conservation Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such red data species that are under threat of extinction.

## 7.5.6 Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations (“the Regulations”) which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

### Eradication protocol

The act required the removal of these species, being the responsibility of the landowner, as described in Table 12 below.

Table 12: Legislation regarding invasive alien species.

The National Environmental Management Act: Alien and Invasive Species Act (18 September 2020) stipulates the following:

**6. Control measures**

(1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.

(2) Such control measures may relate to –

(1) the control of weeds and invader plants.

(3) A control measure may –

(a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).

(5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.

In this regard, Government Notice R. 598 – National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:

**CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES**

**2. Category 1a: Listed Invasive Species**

(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.

(2) A person in control of a Category 1a Listed Invasive Species must-

(a) comply with the provisions of section 73(2) of the Act.

(b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and

© allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.

If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

**3. Category 1b: Listed Invasive Species**

(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

**4. Category 2: Listed Invasive Species**

(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.

(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

#### **5. Category 3: Listed Invasive Species**

(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

#### CHAPTER 7: ISSUING, AMENDMENT AND CANCELLATION OF PERMITS

##### 29. Sale or transfer of alien and listed invasive species

(1) If a permit-holder sells a specimen of an alien or listed invasive species or sells the property on which a specimen of an alien or listed invasive species is under the permit-holder's control, the new owner of such specimen or such property must apply for a permit in terms of Chapter 7 of the Act.

(2) The new permit-holder contemplated in sub-regulation (1) will be subject to the same conditions as the permit-holder who has sold the specimen of an alien or listed invasive species, or the property on which a specimen of an alien or listed invasive species occurs, unless specific circumstances require all such permit conditions to be revised, in which case full reasons must be giving in writing by the issuing authority.

(3) The seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.

#### CHAPTER 9: COMPLIANCE AND ENFORCEMENT

##### 35. Offences and penalties

(1) Any offence committed in terms of section 101 of the Act shall, upon conviction, carry the penalties referred to in section 102 of the Act.

(2) Any person who contravenes or fails to comply with a provision of these regulations is guilty of an offence and is liable, on conviction, to-

(a) a fine not exceeding five million rand, and in the case of a second or subsequent conviction, to a fine not exceeding R 10 million; or

(b) imprisonment for a period not exceeding 10 years; or

© to both such fine and imprisonment.

The seller of any immovable property must also, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed IAPs on the property. Property sales agreements dated 1 October 2014 and onwards, should also incorporate a clause in terms of which the purchaser acknowledges that he has acquainted himself with the extent and the nature of the property he is buying and that he accepts the property as such, including the vegetation on the property.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the construction EMP, and a detailed action plan compiled and implemented by the ECO. Any seed-bearing material is to be disposed of at a registered landfill.

## 7.6 Appendix E: Abbreviations & Glossary

### 7.6.1 Abbreviations

CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DEA	Department of Environmental Affairs ( <i>now DFFE, see below</i> )
DFFE	The Department of Environmental Affairs (DEA) was renamed the <u>Department of Forestry and Fisheries and the Environment</u> (DFFE), incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries.
DEMC	Desired Ecological Management Class
DWS	Department of Water Affairs and Sanitation
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LM	Local Municipality
masl	meters above sea level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forests Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
RDL	Red Data List
RHS	Right Hand Side
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SoER	State of the Environment Report
SSC	Species of Special Concern
ToPS	Threatened of Protected Species
ToR	Terms of Reference
+ve	Positive
-ve	Negative

## 7.6.2 Glossary

Alien Invasive Species (AIS)	An alien species whose introduction and/or spread threaten biological diversity ( <a href="#">Convention on Biological Diversity</a> ). Note: “ <i>Alien invasive species</i> ” is considered to be equivalent to “ <i>invasive alien species</i> ”. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity ( <a href="#">IUCN</a> ).
Best Environmental Practice	The application of the most appropriate combination of environmental control measures and strategies ( <a href="#">Stockholm Convention</a> ).
Best Management Practice	Established techniques or methodologies that, through experience and research, have proven to lead to a desired result ( <a href="#">BBOP</a> ).
Biodiversity	Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Biodiversity Offset	Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people’s use and cultural values associated with biodiversity ( <a href="#">BBOP</a> ).
Bioremediation	The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.
Boundary	Landscape patches have a boundary between them which can be defined or fuzzy ( <a href="#">Sanderson and Harris, 2000</a> ). The zone composed of the edges of adjacent ecosystems is the boundary.
Connectivity	The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.
Corridors	Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems, or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as “steppingstones” that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Critically Endangered (CR)	A category on the IUCN Red List of Threatened Species which indicates a taxon is facing an extremely high risk of extinction in the wild ( <a href="#">IUCN</a> ).
Cultural Ecosystem Services	The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values ( <a href="#">Millennium Ecosystem Assessment</a> ).
Cumulative Impacts	The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project’s impact is therefore one part of the total cumulative impact on the environment. The analysis of a project’s incremental impacts combined with

	the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation ( <a href="#">BBOP</a> ).
Data Deficient (DD)	A <u>taxon is Data Deficient</u> when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat( <a href="#">IUCN</a> ).
Degraded Habitat/Land	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
Disturbance	An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.
Ecological Processes	Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.
Ecosystem Status	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving most species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem ( <a href="#">Millennium Ecosystem Assessment</a> ).
Ecosystem Services	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Ecosystem	All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecotone	The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of

	ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone.
Edge	The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.
Emergent Tree	Trees that grow above the top of the canopy
Endangered (En)	<u>Endangered terrestrial ecosystems</u> have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. <u>A taxon (species)</u> is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a <u>very high risk</u> of extinction in the wild ( <u>IUCN</u> ).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Exotic	Non-indigenous; introduced from elsewhere, may also be a <i>weed</i> or alien <i>invasive</i> species. Exotic species may be invasive or non-invasive.
Ecological Structure	The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.
Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.
Ecological Pattern	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.
Ecological Process	Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]



Fragmentation (Habitat Fragmentation)	The ‘breaking apart’ of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs.
Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time ( <a href="#">IEEP</a> ).
Habitat	The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.
IFC PS6	<a href="#">International Finance Corporation Performance Standard 6</a> – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous Species (Native species)	A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times ( <i>Bern Convention 1979</i> ). A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal systems</u> ( <i>modified after the Convention on Biological Diversity</i> )
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project’s own operations ( <a href="#">BBOP</a> )
Intact Habitat / Vegetation	Land that has not been significantly impacted upon by man’s activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.
Keystone Species	Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems ( <a href="#">Millennium Ecosystem Assessment</a> ).
Landscape Approach	Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations ( <a href="#">FAO</a> ).
Landscape connectivity	The degree to which the landscape facilitates or impedes movement among resource patches.
Least threatened / Least Concern (LC)	These <u>ecosystems</u> have lost only a small proportion (more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).

	A <u>taxon (species)</u> is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category ( <i>IUCN</i> ).
Matrix	The “ <i>background ecological system</i> ” of a landscape with a high degree of connectivity.
Natural Forest (Indigenous Forest)	<p>The definition of “<i>natural forest</i>” in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: ‘A natural forest means a group of indigenous trees • whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2)</p> <p>This definition should be read in conjunction with Section 2(1)(x) which states that ‘Forest’ includes:</p> <ul style="list-style-type: none"> <li>• A natural forest, a woodland, and a plantation</li> <li>• The forest-produce in it; and</li> <li>• The ecosystems which it makes up.</li> </ul> <p>The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (<i>Podocarpus latifolius</i>) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as:</p> <ul style="list-style-type: none"> <li>• A generally multi-layered vegetation unit</li> <li>• Dominated by trees that are largely evergreen or semi-deciduous</li> <li>• The combined tree strata have overlapping crowns, and crown cover is &gt;75%</li> <li>• Grasses in the herbaceous stratum (if present) are generally rare</li> <li>• Fire does not normally play a major role in forest function and dynamics except at the fringes</li> <li>• The species of all plant growth forms must be typical of natural forest (check for indicator species)</li> <li>• The forest must be one of the national forest types</li> </ul>
Near Threatened (NT)	A <u>taxon (species)</u> is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future ( <i>IUCN</i> ).
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.
Protected Area	A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Range restricted species	<p>Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EOO):</p> <ul style="list-style-type: none"> <li>• For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km<sup>2</sup>).</li> </ul>
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Resilience	The capacity of a natural system to recover from disturbance ( <i>OECD</i> ).
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised.

	Rehabilitation emphasizes the reparation of ecosystem processes, productivity, and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure ( <a href="#">BBOP</a> ).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions ( <a href="#">IFC</a> ).
Riparian	Pertaining to, situated on, or associated with the banks of a watercourse, usually a river or stream.
River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs ( <a href="#">WCED</a> ).
Terrestrial	Occurring on, or inhabiting, land.
Threatened Species	Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species ( <a href="#">IUCN</a> ). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate ( <a href="#">EU</a> ).
Traditional Ecological Knowledge	Knowledge, innovations, and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry ( <a href="#">CBD</a> ).
Transformation	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon because of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary	A small stream or river flowing into a larger one.
Untransformed Habitat/Land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.

Vulnerable (Vu)	<p><u>Vulnerable terrestrial ecosystems</u> have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.</p> <p>A <u>taxon (species)</u> is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (<i>IUCN</i>).</p>
Watercourse	<p>Natural or man-made channel through or along which water may flow.</p> <p>A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake, or dam into which, or from which, water flows.</p> <p>and a reference to a watercourse includes, where relevant, its bed and banks;</p>
Weed	<p>An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.</p>
Wetlands	<p>A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.</p>
Catchment	<p>In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.</p>
Estuary	<p>a partially or fully enclosed body of water -</p> <p>(a) which is open to the sea permanently or periodically; and</p> <p>(b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.</p>
Instream habitat	<p>Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;</p>
Riparian Habitat	<p>Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.</p>

## 7.7 Appendix F: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed will be managed / controlled as set out under mitigating measures and as detailed in this section for the more significant impacts during the operational phase.

### 7.7.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation should be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site must be done as described in the Rehabilitation Plans.

#### *Flora search and Rescue*

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of Conservation Concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

### 7.7.2 Alien and Invasive Plan Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.

- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

### 7.7.3 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor must strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making must be strictly prohibited.
- The Contractor should take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor must ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor must supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” must be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area must be away from flammable stores. All events must be under management’s supervision and a fire extinguisher will be immediately available. “Low-smoke” fuels must be used (e.g., charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

### 7.7.4 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

### 7.7.5 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register will be developed.
- If required, water spray vehicles will be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens should be used to reduce wind and dust in open areas.

### 7.7.6 Infrastructural Requirements

#### Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

#### Stormwater and Erosion Control

- Stormwater Management Plans must be developed for the site and should include the following:
  - The management of stormwater during construction.
  - The installation of stormwater and erosion control infrastructure.
  - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater must be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes should be profiled at a maximum 1:3 gradient.
- Diversion channels should be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation must be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

#### Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

#### Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.

- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity.

### Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previously stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

### Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This *must* be done in conjunction with the ECO.
- Final rehabilitation *must* comply with the requirements mention in the Rehabilitation Plan.

## 7.7.7 Rehabilitation Plan

### Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:



- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

### Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contrast to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

### Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

Botanical name	Common name	Approx seed mixture /Ha
<i>Cynodon dactylon</i>	Kweek	12 kg/ Ha
<i>Eragrostis curvula</i>	Weeping Love Grass	6 kg/ Ha
<i>Eragrostis tef</i>	Teff	2 kg/ Ha
<i>Digitaria eriantha</i>	Smuts Grass	4 kg/ Ha
<b>Other indigenous veld grasses can be added to the seed mix</b>		$\pm$ 4 kg/Ha

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system
- Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

### Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.

- Areas to be disturbed in future activities will be kept as small as possible (i.e., conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

### Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas

## 7.7.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

## 7.7.9 Closure objectives and extent of alignment to pre-construction environment

### Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

## 7.8 Appendix G: Specialist Declaration, Profile & Registration



### forestry, fisheries & the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 899 9000, Fax: +27 86 625 1042

### **SPECIALIST DECLARATION FORM – AUGUST 2023**

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### REPORT TITLE

FE Kudu Wind Energy Facility, Eastern Cape Province

#### Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.dffe.gov.za/documents/forms>.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with 'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020', where applicable.

#### 1. SPECIALIST INFORMATION

Title of Specialist Assessment	Terrestrial Biodiversity Assessment
Specialist Company Name	
Specialist Name	Jamie Pote
Specialist Identity Number	740515 5152 089
Specialist Qualifications:	BSc (Hons)
Professional affiliation/registration:	SACNASP
Physical address:	
Postal address:	Postnet Suite 57, P Bag X13130, Humewood, Port Elizabeth
Postal address	
Telephone	
Cell phone	076 888 9890
E-mail	jamiepote@gmail.com

**SPECIALIST DECLARATION FORM – AUGUST 2023****2. DECLARATION BY THE SPECIALIST**

I, Jamie Pote declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements 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 (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

N/A

Name of Company:

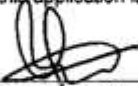
18 Aug 2023

Date

**SPECIALIST DECLARATION FORM – AUGUST 2023**

**3. UNDERTAKING UNDER OATH/ AFFIRMATION**

I, Jamie Pote, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

N/A

Name of Company

18 August 2023

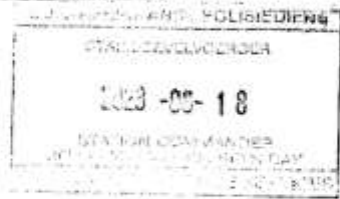
Date



Signature of the Commissioner of Oaths

2023-08-18

Date





**herewith certifies that**  
**Jamie Robert Claude Pote**  
Registration Number: 115233  
**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act, 2003  
(Act 27 of 2003)  
in the following field(s) of practice (Schedule 1 of the Act)  
Ecological Science (Professional Natural Scientist)

Effective **20 July 2016**

Expires **31 March 2024**



Chairperson

Chief Executive Officer



To verify this certificate scan this code



## Jamie Pote

BIODIVERSITY ADVISOR, ECOLOGIST AND ENVIRONMENTAL SCIENTIST

### CONTACT

-  (+27) 76 888 9890
-  [jamiépote@live.co.za](mailto:jamiépote@live.co.za)
-  Port Elizabeth, South Africa
-  [linkedin.com](https://www.linkedin.com/in/jamiépote)
-  JamiePote
-  [Bluesky-SA](https://github.com/Bluesky-SA)

### EDUCATION

- Bachelor of Science  
*Rhodes University*  
2002 (Botany & Environmental Science)
- Bachelor of Science (Honours)  
*Rhodes University*  
2003 (Botany)
- Professional Natural Scientist  
*SACNASP: 2016 (Ecological Science)*

### SERVICES

*Terrestrial Biodiversity Specialist Assessments*  
*IFC PS6 Biodiversity & Critical Habitat Assessments*  
*Terrestrial Biodiversity Compliance Statements*  
*Geographic Information Systems*  
*Environmental Management Plans & Programmes*  
*Environmental Compliance & Monitoring*  
*Independent Environmental & Ecological reviews*  
*Bioremediation, Restoration & Rehabilitation Plans*  
*Permit and License applications (Flora & Fauna)*  
*Flora Search & Rescue Plans & Relocations*  
*Invasive Alien Plant Control & Management Plans*  
*Environmental & Mining Applications*

### ABOUT ME

*18 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 250 projects in southern, western and central Africa. Environmental Assessment Practitioner on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. Advanced GIS mapping tools and Analysis.*

### EXPERIENCE AND CLIENTS

#### Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

#### Key Projects

- *Over 250 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Basic Assessments, Mining applications and compliance monitoring on over 50 projects for various clients including the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape, including over 300 individual borrow pits.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Pre-Construction compliance.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing clients.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*

24/06/2021

**PROJECT EXPERIENCE****ENERGY PROJECTS (WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE)**

• Terrestrial Biodiversity Screening for proposed WEF, Beaufort West, Western Cape (ZA)	2023
• Terrestrial Biodiversity Walkdown for Koup 1 & 2 WEF, Beaufort West, Western Cape (ZA)	2023
• Terrestrial Biodiversity Assessment for Harmony Kalgold PV, Mahikeng, North West (ZA)	2022
• Terrestrial Biodiversity Assessment for Bonsmara PV, Kroonstad, Free State (ZA)	2023
• Terrestrial Biodiversity Screening for proposed WEF, Springbok, Northern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Harmony Chemwes PV, Klerksdorp, North West (ZA)	2022
• Terrestrial Biodiversity Assessment for Harmony Target PV, Welkom, Free State (ZA)	2022
• Terrestrial Biodiversity Assessment for MTN Mast, Louterwater, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for MTN Mast, Mount Stewart, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for MTN Mast, Pearston, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for MTN Mast, Roussouw, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Screening for proposed PV & WEF, Beaufort West, Western Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for WKN Soutrivier WEF, Victoria West, Northern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for WKN Taaibos WEF, Victoria West, Northern Cape (ZA)	2022
• Terrestrial Biodiversity Screening for proposed PV, Beaufort West, Western Cape (ZA)	2022
• Terrestrial Biodiversity Screening for proposed WEF & PV, Secunda, Mpumalanga (ZA)	2022
• Terrestrial Biodiversity Screening for proposed WEF, Standerton, Mpumalanga (ZA)	2022
• Terrestrial Biodiversity Walkdown for Phezukomoya WEF, Noupoort, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Walkdown for San Kraal WEF, Noupoort, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Walkdown for Hartebeeshoek WEF, Noupoort, Eastern Cape (ZA)	2023
• Terrestrial Biodiversity Amendment for Banna ba Pifhu WEF, Humansdorp, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Seekoei PV, Middleburg, Northern Cape (ZA)	2022
• Terrestrial Biodiversity Screening for proposed PV, Kroonstad, Free State (ZA)	2022
• Terrestrial Biodiversity Assessment for Paulputs WEF, Pofadder, NC (ZA)	2021
• Terrestrial Biodiversity Assessment for Komas WEF, Kleinsee, NC (ZA)	2021
• Preliminary Biodiversity Screening and GIS mapping for Balekani Photovoltaic Solar Project (SZ)	2020
• Preliminary Biodiversity Screening and GIS mapping for Sihoye Photovoltaic Solar Project (SZ)	2020
• Preliminary Biodiversity Screening and GIS mapping Mpaka Photovoltaic Solar Project (SZ)	2020
• Preliminary Biodiversity Screening and GIS mapping for Chiwelwa Hydroelectric project (ZM)	2020
• Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape	2020
• Ecological Assessment for Windcurrent Wind Farm, Eastern Cape	2012
• Ecological Assessment for Universal Windfarm, NMB (ZA)	2011
• Ecological Assessment for Inca Energy Windfarm, Northern Cape	2011
• Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape	2011
• Botanical Assessment for Electrawinds Windfarm Coega, NMB	2010

**TERRESTRIAL BIODIVERSITY ASSESSMENTS AND COMPLIANCE STATEMENTS**

• Terrestrial Biodiversity Assessment for Glen Ewan Private School, Komani (ZA)	2023
• Terrestrial Biodiversity Assessment for Hard Rock Agriculture, Addo, EC (ZA)	2022
• Terrestrial Biodiversity Assessment for Coegakammakloof Chicken Houses, Addo, EC (ZA)	2022
• Terrestrial Biodiversity Assessment for Umziwabantu Agriculture, Addo, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Compliance Statement for Middeldrift PV, Addo, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Compliance Statement for Disco PV, Addo, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Mbashe AmaXhosa Royal House, Mbashe, Eastern Cape	2022
• Terrestrial Biodiversity Assessment for Nordex Roggeveld CTF, Western Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Erf 805 Amsterdamhoek, Eastern Cape (ZA)	2022



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• Terrestrial Biodiversity Assessment for Addo Fuel Depot, Addo, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Tsomo WTW, CHDM, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Beacon Bay Memorial Park, Buffalo City, Eastern Cape	2022
• Terrestrial Biodiversity Assessment for Ph 5 Nxamagale Reservoir & Pipeline, CHDM, EC (ZA)	2022
• Terrestrial Biodiversity Assessment for Ph 9 Water Pipeline to Sada WTW, Hewu, Eastern Cape	2022
• Terrestrial Biodiversity Assessment for Erf 5707 Beacon Bay, Buffalo City, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Erf 8077 Uitenhage Fuel Station, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Farm 3/599 Buffalo City, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Sontule Citrus expansion, Addo, Eastern Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Kurland WTW and Pipeline, Western Cape (ZA)	2022
• Terrestrial Biodiversity Assessment for Addo Offices, Addo, Eastern Cape (ZA)	2021
• Terrestrial Biodiversity Assessment for Blaauwater Farms, Eastern Cape	2021
• Terrestrial Biodiversity Assessment for Buffelshoek Farm, Loerie, Eastern Cape	2021
• Terrestrial Biodiversity & Aquatic Assessment & Review, Falcon Ridge Dam, Addo, EC	2021
• Terrestrial Biodiversity Assessment for Gubenxa Valley Deciduous Fruit, Eastern Cape	2021
• Terrestrial Biodiversity Assessment (Little Chelsea Mixed-use)	2021
• Terrestrial Biodiversity Compliance Statement (Maldenhead Farm)	2021
• Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project Grid Interconnection	2021
• Terrestrial Biodiversity Compliance Statement (Lahlangubo River Bridge)	2021
• Terrestrial Biodiversity Assessment (Mbashe access roads - 3 sites)	2021
• Terrestrial Biodiversity Assessment for Burlington Farm Citrus Development, Cookhouse, EC	2020
• Terrestrial Biodiversity Compliance Statement: CHDM Cluster 9 Phase 3D Pipeline	2020
• Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project BESS	2020
• Terrestrial Biodiversity Assessment (Mbashe housing projects, Dutywa & Willowvale)	2020
• Terrestrial Biodiversity Assessment (Helpmekaar Dam, Tarkastad)	2020
• Terrestrial Biodiversity Assessment (Herbertsdale pipeline, Mossel Bay)	2020
• Terrestrial Biodiversity Assessment (Keurbooms Erf 155, Keurboomstrand)	2020
• Terrestrial Biodiversity Assessment (Lowmar Hydroelectric Project, Cradock)	2020
• Terrestrial Biodiversity Assessment (Mossel Bay Gas Power Plant)	2020
• Terrestrial Biodiversity Assessment (Erf 1820, Mthatha)	2020
• Terrestrial Biodiversity Assessment (Newlyn Manganese Terminal, Coega SEZ)	2020
• Terrestrial Biodiversity Assessment Thornhill Phase 2 Sanitation Link	2020
• Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape	2010

#### PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS (IEC PS6)

• DBSA Environmental & Social Safeguards Standards 9: Biodiversity Conservation and Sustainable Management Assessment: The Ilitha Fibre Project, Ethekwini	2021
• Critical Habitat & Biodiversity Assessment - Krusevallei Hydroelectrical Energy Project	2020
• Critical Habitat & Biodiversity Assessment & Walkdown- Brandvallei WEF, Northern Cape	2021
• Critical Habitat & Biodiversity Assessment & Walkdown- Rietkloof WEF, Northern Cape	2021
• Critical Habitat & Biodiversity Assessment & Walkdown- Karreebosch Grid Connection, NC	2021
• Critical Habitat & Biodiversity Assessment & Walkdown- Karreebosch WEF, Northern Cape	2021
• Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project	2020
• Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo	2008

#### SPECIALISED ECOLOGICAL REPORTS AND REVIEWS

• Section 24G Assessment and Rehabilitation Plan for Burlington Farm, Cookhouse, Eastern Cape	2022
• Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Cape Town, Western Cape (ZA)	2022
• Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Buffalo City, Eastern Cape (ZA)	2022

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• Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Gqeberha, Eastern Cape (ZA)	2022
• Rebels Vlei Riparian delineation, Kirkwood, Eastern Cape	2021
• Buck Kraal Dam Rehabilitation Plan Review, Addo, Eastern Cape	2020
• Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMB	2015
• Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape	2014
• Mapping and Ecological services for Congo Agriculture, Republic of Congo	2013
• Rehabilitation Plan for Nieu Bethesda, Eastern Cape	2011
• Mapping of pipeline for Kenton Water Board, Eastern Cape	2010
• Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB	2010
• Representative for landowner group for Seaview burial Park, NMB	2010
• Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB	2008
• Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape	2007
• Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape	2006
• Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape	2003

#### ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

• Terrestrial Biodiversity Amendment for Transnet/Portnet CDC SEZ Mn Terminal	2023
• Terrestrial Biodiversity Assessment for Machani to Taleni SPS Access Road (SPM)	2022
• Terrestrial Biodiversity Assessment for Matonga to Mantlaneni Access Road (SPM)	2022
• Terrestrial Biodiversity Assessment for Newlyn Mn Terminal & conveyor (CDC IDZ), NMB	2021
• Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB	2013
• Ecological Assessment Review for Penhoek Road widening, Eastern Cape	2012
• Ecological Assessment for R61 road widening, Eastern Cape	2012
• Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB	2010
• Botanical Assessment for Motherwell - Blue Water Bay Road, NMB	2010
• Ecological Assessment for Port St John Road, Eastern Cape	2010
• Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape	2009
• Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB	2009
• Botanical Assessment for Manganese Conveyor Screening Report, NMB	2008
• Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape	2006

#### MINING PROJECTS

• Ecological Assessment for Bochum Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines)	2013
• Ecological Assessment for Thulwe Road Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana	2010
• Botanical Assessment for Zwartenbosch Quarry, Eastern Cape	2008
• Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape	2008
• Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape	2008
• Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape	2008
• Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape	2008
• Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo	2008
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape	2008

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• Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape	2008
• Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape	2008
• Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape	2008
• Regional Botanical Map for mining prospecting permit, Welkom	2008
• Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit – Jeffreys Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms River/Kareedouw, Eastern Cape	2007
• Biophysical Assessment for Humansdorp Quarry, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB	2006
• GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape	2006
• Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo	2006
• Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape	2006

POWERLINE INFRASTRUCTURE PROJECTS

• Terrestrial Biodiversity Assessment for Paulputs WEF Grid connection, Pofadder, NC (ZA)	2021
• Terrestrial Biodiversity Assessment for Komas WEF Grid connection, Kleinsee, NC (ZA)	2021
• Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM	2016
• Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM	2016
• Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline, NC	2015
• Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape	2013
• Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, EC	2012
• Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB	2012
• Botanical Assessment for Dedisa-Grassridge Powerline, EC	2010
• Ecological Assessment for Grahamstown-Kowie Powerline, EC	2010
• Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB	2009
• Botanical Assessment for Eskom Powerline - Albany-Kowie, EC	2009
• Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB	2006
• Botanical Assessment for Eskom Power line – Tylara-Wilo, Eastern Cape	2006
• Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape	2004

PIPELINE INFRASTRUCTURE PROJECTS

• Terrestrial Biodiversity Assessment for Hewu Phase 9 Raw Water Pipeline to Sada WTW	2022
• Terrestrial Biodiversity Assessment for CHDM Ph 5 Nxamagale Reservoir & Pipeline (ZA)	2022
• Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape	2020
• Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3)	2018
• Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme	2017
• Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey)	2017
• Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape	2016

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• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4)	2013
• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2013
• Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng	2012
• Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape	2010
• Basic Botanical Assessment for Chatty Sewer, NMB	2010
• Species of Special Concern Mapping for Seaview Pipeline, NMB	2009
• Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB	2009
• Map Production for Russell Rd Stormwater, NMB	2008
• Basic Botanical Assessment for Albany Pipeline, Eastern Cape	2008
• Environmental Risk Assessment for Elands River pipeline, Eastern Cape	2007
• Detailed Botanical Assessment for Motherwell Pipeline, NMB	2007
• Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape	2007
• Botanical & Floristic Report for Hankey pipeline, Eastern Cape	2006
• Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape	2004

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

• Ecological Assessment for Amalinda crossing, BCM, Eastern Cape	2019
• Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape	2019
• Ecological Assessment for Nelson Mandela University Access Road, NMB	2019
• Botanical Assessment for Zachtevlei Dam (Lady Grey), Eastern Cape	2017
• Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape	2017
• Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape	2012
• Botanical Assessment for Jansenville Cemetery, Eastern Cape	2009
• Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB	2008
• Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape	2007
• Botanical Assessment for PE Airport Extension, NMB	2006
• Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape	2006

HOUSING DEVELOPMENT PROJECTS

• Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape	2020
• Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Ecological Assessment Portion 21-23 and 41 of Farm 807, Gonubie, Buffalo City	2019
• Ecological Assessment for Emerald Sky Housing Project, BCMM	2019
• Ecological Assessment for Erf 14, Kabega, Port Elizabeth	2017
• Ecological Assessment for Fairwest Rental Housing, Port Elizabeth	2017
• Ecological Assessment for Hankey Housing, Kouga District Municipality	2015
• Ecological Assessment for Lebowakgoma Housing, Limpopo	2013
• Ecological Assessment for Giyani Development, Limpopo	2013
• Ecological Assessment for Palmietfontein Development, Limpopo	2013
• Ecological Assessment for Seshego Development, Limpopo	2013
• Botanical Assessment for Sheerness Road, BCM, Eastern Cape	2013
• Ecological Assessment for Ethembeni Housing, NMB	2012
• Ecological Assessment for Pelana Housing, Limpopo	2012
• Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape	2011
• Botanical Assessment for The Craggs 288/03, Western Cape	2010
• Ecological Assessment Revision Report for Fairview Housing, NMB	2010

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• Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape	2010
• Botanical Assessment for Little Ladywood, Western Cape	2010
• Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB	2010
• Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape	2010
• Botanical Assessment for Willow Tree Farm, NMB	2010
• Botanical Assessment for Kouga RDP Housing, Eastern Cape	2009
• Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB	2009
• Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape	2009
• Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape	2009
• Botanical Assessment for Plettenberg Bay - 438/4, Western Cape	2009
• Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape	2008
• Site screening assessment for Greenbushes Site screening, NMB	2008
• Botanical Assessment for Fairfax development, Eastern Cape	2008
• Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape	2008
• Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB	2008
• Site Screening for Mount Road, NMB	2008
• Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB	2008
• Botanical Assessment for Greenbushes 130, NMB	2008
• Botanical Assessment for Greenbushes Kuyga no. 10, NMB	2008
• Botanical Assessment for Plettenberg Bay - 438/24, Western Cape	2007
• Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape	2007
• Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape	2006
• Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape	2006
• Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape	2006
• Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM	2006
• Botanical Assessment for Bosch Hoogte, NMB	2006
• Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape	2006
• Botanical Assessment for Plettenberg Bay - 444/27, Western Cape	2006
• Botanical Assessment for Leisure Homes, BCM, Eastern Cape	2006
• Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape	2005
• Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB	2005
• Botanical Assessment for Smart Stone, NMB	2005
• Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape	2005
• Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape	2005
• Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB	2005
• Basic Botanical Assessment for Parsonslei 3/4, Eastern Cape	2005
• Botanical Assessment for Bridgemead - Malabar PE, NMB	2004

#### AGRICULTURAL PROJECTS

• Preliminary Biodiversity Screening for Chrisdelina Ranch Agricultural Project, Kizenga District	• 2020
• Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020
• Thornhill Eggland Specialist Ecological Assessment	2020
• Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Ecological Assessment for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
• Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape	2014
• Ecological Assessment for Tzaneen Chicken Farm, Limpopo	2013
• Botanical Assessment and Open Space Management Plan for Kudukloof, NMB	2010

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- Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB 2010
- Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB 2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

- Species List & Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape 2009
- Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape 2008
- Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape 2006

MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvelei Erf 984 & 1134 Parsonsvelei, NMB 2020
- Mthatha Retails and Service Center 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006

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• Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape	2006
• Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape	2006
• Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape	2006
• Botanical Assessment for Rosehill Farm, Eastern Cape	2005
• Botanical Assessment for Resolution Game Farm, Eastern Cape	2005
• Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape	2005
• Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape	2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

• Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape	2020
• Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape	2018
• Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape	2018
• Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape	2018
• Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2016
• Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2016
• Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)	2015
• Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB	2014
• Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape	2013
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)	2013
• Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB	2013
• Flora and Fauna Search and Rescue for Jeffries Bay School, Eastern Cape	2013
• Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape	2012
• Flora Relocation for Disco Poultry Farm, NMB	2010
• Flora Relocation for Mainstream Windfarm, Eastern Cape	2010

ENVIRONMENTAL MANAGEMENT PLANS

• Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandela Bay Municipality	2020
• Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality	2019
• Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape	2010
• Wetland Management Plan for NMB Portnet, NMB	2010
• Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape	2009
• Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape	2006
• EMP for Kromensee EMP (Jeffries Bay), Eastern Cape	2006
• Floral Survey for Mbotyi Conservation Assessment, Eastern Cape	2005
• Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape	2005

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

• Basic Assessment Application for Parsonsvele Erf 984 & 1134 Parsonsvele	2020
• Construction of Deviation and Rehabilitation of Bridge along DR02481 road	2020
• Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020

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• Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development	2020
• Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10	2020
• Basic Assessment Application for Nelson Mandela University Access Road, NMB	2019
• Basic Assessment, WULA and Borrow Pit/Quarry Mining Application, Clarkebury Rd, Idutywa	2019
• Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation	2019
• Basic Assessment Application for Erf 14 Kabega, NMBM	2017
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2017
• Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay	2017
• Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2015
• Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
• Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018	

#### MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

• Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape – (SANRAL)	2019
• Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)	2018
• Mining BAR/EMP's for Bavians LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Inkwanca (Enoch Mgiijima) LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Blue Crane Route & Camdeboo LM 12 Borrow Pits – (DoT)	2016
• Mining BAR/EMP's for Elundini LM 6 Borrow Pits (DoT)	2016
• Mining BAR/EMP's for Bavians LM 6 Borrow Pits (DoT)	2016
• Mining BAR/EMP's for Kouga & Koukamma LM 12 Borrow Pits (DoT)	2016
• Mining BAR/EMP's for Sakhisizwe & Engcobo LM 12 Borrow Pits (DoT)	2016
• Mining BAR/EMP's for Senqu LM 12 Borrow Pits (DoT)	2016
• Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Ikwezi/Bavians LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits – Intsika Yethu and Emalahleni (DRPW)	2015
• Mining BAR/EMP's for Joe Gqabi DM Borrow Pits – Senqu (DRPW)	2015
• Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Amahlathi LM Borrow Pits – Amatole (DRPW)	2015
• Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits – Amatole (DRPW)	2015



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• Mining BAR/EMP's for Sundays River Valley LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Kouga LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 – Matatiele (DRPW)	2014

**ENVIRONMENTAL COMPLIANCE AUDITING**

• Environmental Compliance Audit (Habata Boerdery)	2021
• Environmental Compliance Audit (Sontule Farm)	2021

**ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS**

• Environmental Auditing Services Construction (Intsomi Citrus)	2021
• Environmental Auditing Services Pre-construction and Construction (Rocky Coast Farm)	2021
• Environmental Auditing Services (Middledrift Breeder Facility)	2021
• Coega Aquaculture Development Zone Environmental Compliance and Monitoring for Construction (24 Months)	2020
• Construction of NMU West End Student Residences Phases 1 & 3 Environmental Control Office (30 Months)	2020
• Environmental Auditing and construction monitoring for construction of Phase 1 River Park (South End Precinct)	2020
• Waste Management License audit for Bedford Recycling project	2020
• Auditing for Construction of Fairwest Village Housing Project	2019
• Auditing for Construction of Utopia Estate monthly auditing	2019
• ECO for DRPW IRM Road Maintenance projects, Bavians LM	2019
• ECO for DRPW IRM Road Maintenance projects, Senqu LM	2019
• ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM	2019
• ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM	2019
• ECO for DRPW IRM Road Maintenance projects, Elundini LM	2019
• ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM	2019
• ECO for Construction of Fairwest Village Housing Project	2019
• ECO for Construction of Utopia Estate Mixed Use Project	2019
• ECO for Construction of NMU West End Student Residences Phases 1 & 3	2019
• ECO for Construction of Eco-Pullets pullet rearing facility, Paterson	2018
• ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM	2018
• ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgijima) LM	2018
• ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2017
• ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts	2017
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2017
• ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL)	2016
• Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbashe LM	2016

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• ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Senqu LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Elundini LM	2016
• ECO and Environmental Management for closure of Bushmans River Landfill site	2016
• ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's	2015
• ECO for Riversbend Citrus Farm, NMB	2014
• ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA	2014
• ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba	2014
• EMP and ECO for Utopia Estate, NMB	2013
• Final EMP submission for Seaview Garden Estate, NMB	2012
• ECO audits for NMB Road surfacing, NMB (multiple contacts)	2011
• EMP submission and ECO for Seaview Garden Estate, NMB	2010
• ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape	2010
• EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape	2009
• Flora Relocation Plan and Permit application for Wildemans Plaas, NMB	2006

#### ENVIRONMENTAL SCREENING PROJECTS

• Somerset East Stormwater Environmental Screening Report	2021
• Woodlands Diary Road Upgrade Environmental Screening Report, Kouga LM	2021
• Risk Assessment and Screening for proposed Heatherbank access road, NMB	2020
• Environmental Screening Report for Proposed Life Hospital parking expansion, NMB	2019
• Environmental Screening Report for Erf 984 & 1134 development, Parsonsvelel, NMB	2019
• Environmental Screening Report for proposed Khayaletu School, Buffalo City	2018
• Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB	2016
• Environmental Screening Report for Development of Little Chelsea No 25, NMB	2016
• Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)	2015
• Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth	2015
• Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe	2015
• Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth	2015
• Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate	2015
• Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB	2015

#### SECTION 24G APPLICATIONS

• 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)	2015
• Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape	2015

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CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. *Fuelwood harvesting and selection in Valley Thicket, South Africa*. *Journal of Arid Environments*, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. *The homegarden cultivation of indigenous medicinal plants in the Eastern Cape*. *Indigenous Plant Use Forum*, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. *The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. *The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape*. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch, South Africa.

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuys & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in *Cyphia* (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

## 7.9 Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

### SCOPE

The protocol (*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 (GN 320, 20 March 2020)*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*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 NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation<sup>21</sup>.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute<sup>22</sup>.

### SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken using:
  - a. a desk top analysis, using satellite imagery,
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.
  - b. contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and

<sup>21</sup> The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

<sup>22</sup> The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on the screening tool).

- c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

## TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.	✓
1.3	However, where the information gathered from the site sensitivity verification differs from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.	✓
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.	✓
1.5	If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.	✓
	<b>VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features</b>	
2	Terrestrial Biodiversity Specialist Assessment	
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.	✓
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	✓
2.3.1	a description of the ecological drivers or processes of the system and how the proposed development with impact these;	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
2.3.2	ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	✓
2.3.3	the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	✓
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);	✓
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	✓
(a)	main vegetation types;	✓
(b)	threatened ecosystems, including fisted ecosystems as well as locally important habitat types identified;	✓
(c)	ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and	✓
(d)	species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	✓
2.3.6	the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	✓
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
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 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;	✓
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;	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
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;	✓
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 I network;	✓
2.3.7.5	Strategic Water Source Areas (SWSAs) including:	✓
(a)	the impact(s) on the terrestrial habitat of 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),	✓
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;	✓
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.	✓
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report	✓
3	Terrestrial Biodiversity Specialist Assessment Report	
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	✓
3.1.1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,	✓
3.1.4	description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;	✓
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	✓
3.1.6	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	✓
3.1.7	additional environmental impacts expected from the proposed development;	✓
3.1.8	any direct, indirect, and cumulative impacts of the proposed development;	✓
3.1.9	the degree to which impacts, and risks can be mitigated;	✓
3.1.10	the degree to which the impacts and risks can be reversed;	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
3.1.11	the degree to which the impacts and risks can cause loss of irreplaceable resources;	✓
3.1.12	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),	✓
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,	✓
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 a not; and	✓
3.1.15	any conditions to which this statement is subjected.	✓
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
<b>LOW SENSITIVITY RATING – for terrestrial biodiversity features</b>		
4	Terrestrial Biodiversity Compliance Statement	✓
4.1	The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.	✓
4.2	The compliance statement must:	✓
4.2.1	be applicable to the preferred site and proposed development footprint;	✓
4.2.2	confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and	✓
4.2.3	indicate whether or not the proposed development will have any impact on the biodiversity feature.	✓
4.3	The compliance statement must contain, as a minimum, the following information:	✓
4.3.1	the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	✓
4.3.2	a signed statement of independence by the specialist;	✓
4.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
4.3.4	a baseline profile description of biodiversity and ecosystems of the site;	✓
4.3.5	the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;	✓
4.3.6	in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures propped, the land can be returned to the current state within two years of completion of the construction phase;	✓



<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
4.3.7	where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	✓
4.3.8	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
4.3.9	any conditions to which this statement is subjected.	✓
4.4	A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓

#### ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Compliance Statement.	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial animal species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	area on which the proposed development will take place and includes the area that will be disturbed or impacted.	
1.7	The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.	✓
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline <sup>23</sup> , and the study area must include the PAOI, as determined.	✓
	<b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species</b>	
2	Terrestrial Animal Species Specialist Assessment	✓
	<p><b>VERY HIGH SENSITIVITY RATING</b>            Critical habitat for range-restricted species<sup>24</sup> of conservation concern, that have a global range of less than 10 km<sup>2</sup>.            SCC listed on the IUCN Red List of Threatened Species<sup>25</sup> or on South Africa's National Red List website<sup>26</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.            Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.            The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.            These areas are irreplaceable for SCC.</p> <p><b>HIGH SENSITIVITY RATING</b>            Confirmed habitat for SCC.            SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.            These areas are unsuitable for development due to a very likely impact on SCC.</p>	✓
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a	✓

<sup>23</sup> Available at <https://bgis.sanbi.org/>

<sup>24</sup> Species with a geographically restricted area of distribution.

<sup>25</sup> <https://www.iucnredlist.org/>

<sup>26</sup> This category includes the categories Extremely Rare, Critically Rare, and Rare

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	field of practical experience relevant to the taxonomic group (“taxa”) for which the assessment is being undertaken.	
2.2	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline <sup>27</sup> ; and must:	✓
2.2.1	identify the SCC which were found, observed or are likely to occur within the study area;	✓
2.2.2	provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility <sup>28</sup> , immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓
2.2.3	identify the distribution, location, viability <sup>29</sup> and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.2.4	identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area;	✓
2.2.5	determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	✓
2.2.6	determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	✓
2.2.7	include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation;	✓
2.2.8	identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓
2.2.9	identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability;	✓
2.2.10	determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;	✓
2.2.11	discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species <sup>30</sup> ; or roosting and	✓

<sup>27</sup> Available at <https://bgis.sanbi.org/>

<sup>28</sup> The preferred platform is iNaturalist.org but any other national or international virtual museum.

<sup>29</sup> the ability to survive and reproduce in the long term.

<sup>30</sup> Undescribed species are to be assessed as “High Sensitivity”.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and	
2.2.12	identify any alternative development footprints within the preferred site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.3	The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report.	✓
3	Terrestrial Animal Species Specialist Assessment Report	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
3.1.4	a description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant;	✓
3.1.5	a description of the mean density of observations/number of sample sites per unit area <sup>31</sup> and the site inspection observations;	✓
3.1.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
3.1.7	details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported <sup>32</sup> ;	✓
3.1.8	the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area;	✓
3.1.9	the location of areas not suitable for development and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the cumulative impacts;	✓
3.1.11	impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	✓
3.1.13	a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “low”	✓

<sup>31</sup> Species Environmental Assessment Guideline

<sup>32</sup> The actual 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 a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	or “medium” terrestrial animal species sensitivity and were not considered appropriate.	
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
4	<b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>	
	MEDIUM SENSITIVITY RATING – for terrestrial animal species: Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species <sup>33</sup> . SCC listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines.	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as “medium” sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.	✓
5	<b>LOW SENSITIVITY RATING – for terrestrial animal species</b>	
	Terrestrial Animal Species Compliance Statement Areas where no natural habitat remains. Natural areas where there is no suspected occurrence of SCC.	✓

<sup>33</sup> The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of “low” sensitivity for terrestrial animal species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement <sup>34</sup> must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	the mean density of observations/ number of samples sites per unit area.	✓
5.3.6	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.7	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

#### PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Specialist Assessment Report.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium	✓

<sup>34</sup> An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	sensitivity” for terrestrial plant species must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Compliance Statement.	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial plant species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	✓
1.7	The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the study area.	✓
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline <sup>35</sup> , and the study area must include the PAOI, as determined.	✓
	<b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species</b>	
2	Terrestrial Plant Species Specialist Assessment	✓
	<b>VERY HIGH SENSITIVITY RATING</b> Critical habitat for range-restricted species <sup>36</sup> of conservation concern, that have a global range of less than 10 km <sup>2</sup> .	✓

<sup>35</sup> Available at <https://bgis.sanbi.org/>

<sup>36</sup> Species with a geographically restricted area of distribution.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
	<p>SCC listed on the IUCN Red List of Threatened Species<sup>37</sup> or on South Africa’s National Red List website<sup>38</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.</p> <p>Species aggregations that represent <math>\geq 1\%</math> of the global population size of a species, over a season, and during one or more key stages of its life cycle.</p> <p>The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.</p> <p>These areas are irreplaceable for SCC.</p> <p><b>HIGH SENSITIVITY RATING</b></p> <p>Confirmed habitat for SCC.</p> <p>SCC, listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</p> <p>These areas are unsuitable for development due to a very likely impact on SCC.</p>	
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a field of practical experience relevant to the taxonomic group (“taxa”) for which the assessment is being undertaken.	✓
2.2	The assessment must be undertaken within the study area.	✓
2.3	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline <sup>39</sup> ; and must:	✓
2.3.1	Identify the SCC which were found, observed or are likely to occur within the study area;	✓
2.3.2	provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility <sup>40</sup> , immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓
2.3.3	identify the distribution, location, viability <sup>41</sup> and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.3.4	identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area;	✓
2.3.5	determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	✓

<sup>37</sup> <https://www.iucnredlist.org/>

<sup>38</sup> This category includes the categories Extremely Rare, Critically Rare, and Rare

<sup>39</sup> Available at <https://bgis.sanbi.org/>

<sup>40</sup> The preferred platform is iNaturalist.org but any other national or international virtual museum.

<sup>41</sup> the ability to survive and reproduce in the long term.



<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
2.3.6	determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	✓
2.3.7	include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation;	✓
2.3.8	identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓
2.3.9	identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability;	✓
2.3.10	determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;	✓
2.3.11	discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species <sup>42</sup> ;	✓
2.3.12	identify any alternative development footprints within the preferred site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.4	The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report.	✓
3	Terrestrial Plant Species Specialist Assessment Report	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
3.1.4	a description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant;	✓
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
3.1.6	a description of the mean density of observations/number of sample sites per unit area <sup>43</sup> and the site inspection observations;	✓

<sup>42</sup> Undescribed species are to be assessed as “High Sensitivity”.

<sup>43</sup> Species Environmental Assessment Guideline

<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
3.1.7	details of all SCC found or suspected to occur on site, ensuring sensitive species <sup>44</sup> are appropriately reported;	✓
3.1.8	the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area;	✓
3.1.9	the location of areas not suitable for development and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the cumulative impacts;	✓
3.1.11	impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	✓
3.1.13	a motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.	✓
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
<b>4</b>	<b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>	
	MEDIUM SENSITIVITY RATING – for terrestrial plant species: Suspected habitat for SCC based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model <sup>45</sup> . SCC listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	✓

<sup>44</sup> The actual 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 a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

<sup>45</sup> The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines.	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as “medium” sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Plant Species Compliance Statement must be submitted.	✓
<b>5</b>	<b>LOW SENSITIVITY RATING – for terrestrial plant species</b>	
	Terrestrial Plant Species Compliance Statement Areas where no natural habitat remains. Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of “low” sensitivity for terrestrial plant species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement <sup>46</sup> must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓

<sup>46</sup> An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

<b>TABLE 1:</b>	<b>ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY</b>	<b>REPORT REFERENCE</b>
5.3.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
5.3.7	the mean density of observations/ number of samples sites per unit area <sup>47</sup> ; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

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<sup>47</sup> Refer to the Species Environmental Assessment Guideline

## 7.10 Appendix I: Site Sensitivity Verification Report

### 7.10.1 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken through the use of:
  - a. a desk top analysis, using satellite imagery.
  - b. a preliminary on-site inspection; and
  - c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 7.10.2 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.

- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- Bioregional Planning: Northwest Biodiversity Sector Plan (2015).
- Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

### 7.10.3 Site visit

A preliminary site verification for screening purposes was conducted between 25 and 28 April 2023. This initial site visit did not include any detailed habitat or species assessments, the purpose being to obtain an overview of the site only and to identify possible risks to the proposed activity and undertake preliminary habitat mapping. A follow up site visit was conducted between 24 & 26 May 2023 in order to supplement the initial findings, undertake further species surveys as well as refine sensitivity mapping.

### 7.10.4 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report and have been undertaken by an aquatic specialist.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

### 7.10.5 Site and Activity Description

The site – Kudu, is situated between **Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape** province, slightly northwest of the R61 district road. The site is situated within a

commercial livestock and game farming area (Refer to Figure 1), generally comprising dryland grazing. The portion assessed is approximately 9 000 Ha in extent. The area falls within a low, predominantly summer rainfall area.

### 7.10.6 National Environmental Screening Tool

The DFFE National Environmental Screening Tool indicates the following:

- Terrestrial Biodiversity – Very High & Low
- Animal Species – High, Medium, & Low
- Plant Species – Medium & Low
- Aquatic Biodiversity – Very High & Low

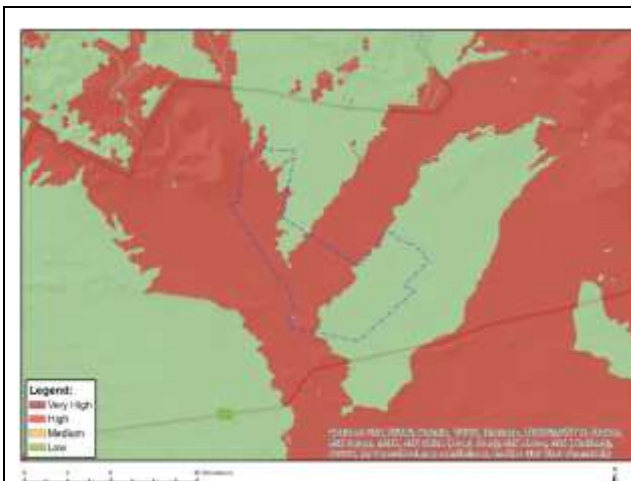


Figure 19: Terrestrial Biodiversity Sensitivity

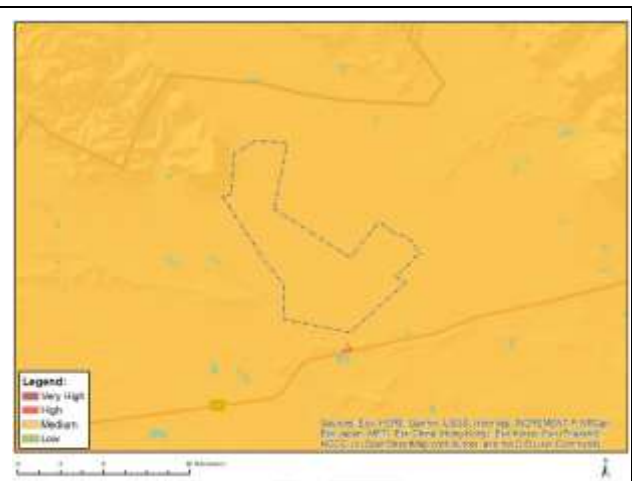


Figure 20: Plant Species Sensitivity

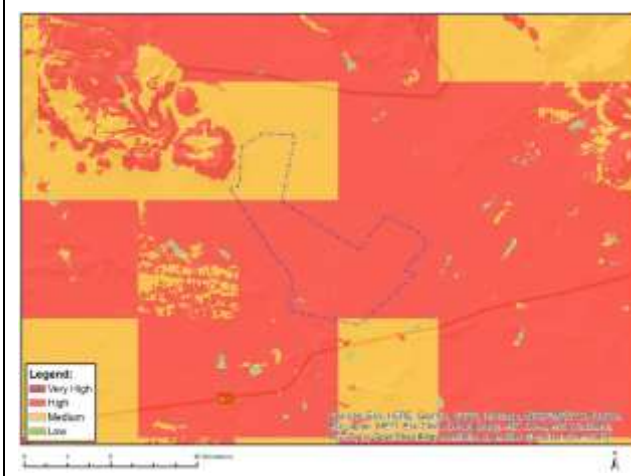


Figure 21: Animal Species Sensitivity



Figure 22: Aquatic Sensitivity

SENSITIVITY	DESCRIPTION - FEATURE(S) IN PROXIMITY
<b>Terrestrial Sensitivity</b>	
Very High	CBA 2, ESA 1 & 2
High	None
Medium	None
Low	Present
<b>Plant Sensitivity</b>	
Very High	None
High	None
Medium	Sensitive species 1212 & 1039, <i>Peersia frithii</i> , <i>Tridentea virescens</i> , <i>Cliffortia montana</i>

SENSITIVITY	DESCRIPTION - FEATURE(S) IN PROXIMITY
Low	Present
<b>Animal Sensitivity</b>	
Very High	None
High	<i>Neotis ludwigii</i> , <i>Afrotis afra</i> (Birds)
Medium	<i>Neotis ludwigii</i> , <i>Afrotis afra</i> (Birds) & <i>Chersobius boulengeri</i> (reptile)
Low	Present
<b>Aquatic Sensitivity</b>	
Very High	Rivers & Wetlands
High	None
Medium	None
Low	Present

The following is deduced from the DFFE [National Environmental Screening Tool](#):

- The terrestrial biodiversity theme is designated Very High.
- Several flora (plant) species regarded as being of concern are flagged and will be assessed further in the report, however none were found to be present during the site visit and are furthermore not deemed likely to be present, as the site is outside of the known range.
- Faunal (animal) species regarded as being of concern is flagged. This species is confirmed to not be present, supported by the fact that suitable habitat is not present.
- The aquatic sensitivity is Very High, supported by on site observations. Refer to separate aquatic assessment for specific findings outside the scope of this terrestrial biodiversity assessment.
- The terrestrial flora and fauna impacts are assessed further in the relevant report sections for flora and fauna in the accompanying report.

The site assessment has physically screened for the presence of any species as listed in the National Environmental Screening Tool, as well as other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

## 7.10.7 Findings, Outcomes and Recommendations

### Terrestrial Biodiversity

Site verification of the Terrestrial Biodiversity sensitivities is summarised in *Table 13* and depicted in *Figure 23*. Designated Critical Biodiversity Area 2 and Ecological Support Area 1 does intersect with the site or project area. Rivers and Wetlands are also indicated.

*Table 13: Terrestrial Biodiversity Features.*

Feature	COMMENT	
Critical Biodiversity Area	Present	CBA 2 is present overlapping a portion of the site.
Ecological Support Area	Present	ESA 1 is present overlapping a significant portion of the site.

### Plant Species (Flora)

National Environmental Screening Tool flagged a single flora species, which is thought to be extinct. The proposed WEF site does not provide suitable habitat for the flagged species and construction of the



WEF, and associated infrastructure is unlikely to pose any risk if it were to be present due to the limited impact and footprint.

Animal Species (Fauna)

A reptile species is listed in the screening tool; however, the preferred habitat for this species is not considered to be abundant within the site. Refer to Avifaunal report regarding bird species.

Aquatic

Wetland and River features are present in the broader area. Refer to Aquatic assessment report regarding aquatic aspects.

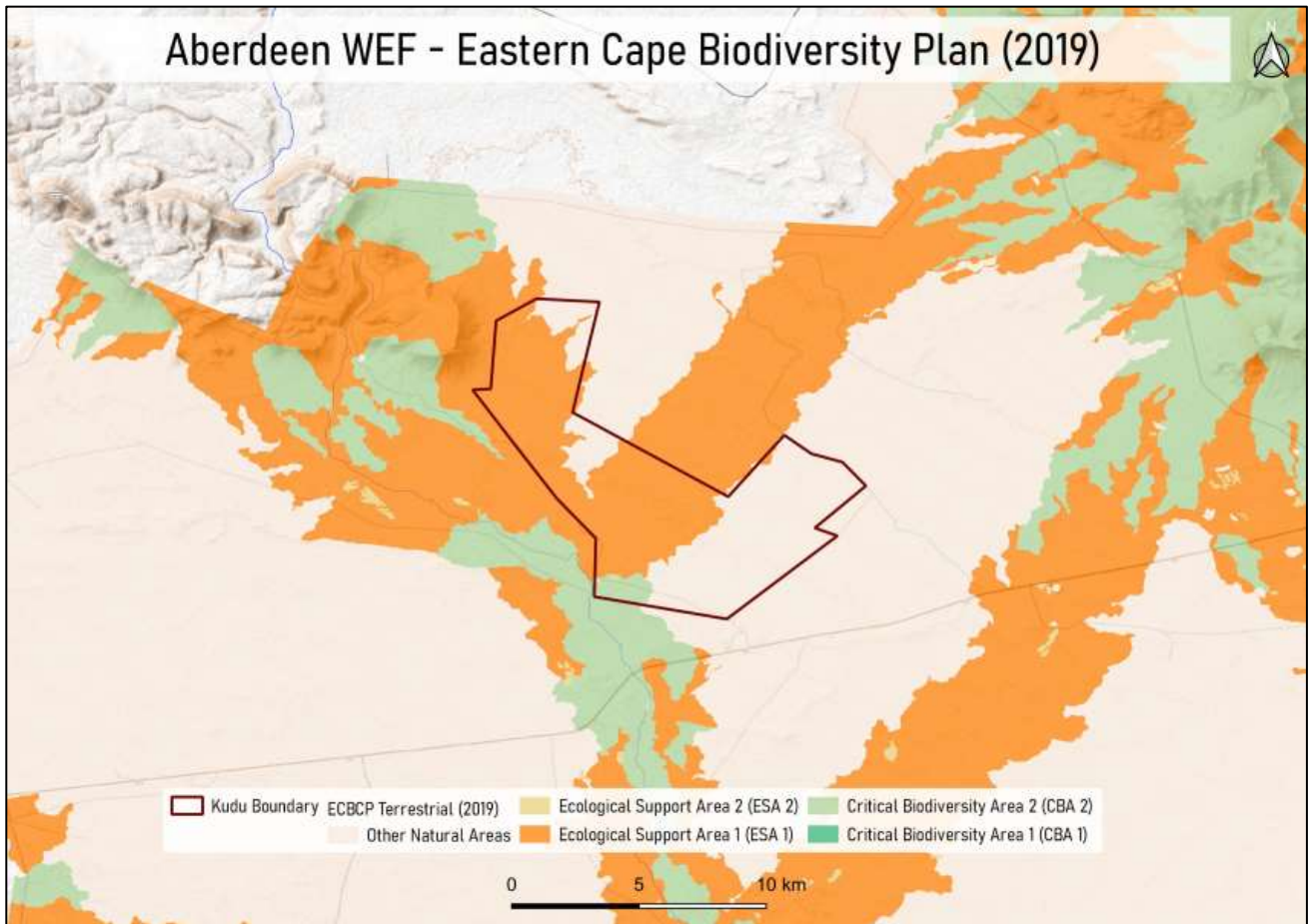


Figure 23: Map indicating Eastern Cape Biodiversity Plan (ECBCP, 2019) and Rivers and Wetlands.

7.10.8 Conclusions

The site verification thus confirms that a portion of the site overlaps with designated terrestrial Critical Biodiversity and Ecological Support Areas, associated with broader landscape level ecological processes and conservation priorities of the affected vegetation units. It further confirms that the listed plant species were not recorded at the time of assessment. Refer to summary in table below.

Feature		COMMENT
Critical Biodiversity Area	Present	ECBCP (2019) designated CBA 2 is present, overlapping a small portion of the site along the southern boundary. This is the norther edge of a

Feature	COMMENT	
		larger CBA 2 area situated to the south (downstream) from the site and in a likely less degraded portion of the vegetation unit. The portion of CBA within the site boundary is traversed by the existing gravel road and the small section of proposed access road will likely have a negligible and acceptable loss.
Ecological Support Area	Present	ECBCP (2019) designated ESA 1 is present overlapping a significant portion of the site. The ESA has however been refined in conjunction with the aquatic specialist and designated as aquatic and ecological corridors. The refined corridor more or less aligns with the ECBCP (2019) designated ESA corridors but are narrower and more refined.

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