



# TrustedPartners

ESG RISK MANAGEMENT AND IMPACT ADVISERS

Project N#: TP210521-01

## TERRESTRIAL ECOLOGY & BIODIVERSITY WALKDOWN REPORT BRANDVALLEY WIND ENERGY PROJECT

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## 1 Report Release Notice

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## 2 Revision Tracker

Date	Section	Revision
2021/11/20	Site Locality	Replaced Figure 1 Revised Layout
2021/11/20	Project Description	Updated the amount of turbine on the project site
2021/11/20	Walkdown Conclusions and Recommendations	Ensure the correct turbine numbers are mentioned
2021/11/20	Regional Vegetation Units	Replaced Figure 2 Revised Layout
2021/11/20	Bioregional Planning (Critical Biodiversity Areas)	Replaced Figure 3 Revised Layout
2021/11/20	Refined vegetation mapping	Replaced Figure 4 Revised Layout
2021/11/20	Sensitive and Critical Habitat features identified during walkdown (Overview)	Replaced Figure 5 Revised Layout
2021/11/20	Sensitive Areas identified and WEF infrastructure	Replaced Figure 6 Revised Layout

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3	Contents	
1	REPORT RELEASE NOTICE.....	2
2	REVISION TRACKER.....	2
3	CONTENTS.....	3
4	LIST OF TABLES.....	4
5	LIST OF FIGURES.....	4
6	ABBREVIATIONS.....	5
7	DEFINITIONS.....	6
8	INTRODUCTION.....	11
9	METHODOLOGY.....	12
9.1	DATA SOURCES AND REFERENCES.....	12
9.2	ASSUMPTIONS AND LIMITATIONS.....	13
10	PROJECT DESCRIPTION.....	14
11	GENERAL TERRESTRIAL BIODIVERSITY.....	16
11.1	VEGETATION UNITS AND HABITATS.....	16
11.2	FAUNAL HABITAT AND COMMUNITIES.....	30
11.2.1	<i>Mammals</i> .....	30
11.2.2	<i>Reptiles</i> .....	31
11.2.3	<i>Amphibians</i> .....	32
11.2.4	<i>Invertebrates</i> .....	32
11.3	BIOREGIONAL PLANNING.....	33
12	WALKDOWN FINDINGS.....	36
12.1	VEGETATION.....	36
12.2	FLORA.....	36
12.3	FAUNA.....	41
12.4	SENSITIVE AREAS AND SPECIES POPULATIONS.....	42
12.4.1	<i>Turbines, Roads and other Infrastructure</i> .....	45
13	WALKDOWN CONCLUSIONS AND RECOMMENDATIONS.....	48
14	REFERENCES.....	50
15	APPENDIX 1: PLANT SPECIES OF CONSERVATION CONCERN (RED LISTED).....	54
16	APPENDIX 2: FLORA PROTECTED IN TERMS OF PROVINCIAL ACTS AND ORDINANCE(S).....	61
17	APPENDIX 3 - ABOUT TRUSTED PARTNERS.....	69

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17.1	MALCOLME LOGIE, PARTNER.....	71
17.2	JAMIE POTE, ASSOCIATE PARTNER.....	73

#### 4 List of Tables

TABLE 1:	CENTRAL MOUNTAIN SHALE RENOSTERVELD.....	19
TABLE 2:	KOEDOESBERGE-MOORDENAARS KAROO .....	20
TABLE 3:	TANQUA KAROO ( <sup>W</sup> WESTERN DISTRIBUTION LIMIT) .....	22
TABLE 4:	TANQUA ESCARPMENT SHRUBLAND .....	24
TABLE 5:	TANQUA WASH RIVIERE .....	26
TABLE 6:	FLORA SPECIES OF CONSERVATION CONCERN CONFIRMED TO BE PRESENT.....	38
TABLE 7:	FLORA SPECIES DESCRIPTIONS .....	40
TABLE 8:	FAUNA SPECIES .....	41
TABLE 9:	SENSITIVE AREAS IDENTIFIED IN PROXIMITY TO PROJECT INFRASTRUCTURE.....	42
TABLE 10:	SUMMARY OF WEF AND INFRASTRUCTURE VEGETATION AND SENSITIVITIES. ....	45

#### 5 List of Figures

FIGURE 1:	SITE LOCALITY .....	15
FIGURE 2:	REGIONAL VEGETATION UNITS.....	17
FIGURE 3:	BIOREGIONAL PLANNING (CRITICAL BIODIVERSITY AREAS).....	35
FIGURE 4:	REFINED VEGETATION MAPPING. ....	37
FIGURE 5:	SENSITIVE AND CRITICAL HABITAT FEATURES IDENTIFIED DURING WALKDOWN (OVERVIEW). ....	44
FIGURE 6:	SENSITIVE AREAS IDENTIFIED AND WEF INFRASTRUCTURE. ....	47

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## 6 Abbreviations

AOI	Area of Influence
AOO	Area of Occupancy (the area within its 'extent of occurrence' which is occupied)
CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs ( <i>now DFFE, see below</i> )
DENC	Northern Cape Department of Environmental Affairs and Nature Conservation
DFFE	The Department of Environmental Affairs 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 and department of Environmental Affairs (DEA).
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
EOO	Extent of Occurrence (the spatial spread of the areas currently occupied)
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LHS	Left Hand Side (refers to river bank facing downstream)
LM	Local Municipality
MAP	Mean Annual Precipitation
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 (refers to river bank facing downstream)
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SoER	State of the Environment Report
SCC	Species of Conservation Concern
ToPS	Threatened of Protected Species (NEM:BA)
ToR	Terms of Reference
+ve	Positive
-ve	Negative

## 7 Definitions

Area of Influence	<p>Area of Influence WB OP 4.01, Annex A, para. 6:</p> <p>“The area likely to be affected by the project, including all its ancillary aspects, such as power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, and construction camps, as well as unplanned developments induced by the project.”</p> <p>A single project may have more than one AOI, for example different environmental and social aspects will/may have different AOI</p>
Alien Invasive Species (AIS)	<p>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>).</p>
Area of Occupancy (AOO)	<p>Area of Occupancy is the area within its ‘extent of occurrence’ which is occupied. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats.</p>
Biodiversity	<p>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.</p>
Boundary	<p>Landscape patches have a boundary between them which can be defined or fuzzy (Sanderson and Harris, 2000). The zone composed of the edges of adjacent ecosystems is the boundary.</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>
Connectivity	<p>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.</p>
Corridors	<p>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.</p>
Critically Endangered (CR)	<p>A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an <u>extremely high risk of extinction in the wild</u> (<a href="#">IUCN</a>).</p>
Data Deficient (DD)	<p>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>).</p>
Degraded Habitat/Land	<p>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</p>

	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 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 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	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.
Ecosystem Services	Ecosystem services valued by humans are often underpinned by biodiversity. Impacts on biodiversity can therefore often adversely affect the delivery of ecosystem services. This Performance Standard addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle.
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.
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 <u>a 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.
Evolutionary Processes	The process by which genetic changes have taken place and continue to take place in populations of plants and animals over successive generations in response to environmental changes. Evolutionary Processes includes the mechanisms that produce the biodiversity of life and include Mutation and Migration (Gene Flow), Genetic Drift, Natural Selection, Common Descent, Speciation, Sexual Selection, and Biogeography. Disruptions to evolutionary processes can prevent ecosystems and species from adapting to environmental change over time. Significant fragmentation is considered to be an important disrupter of evolutionary processes.
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.
Extent of Occurrence (EOO)	Extent of Occurrence is the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence.
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	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	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
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> )
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems ( <a href="#">Millennium Ecosystem Assessment</a> ).
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 ( <a href="#">IUCN</a> ).



Matrix	The “ <i>background ecological system</i> ” of a landscape with a high degree of connectivity.
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 ( <a href="#">IUCN</a> ).
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.
Rare or Critically Rare	Non-IUCN category status for species, as indicated by SANBI where formal assessment and classification has not been undertaken, or species does not meet IUCN criteria, but species is thought to be under threat.
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.
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.
Riparian Habitat	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.
Seep	A moist or wet place where water, usually groundwater, reaches the earth's surface from an underground aquifer
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> ).
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 as a result 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.
Vulnerable (Vu)	<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. 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 ( <a href="#">IUCN</a> ).
Watercourse	Natural or man-made channel through or along which water may flow. 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. and a reference to a watercourse includes, where relevant, its bed and banks;
Weed	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.
Wetlands	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.

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## 8 Introduction

**Trusted Partners** were appointed by WSP in Africa to undertake an ecological site walkdown for the proposed Brand Valley Wind Energy Facility.

The Brand Valley Wind Energy Facility walkdown has been undertaken in fulfilment of specific conditions contained in the environmental authorisation (Reg. No. 14/12/16/3/3/2/900) dated November 23, 2016 and subsequent amendments issued by Department of Environmental Affairs for the project, as follows:

- Conditions 45: *A pre-construction walk through of the approved powerline alignment and turbine positions by ...an ecologist, must be conducted to ensure that the micro-siting of the turbines, pylons and powerline alignment have the least possible ... and all protected plant species impacted are identified.*
- Condition 50: *A pre-construction survey of the final development footprint must be conducted by a qualified floral specialist to identify protected species affected by the proposed development. Prior to the commencement of construction. a rescue and rehabilitation operation for these species which could survive translocation must be conducted.*
- Conditions 129: *The approved turbines must be placed in a manner to avoid all designated, "no-go" areas as well as its buffers.*
- Conditions 130: *The final placement of turbines must follow a micro siting procedure involving a walk-through and identification of any sensitive areas by botanical ... specialists.*
- Conditions 131: *Exclusion of sensitive ecological ... areas from construction activities must inform micro siting of all development activities.*

No environmental authorisation has been obtained for the 132kV powerline; hence it is not included in this reporting.

The primary purpose of the ecological walkdown, as per the EA condition is to *ensure that the micro-siting of the turbines and power line has the least possible impact and all protected plant species impacted are identified.* As a secondary outcome a species list of protected species as well as species suited to translocation is provided.

This report is one of several undertaken for a series of adjacent Wind Energy Facility Projects within an overlapping Area of Influence. The general descriptions provided in this report are thus an overview of the broader area and may contain information that has been summarised from separate but contiguous or overlapping site assessments in order to more effectively contextualise the broader environment and the area of influence as well as to better understand

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the '*bigger picture*', since the natural environment is interconnected, and as will become evident the local environment is strongly influenced by the surrounding area.

## 9 Methodology

The site walkdown was undertaken in the time-period between August 30, 2021, and September 11, 2021. The Level-of-Effort was three persons, consisting of two Natural Scientists and one Technician. The site walkdown was undertaken shortly after a particularly rainy period, which was evident in the notable flowering proliferation, which progressed throughout the site visit period. While the seasonal response of local flora does vary throughout the year, with certain species flowering during different seasons, the time during which the walkdown was undertaken is deemed to have been at a time that would most effectively identify the most species. Many geophytic species which may be dormant for large parts of the year were visible, if not flowering. It is possible that certain flora were not visible at the time of the walkdown.

### 9.1 Data sources and references

A comprehensive list of references, including data sources is provided in [Section 14](#). Data sources that were utilised for the walkdown and 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.
  - Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
  - Namakwa District Biodiversity Sector Plan (2008) – Bioregional Plan.
  - Succulent Karoo Ecosystem Planning (SKEP, 2002).
  - 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>).
  - Original Ecological conducted for the project, excluding bats and avifauna by Todd (2011, 2014, 2016, 2019); and other adjacent Critical Habitat and Biodiversity Assessments by **Trusted Partners** (2020).
  - 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.

## 9.2 Assumptions and Limitations

- The site visit was undertaken in early spring 2021, preceded by a period of good winter rain and was thus a good time for undertaking the survey.
- Threatened and protected species are by their nature elusive to find and can be missed when surveying extensive areas. All reasonable measures have been taken to minimise this risk.
- Flora species are known to grow and flower at slightly different times of the year and in some cases do not lower every year, hence it is possible that certain species may not have been representing at the time of survey. The time period of the survey was thus at a time when most species were likely to be visible.
- Information provided by WSP in Africa;

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## 10 Project Description

The Brandvalley Wind Farm is a 140MW WEF located within the Karoo Hoogland Local Municipality (Namakwa District Municipality) in the Northern Cape and the Laingsburg Local Municipality (Central Karoo District Municipality) in the Western Cape. It must be noted that the Karreebosch Wind Farm is located within the Komsberg Renewable Energy Development Zone (REDZ) as determined by the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa (2015 – CSIR/DEA) and formally gazetted on 16 February 2018 (GN 114).

The WEF consists of the following:

- 34 wind turbines with a maximum generating capacity of 140MW;
- Transformer hard standing area per turbine;
- Construction camp and Laydown areas;
- Access roads;
- Overhead 33kV powerlines and underground cabling;
- Low voltage substation;
- 4 x 125m tall wind measuring lattice masts.

The location of the site is indicated in Figure 1 below.

# Project : Euronotus

## Layout - Topographic Locality Map

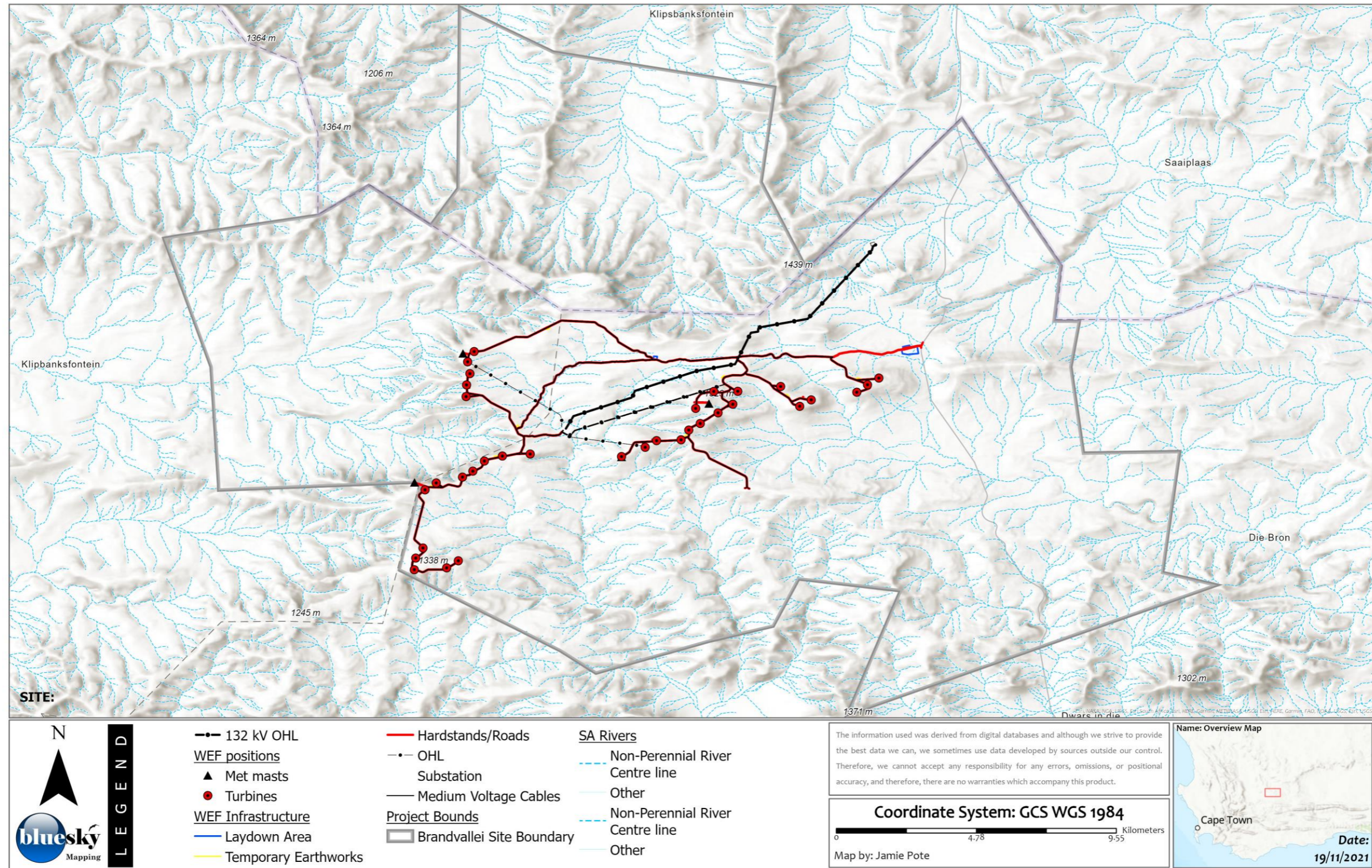


Figure 1: Site Locality

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## 11 General Terrestrial Biodiversity

### 11.1 Vegetation Units and Habitats

It is clearly evident from the site investigation that the vegetation units which represented within the project area of influence are transitional rather than distinct units. The Renosterveld complex, of which the Shale Renosterveld is recognised as one unit is clearly associated with the higher lying mountains which extend along the Roggeveldberge from the Hantam Karoo near Calvinia in the north-west to the Nuweveldberge between Fraserburg and Merweville in the north-east and extending southwards into the Koedoesberge towards Matjiesfontein. The higher-lying mountainous areas receive a higher rainfall compared to the surrounding distinctly karroid areas, which promotes a less and distinctly wood succulent shrub and herbaceous component compared to the strongly succulent karroid vegetation.





# Project : Euronotus

## Layout - Vegetation & Status (NBA)

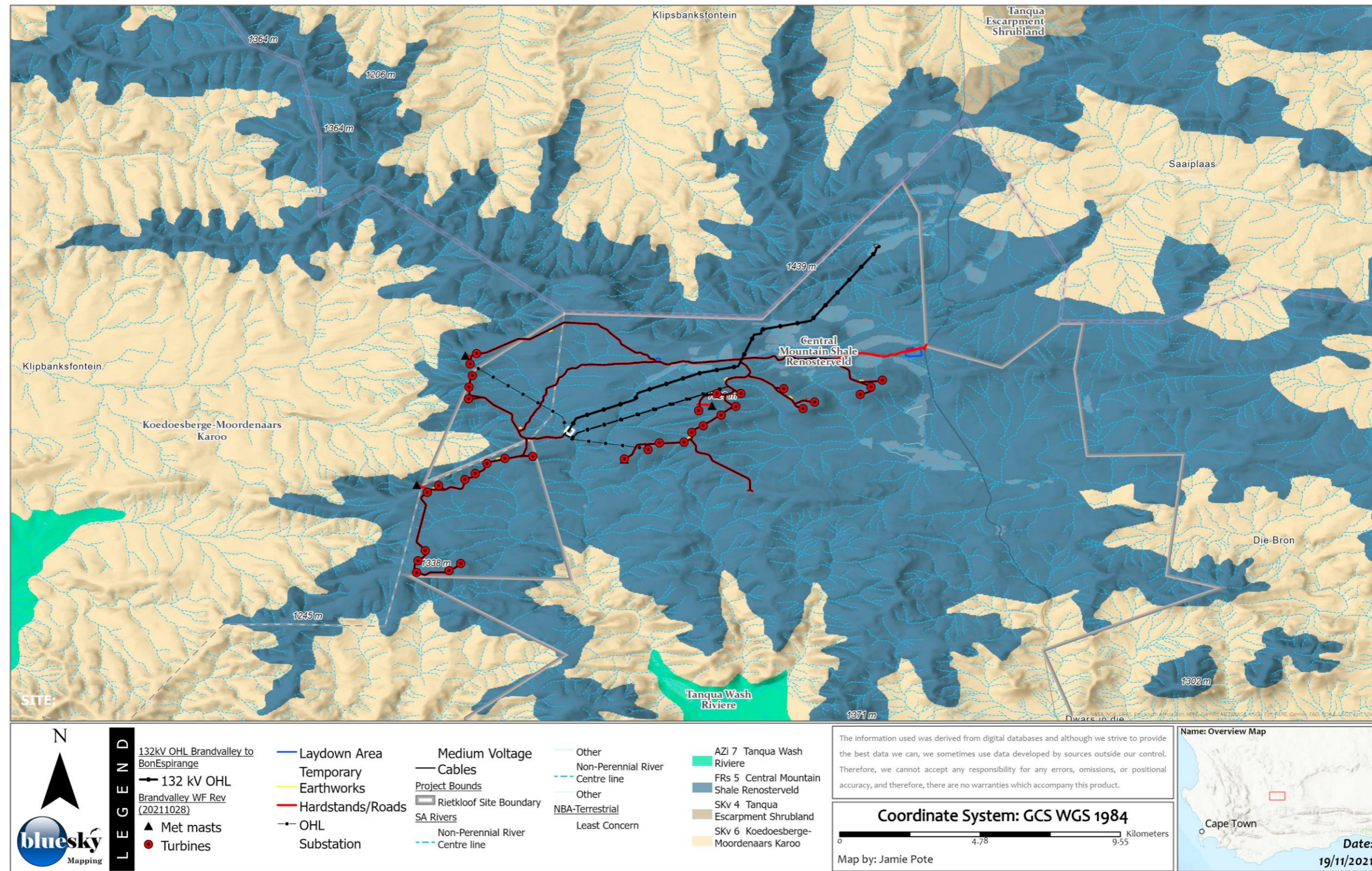


Figure 2: Regional Vegetation Units

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The vegetation occurring within the area surrounding the site and area of influence is broadly according to the national vegetation classification and descriptions for *Central Mountain Shale Renosterveld* on the higher mountains and slopes, transitioning with *Koedoesberge-Moordenaars Karoo* on the lower mountains and valleys in the south, east and west with strong *Tanqua Karoo* influences in the west and *Tanqua Escarpment Shrubland* in the north. *Tanqua Wash Riviere* elements are found encroaching towards the site from the west, into the lower lying valleys running south, north and westwards (Figure 2). It is further evident that the *Koedoesberge-Moordenaars Karoo* present on the west side of the project area has several dominant species not occurring on the western side, with appearance of species such as *Euphorbia hamata* suggesting that the vegetation unit in this area may be more closely aligned with the *Tanqua Karoo* than with the *Moordenaars Karoo* found to the east.

Central Mountain Shale Renosterveld is the predominant vegetation occurring on higher lying mountains, slopes and valleys within the site area at altitude of around 1 050–1 500 m. Regionally, this unit occurs within the Northern and Western Cape Provinces particularly on the southern and south-eastern slopes of the Klein-Roggeveldberge and Komsberg below the Roggeveld section of the Great Escarpment (facing the *Moordenaars Karoo*) as well as farther east below the Besemgoedberg and Suurkop, west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.. The vegetation occurs on slopes and broad ridges of low mountains and escarpments, with tall shrubland dominated by *Renosterbos* and large suites of mainly non-succulent karoo shrubs and with a rich geophytic flora in the undergrowth or in more open, wetter or rocky habitats. Soils are clayey, overlying mudstones and subordinate sandstones. *Glenrosa* and *Mispah* forms are prominent and Land types mainly Ib and Fc. The area has an arid to semi-arid climate with MAP 180–410 mm, with relatively even rainfall, but still showing a slight high in autumn-winter. Mean daily maximum and minimum temperatures 29.9 °C and 0.9 °C for January and July, respectively. Frost incidence is 20–50 days per year.

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 1.

Table 1: Central Mountain Shale Renosterveld

Growth Form	Description/Species
Geophytic herbs	<i>Bulbine asphodeloides</i> , <i>Drimia intricata</i> , <i>Othonna auriculifolia</i> , <i>Oxalis obtusa</i> . Succulent
Grasses	<i>Ehrharta calycina</i> , <i>Karoochloa purpurea</i> , <i>Merxmullera stricta</i>
Herbs	<i>Crassula deceptor</i> , <i>C. muscosa</i> , <i>C. tomentosa</i> var. <i>glabrifolia</i> , <i>Senecio radicans</i> , <i>Dianthus caespitosus</i> subsp. <i>caespitosus</i> , <i>Heliophila pendula</i> , <i>Lepidium desertorum</i> , <i>Osteospermum acanthospermum</i> , <i>Senecio hastatus</i> .
Low shrubs	<i>Elytropappus rhinocerotis</i> (d), <i>Amphiglossa tomentosa</i> , <i>Asparagus capensis</i> var. <i>capensis</i> , <i>Chrysocoma ciliata</i> , <i>C. oblongifolia</i> , <i>Diospyros austro-africana</i> , <i>Eriocephalus africanus</i> var. <i>africanus</i> , <i>E. ericoides</i> subsp. <i>ericoides</i> , <i>E. eximius</i> , <i>E. grandiflorus</i> , <i>E. microphyllus</i> var. <i>pubescens</i> , <i>E. pauperimus</i> , <i>E. purpureus</i> , <i>Euryops imbricatus</i> , <i>Exomis microphylla</i> , <i>Felicia filifolia</i> subsp. <i>filifolia</i> , <i>F. muricata</i> subsp. <i>muricata</i> , <i>F. ovata</i> , <i>Galenia africana</i> , <i>Helichrysum dregeanum</i> , <i>H. lucilioides</i> , <i>Hermannia multiflora</i> , <i>Lessertia fruticosa</i> , <i>Lycium cinereum</i> , <i>Nenax microphylla</i> , <i>Pelargonium abrotanifolium</i> , <i>Pentzia incana</i> , <i>Pteronia ambrariifolia</i> , <i>P. glauca</i> , <i>P. glomerata</i> , <i>P. incana</i> , <i>P. sordida</i> , <i>Rosenia glandulosa</i> , <i>R. humilis</i> , <i>R. oppositifolia</i> , <i>Selago albida</i> , <i>Tripteris sinuata</i> , <i>Zygophyllum spinosum</i> .
Succulent Shrubs	<i>Delosperma subincanum</i> , <i>Drosanthemum lique</i> , <i>Euphorbia stolonifera</i> , <i>Trichodiadema barbatum</i> , <i>Tylecodon reticulatus</i> subsp. <i>reticulatus</i> , <i>T. wallichii</i> subsp. <i>wallichii</i> . Woody Climber: <i>Asparagus aethiopicus</i>
Biogeographically Important Taxa	None recorded in descriptions
Endemic Taxa	None recorded in descriptions
Conservation Status	Least Concern
Conservation Target	Target 27 % (National Biodiversity Assessment, 2018).
Conserved in	None conserved in statutory or private conservation areas.
Threat activities	Only about 1% transformed. Erosion moderate.
Protection Level	<i>Not Protected</i>
Remarks	This is a very poorly known renosterveld type despite its interesting biogeographical borderline position. The unit straddles the Fynbos, Succulent Karoo and marginally the Nama-Karoo Biomes. <i>It does not appear to have any endemic species.</i>

The Koedoesberge-Moordenaars Karoo vegetation is the predominant vegetation occurring on lower-lying valleys, slopes and mountains at lower elevations, of around 500–1 250 m, to the north, west and south of the project area. Regionally, the unit is found within the Western Cape and Northern Cape provinces in the vicinity of the Koedoesberge and Pienaar se Berg low mountain ranges bordering on southern Tanqua Karoo to the west and separated by the Klein Roggeveld Mountains from the Moordenaars Karoo in the broad area of Laingsburg and Merweville to the east. The unit also includes the Doesberg region east of Laingsburg and piedmonts of the Elandsberg as far as beyond the Gamkapoort Dam at Excelsior (west of Prince Albert). The vegetation is comprised of a slightly undulating to hilly landscape covered by low succulent scrub and dotted by scattered tall shrubs, patches of 'white' grass visible on plains, the most conspicuous dominants being dwarf shrubs of *Pteronia*, *Drosanthemum* and *Galenia*.

Soils are derived from Mudstones, shales, sandstones and Dwyka Group diamictites, which gives rise to shallow, skeletal soils. The region is classified largely as Fc land type, with Ib land type playing a subordinate role. MAP is low, slightly above 200 mm, being an arid area. There are two slight rainfall optima: one being in March and another spread from May to August. MAT is close to 16 °C and incidence of frost relatively high (30 days).

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 2.

Table 2: Koedoesberge-Moordenaars Karoo

Growth Form	Description/Species
Succulent shrubs	<i>Hereroa odorata</i> (d), <i>Antimima fergusoniae</i> , <i>A. maxwellii</i> , <i>A. wittebergensis</i> , <i>Aridaria noctiflora</i> subsp. <i>straminea</i> , <i>Crassula nudicaulis</i> , <i>C. rupestris</i> subsp. <i>commutata</i> , <i>Cylindrophyllum comptonii</i> , <i>Drosanthemum framesii</i> , <i>D. karrooense</i> , <i>D. lique</i> , <i>Euphorbia decussata</i> , <i>E. eustacei</i> , <i>E. mauritanica</i> , <i>Hoodia gordonii</i> , <i>H. grandis</i> , <i>Lycium oxycarpum</i> , <i>Manochlamys albicans</i> , <i>Peersia macradenia</i> , <i>Pelargonium crithmifolium</i> , <i>Ruschia grisea</i> , <i>R. intricata</i> , <i>Salsola aphylla</i> , <i>Sarcocaulon crassicaule</i> , <i>Sceletium rigidum</i> , <i>Tetragonia robusta</i> var. <i>psiloptera</i> , <i>Trichodiadema barbatum</i> , <i>Tylecodon reticulatus</i> , <i>T. wallichii</i> subsp. <i>wallichii</i> , <i>Zygophyllum flexuosum</i>
Succulent herbs	<i>Astroloba foliolosa</i> , <i>A. spiralis</i> , <i>Brownanthus vaginatus</i> , <i>Crassula deceptor</i> , <i>C. muscosa</i> , <i>C. tomentosa</i> , <i>Deilanthus thudichumii</i> , <i>Haworthia marumiana</i> var. <i>archeri</i> , <i>Mesembryanthemum stenandrum</i> , <i>Pectinaria articulata</i> , <i>Piarranthus parvulus</i> , <i>Psilocaulon coriarium</i> , <i>P. junceum</i> , <i>Quaqua arenicola</i> subsp. <i>arenicola</i> , <i>Q. arida</i> , <i>Q. ramosa</i> , <i>Stapelia pillansii</i> , <i>S. rufa</i> , <i>Stapeliopsis exasperata</i> , <i>Tetragonia microptera</i> , <i>Tripteris aghillana</i> var. <i>integrifolia</i>
Tall shrubs	<i>Diospyros pallens</i>
Low Shrubs	<i>Pteronia incana</i> (d), <i>Amphiglossa tomentosa</i> , <i>Aptosimum indivisum</i> , <i>A. spinescens</i> , <i>Asparagus burchellii</i> , <i>A. capensis</i> var. <i>capensis</i> , <i>Athanasia minuta</i> subsp. <i>inermis</i> , <i>Barleria stimulans</i> , <i>Berkheya spinosa</i> , <i>Chrysocoma ciliata</i> , <i>Eriocephalus africanus</i> , <i>E. ericoides</i> , <i>E. pauperrimus</i> , <i>E. spinescens</i> , <i>Euryops lateriflorus</i> , <i>Felicia filifolia</i> , <i>F. macrorrhiza</i> , <i>F. muricata</i> , <i>F. scabrida</i> , <i>Galenia africana</i> , <i>G. fruticosa</i> , <i>Garuleum bipinnatum</i> , <i>Helichrysum lucilioides</i> , <i>Hermannia grandiflora</i> , <i>H. multiflora</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Melolobium candicans</i> , <i>Menodora juncea</i> , <i>Microloma armatum</i> , <i>Monechma spartioides</i> , <i>Muraltia scoparia</i> , <i>Pelargonium hirtum</i> , <i>Pentzia incana</i> , <i>Polygala seminuda</i> , <i>Pteronia adenocarpa</i> , <i>P. ambrariifolia</i> , <i>P. empetrifolia</i> , <i>P. glauca</i> , <i>P. glomerata</i> , <i>P. pallens</i> , <i>P. scariosa</i> , <i>P. sordida</i> , <i>Rhigozum obovatum</i> , <i>Senecio haworthii</i> , <i>Tripteris sinuata</i> , <i>Zygophyllum microphyllum</i> , <i>Z. retrofractum</i> , <i>Z. spinosum</i> .
Geophytic herbs	<i>Drimia intricata</i> , <i>Geissorhiza karooica</i> , <i>Ixia marginifolia</i> , <i>I. rapunculoides</i> , <i>Ornithogalum adseptentrionesvergentulum</i> , <i>Oxalis obtusa</i> , <i>Romulea austinii</i> , <i>R. tortuosa</i> subsp. <i>tortuosa</i> , <i>Strumaria karooica</i> , <i>S. pubescens</i> , <i>Trachyandra thyrsoides</i>
Grasses	<i>Aristida adscensionis</i> , <i>A. diffusa</i> , <i>Ehrharta calycina</i> , <i>E. delicatula</i> , <i>Enneapogon scaber</i> , <i>Fingerhuthia africana</i> , <i>Karooochloa tenella</i> , <i>Pentaschistis airoides</i> , <i>Stipagrostis ciliata</i> , <i>S. obtusa</i>
Herbs	<i>Atriplex suberecta</i> , <i>Felicia bergeriana</i> , <i>Gazania jurineifolia</i> subsp. <i>scabra</i> , <i>Hermannia althaeifolia</i> , <i>H. pulverata</i> , <i>Lepidium africanum</i> , <i>L. desertorum</i> , <i>Leysera tenella</i> , <i>Pelargonium minimum</i> , <i>P. nervifolium</i> , <i>Syncarpha dregeana</i> ,

Growth Form	Description/Species
	<i>Ursinia nana</i> , <i>Zaluzianskya inflata</i> , <i>Z. peduncularis</i>
Semiparasitic shrub	<i>Thesium lineatum</i>
Herbaceous climber	<i>Fockea sinuata</i>
Semi parasitic epiphytic shrub	<i>Viscum capense</i>
Parasitic herb	<i>Hyobanche glabrata</i>
Woody climber	<i>Asparagus fasciculatus</i> , <i>A. racemosus</i> , <i>A. retrofractus</i> , <i>Microlooma sagittatum</i>
Biogeographically Important Taxa	( <sup>GKB</sup> Great Karoo basin endemic, <sup>RH</sup> Roggeveld-Hantam endemic, <sup>S</sup> Southern distribution limit, <sup>W</sup> Western distribution limit) <ul style="list-style-type: none"> <li>▪ Succulent Shrubs: <i>Deilanthus peersii</i><sup>W</sup>, <i>Hereroa crassa</i><sup>GKB</sup>, <i>Pleiospilos nelii</i><sup>GKB</sup>, <i>Rhinephyllum graniforme</i><sup>GKB</sup>, <i>Ruschia crassa</i><sup>GKB</sup>, <i>R. perfoliata</i>.</li> <li>▪ Low Shrubs: <i>Felicia lasiocarpa</i><sup>GKB</sup>, <i>Sericocoma pungens</i><sup>S</sup>.</li> <li>▪ Herbs: <i>Helichrysum cerastioides</i> var. <i>aurosicum</i><sup>W</sup>, <i>Ifloga molluginoides</i><sup>S</sup>.</li> <li>▪ Geophytic Herbs: <i>Brunsvigia comptonii</i><sup>S</sup>, <i>Drimia karooica</i><sup>W</sup>.</li> <li>▪ Succulent Herbs: <i>Aloe longistyla</i><sup>W</sup>, <i>Crassula hemisphaerica</i><sup>W</sup>, <i>Pectinaria longipes</i> subsp. <i>longipes</i><sup>RH</sup>, <i>Piarranthus comptonii</i><sup>GKB</sup>, <i>Quaqua parviflora</i> subsp. <i>gracilis</i><sup>RH</sup>, <i>Tridentea parvipuncta</i> subsp. <i>parvipuncta</i><sup>GKB</sup>.</li> </ul>
Endemic Taxa	<ul style="list-style-type: none"> <li>▪ Succulent Shrubs: <i>Antimima karroidea</i>, <i>A. loganii</i>, <i>Calamophyllum teretiusculum</i>, <i>Cerochlamys gemina</i>, <i>Drosanthemum comptonii</i>, <i>Ruschia karrooica</i>, <i>Tanquana archeri</i>, <i>Trichodiadema hallii</i>, <i>Tylecodon faucium</i>.</li> <li>▪ Low Shrub: <i>Pelargonium stipulaceum</i> subsp. <i>ovato-stipulatum</i>.</li> <li>▪ Semiparasitic Shrub: <i>Thesium marlothii</i>.</li> <li>▪ Geophytic Herbs: <i>Lachenalia comptonii</i>, <i>Strumaria undulata</i>.</li> <li>▪ Succulent Herbs: <i>Haworthia nortieri</i> var. <i>pehlemanniae</i>.</li> </ul>
Conservation Status	Least Concern
Conservation Target	Target 19 % (National Biodiversity Assessment, 2018)
Conserved in	Only a very small portion enjoying statutory conservation in the Gamkapoort Nature Reserve
Threat activities	Transformed only to a very small extent. No serious alien plant invasions recorded. Erosion is moderate (88%) and only to lesser extent high or very low.
Protection Level	<i>Not Protected</i>
Remarks	Koedoesberge-Moordenaars Karoo remains poorly researched from the vegetation-ecological point of view, despite its proximity to major university centres in the Western Cape as well as good accessibility (N1 road cuts through the region in east-west direction).

Tanqua Karoo, although not spatially associated with the project area, is represented by species common to the unit along the western sides of the greater project area. Regionally it is found at lower altitudes (240–960 m) in the Western and Northern Cape Provinces in basin encompassing valleys of the Tanqua and Doring Rivers between Cederberg (Swartruggens) in the west, the Roggeveld Escarpment in the east and Klein Roggeveld Mountains in the southeast; towards the north this unit borders on higher elevated plains of the Hantam Karoo. It is present on slightly undulating intra-mountain basins sheltered by steep slopes of mountain ranges. The plain is interrupted by a series of solitary dolerite butts and elevated ridges, extensive, flat sheet-washes and deeper incised channels of intermittent rivers (these habitats support vegetation of the Tanqua Wash Riviere). The plains are very sparsely vegetated (low

succulent shrubland with *Ruschia*, *Drosanthemum*, *Aridaria*, *Augea*, *Zygophyllum*), in extreme precipitation-poor years appearing barren, while the slopes of the koppies and adjacent mountain piedmonts support well-developed medium-tall succulent *Euphorbia hamata*–*Pteronia incana* shrubland (Rubin 1998). Small quartz patches occur in the southern Tanqua Basin. Annual flora (*Gazania lichtensteinii*, *Euryops annuus*, *Ursinia nana*) becomes conspicuous with sufficient precipitation, while geophytes and grasses play a subordinate role. *Stipagrostis ciliata* and *S. obtusa* can become locally dominant in places. The unit occurs on Mudrocks, Dwyka Group diamictites and sandstones (Bokkeveld Group) and soils are sandy-loamy of various depths. Quartz patches are a rare phenomenon concentrated in the southern portions of the Tanqua Basin. Fc is the dominant land type, with Ag land type playing subordinate role. Climatically the unit falls within a winter-rainfall regime with most of the precipitation between May and August, while December and January are virtually precipitation-free. The region has high spatial variability of precipitation, with some rain shadows experiencing as little as 40 mm of rainfall per year (in extremely dry years). MAP varies from a low of 72 mm in the central part of the unit to 112 mm in the north of the unit and to 111 mm in the south of the unit. MAT is slightly above 17 °C, but in winter the temperature can often fall below the frost mark (15 days in a year). Mean maximum and minimum monthly temperatures of 35.9 °C and 5.64 °C occur in January and July, respectively.

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 3.

Table 3: Tanqua Karoo (<sup>W</sup>Western distribution limit)

Growth Form	Description/Species
Geophytic herbs	<i>Drimia intricata</i> , <i>Lachenalia ameliae</i> , <i>Moraea pallida</i> , <i>M. speciosa</i> , <i>Ornithogalum xanthochlorum</i> , <i>Ornithoglossum viride</i> , <i>Oxalis pes-caprae</i> , <i>Strumaria unguiculata</i> , <i>Tritonia florentiae</i>
Grasses	<i>Stipagrostis ciliata</i> (d), <i>S. obtusa</i> (d), <i>Aristida adscensionis</i> , <i>Cladoraphis spinosa</i> , <i>Ehrharta calycina</i> , <i>Enneapogon desvauxii</i> , <i>E. scaber</i> , <i>Fingerhuthia africana</i> .
Herbs	<i>Gazania lichtensteinii</i> (d), <i>Amellus microglossus</i> , <i>A. strigosus</i> subsp. <i>pseudoscabridus</i> , <i>Dicoma capensis</i> , <i>Emex australis</i> , <i>Euryops annuus</i> , <i>Hebenstretia parviflora</i> , <i>Helichrysum herniarioides</i> , <i>Lepidium africanum</i> , <i>L. desertorum</i> , <i>Lessertia pauciflora</i> , <i>Leysera tenella</i> , <i>Lotononis parviflora</i> , <i>Lyperia tristis</i> , <i>Oncosiphon grandiflorum</i> , <i>Osteospermum pinnatum</i> , <i>Pelargonium minimum</i> , <i>Plantago cafra</i> , <i>Radyera urens</i> , <i>Ursinia nana</i> .
Semiparasitic shrub	<i>Thesium lineatum</i>
Succulent Shrubs	<i>Antimima hantamensis</i> (d), <i>Augea capensis</i> (d), <i>Gibbaeum gibbosum</i> (d), <i>Ruschia spinosa</i> (d), <i>Antimima wittebergensis</i> , <i>Aridaria noctiflora</i> subsp. <i>noctiflora</i> , <i>A. noctiflora</i> subsp. <i>straminea</i> , <i>Braunsia apiculata</i> , <i>Cephalophyllum curtophyllum</i> , <i>C. framesii</i> , <i>Crassula subaphylla</i> , <i>C. tetragona</i> subsp. <i>connivens</i> , <i>Drosanthemum delicatulum</i> , <i>D. framesii</i> , <i>D. lique</i> , <i>Euphorbia decussata</i> , <i>E.</i>

Growth Form	Description/Species
	<i>mauritanica</i> , <i>E. multiceps</i> , <i>E. rectirama</i> , <i>Hoodia gordonii</i> , <i>Leipoldtia schultzei</i> , <i>Lycium cinereum</i> , <i>Othonna pteronioides</i> , <i>Peersia macradenia</i> , <i>Pelargonium crithmifolium</i> , <i>Phyllobolus grossus</i> , <i>P. splendens</i> , <i>Ruschia intricata</i> , <i>Salsola aphylla</i> , <i>S. namibica</i> , <i>Sarcocaulon crassicaule</i> , <i>Scopelogenia bruynsii</i> , <i>Tetragonia fruticosa</i> , <i>T. robusta</i> var. <i>psiloptera</i> , <i>Tylecodon reticulatus</i> , <i>T. wallichii</i> subsp. <i>wallichii</i> , <i>Zygophyllum flexuosum</i> , <i>Z. microcarpum</i>
Low Shrubs	<i>Tripteris sinuata</i> (d), <i>Aptosimum indivisum</i> , <i>Asparagus capensis</i> var. <i>capensis</i> , <i>Berkheya spinosa</i> , <i>Chrysocoma ciliata</i> , <i>Eriocephalus africanus</i> , <i>E. ericoides</i> , <i>E. pauperrimus</i> , <i>E. spinescens</i> , <i>Euryops cuneatus</i> , <i>Galenia africana</i> , <i>G. fruticosa</i> , <i>Hermannia multiflora</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Monechma spartioides</i> , <i>Pelargonium grandicalcaratum</i> , <i>Pteronia aspalatha</i> , <i>P. ciliata</i> , <i>P. erythrochaeta</i> , <i>P. glauca</i> , <i>P. intermedia</i> , <i>P. oblanceolata</i> , <i>P. pallens</i> , <i>P. scariosa</i> , <i>P. sordida</i> , <i>Rhynchosia bullata</i> , <i>Stachys cuneata</i> <sup>W</sup> , <i>Zygophyllum microphyllum</i>
Herbaceous climber	<i>Cyphia comptonii</i>
Succulent herbs	<i>Brownanthus vaginatus</i> , <i>Crassula muscosa</i> , <i>Duvalia caespitosa</i> subsp. <i>caespitosa</i> , <i>Mesembryanthemum excavatum</i> , <i>M. guerichianum</i> , <i>M. stenandrum</i> , <i>Psilocaulon articulatum</i> , <i>P. junceum</i> , <i>Tetragonia microptera</i> .
Woody climber	<i>Asparagus fasciculatus</i> , <i>Microloma sagittatum</i>
Biogeographically Important Taxa	( <sup>RH</sup> Roggeveld-Hantam endemic, <sup>S</sup> Southern distribution limit) Low Shrubs: <i>Nenax cinerea</i> <sup>RH</sup> , <i>Stachys aurea</i> <sup>RH</sup> . Herbs: <i>Alatoseta tenuis</i> <sup>RH</sup> , <i>Dimorphotheca polyptera</i> <sup>S</sup> , <i>Nemesia karroensis</i> <sup>RH</sup> . Geophytic Herbs: <i>Haemanthus barkeri</i> <sup>RH</sup> , <i>Lapeirousia violacea</i> <sup>RH</sup> . Succulent Herbs: <i>Stapelia surrecta</i> <sup>RH</sup> , <i>Tridentea parvipuncta</i> subsp. <i>truncata</i> <sup>RH</sup> , <i>Tromotriche thudichumii</i> <sup>RH</sup>
Endemic Taxa	Succulent Shrubs: <i>Braunsia stayneri</i> , <i>Cephalophyllum corniculatum</i> , <i>Didymaotus lapidiformis</i> , <i>Drosanthemum bellum</i> , <i>D. lignosum</i> , <i>Euphorbia gentilis</i> subsp. <i>tanquana</i> , <i>Hammeria meleagris</i> , <i>Hereroa nelii</i> , <i>H. teretifolia</i> , <i>Malephora crassa</i> , <i>Ruschia tardissima</i> , <i>Tanquana prismatica</i> . Geophytic Herbs: <i>Haemanthus tristis</i> , <i>Strumaria karoopoortensis</i> .
Conservation Status	Least Concern
Conservation Target	19 %
Conserved in	About 10% statutorily conserved in the Tankwa Karoo National Park and a further 4% in private reserves, including Inverdoorn, Zwartbosch, Jakkalsfontein, Basjanskloof, Groote Kapelsfontein, Uintjieskraal and Vaalkloof.
Threat activities	Only a small portion of this area of low agricultural production has been transformed but due to overgrazing in some places, aliens such as <i>Atriplex lindleyi</i> subsp. <i>inflata</i> have invaded. Erosion is moderate (47%), high (36%) as well as very low (14%).
Protection Level	<i>Moderately Protected</i>
Remarks	Tanqua (Tankwa) Karoo is one of the driest forms of the Succulent Karoo Biome, and the whole appearance of the landscape resembles desert rather than semidesert during most of the year (in extremely precipitation-poor years in particular). The eastern edge (the foot of the Roggeveld Escarpment) and southern parts of the Tanqua Karoo, are wetter and consequently more densely vegetated. The classification status of the driest parts of the Tanqua Karoo as rain-shadow desert rather than semidesert (Succulent Karoo) remains open for the time being. The mapped unit nevertheless lies within the same range of MAP corresponding to some of the Succulent Karoo mapped elsewhere within the winter-rainfall region (Port Nolloth southwards to Wallekraal) but lacks the coastal fog of the latter area. The role of heavy grazing pressure in the 19th and early 20th centuries in the Tanqua Karoo needs to be evaluated in places where it is 'terribly tramped out' according to Acocks (1953). Tanqua Karoo (including the extensive sheet-wash plains) is an important local centre of endemism housing two endemic genera ( <i>Didymaotus</i> and

Growth Form	Description/Species
	<i>Eurystigma</i> ) and three near-endemic genera ( <i>Braunsia</i> , <i>Hammeria</i> and <i>Tanquana</i> )—all of the family Aizoaceae.
References	Lane (1977), Jürgens (1986), Acocks (1988), Mackay (1994), Mackay & Zietsman (1996), Milton et al. (1997), Rubin (1998), Schmiedel & Mucina (2006).

Although not directly associated with the project footprint, influences from Tanqua Escarpment Shrubland elements are prevalent along the northern and western sides of the greater project area. The unit is present in the Northern Cape province along a narrow belt on northwest-facing slopes of the Klein-Roggeveldberge and on southwest-facing and west-facing slopes of the Roggeveld Escarpment as far north as Bloukrans Pass, south of Calvinia. Generally found at altitudes between 620–1 600 m. The vegetation is found on steep flanks below an escarpment overlooking a basin, generally facing southwest supporting succulent shrubland of medium height with *Tylecodon* (botterboom) and *Euphorbia mauritanica* (melkboom) prominent and with undergrowth of both succulent (*Aridaria*, *Crassula*) and non-succulent (*Asparagus*, *Pteronia*) shrubs. Soils are derived from mudrocks as well as brown to grey shales, siltstones and sandstones, broken by network of intrusive Jurassic Karoo dolerites. The shallow soils form the basis for the classification of most of the area into Ib land type (with Dc land type being of lesser importance). The area has a less pronounced winter-rainfall regime with most of the rainfall is spread between March and August (peaking from June to August). MAT is almost 16°C and the incidence of frost is relatively high (30 days).

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 4.

Table 4: Tanqua Escarpment Shrubland

Growth Form	Description/Species
Geophytic herbs	<i>Androcymbium volutare</i> , <i>Asplenium cordatum</i> , <i>Boophone disticha</i> , <i>Cyanella hyacinthoides</i> , <i>Empodium plicatum</i> , <i>Oxalis obtusa</i>
Grasses	<i>Ehrharta calycina</i> , <i>Fingerhuthia africana</i> , <i>Merxmuellera dura</i>
Herbs	<i>Galium capense</i> subsp. <i>garipense</i> , <i>Lasiospermum brachyglossum</i> , <i>Leysera tenella</i> , <i>Pelargonium moniliforme</i> , <i>Tripteris microcarpa</i> .
Low shrubs	<i>Pteronia incana</i> (d), <i>Asparagus capensis</i> var. <i>capensis</i> , <i>A. striatus</i> , <i>Berkheya cardopatifolia</i> , <i>Chrysocoma ciliata</i> , <i>Eriocephalus africanus</i> , <i>E. ericoides</i> , <i>E. spinescens</i> , <i>Felicia filifolia</i> , <i>F. macrorrhiza</i> , <i>F. scabrida</i> , <i>Galenia africana</i> , <i>G. fruticosa</i> , <i>Heliophila cornuta</i> var. <i>squamata</i> , <i>Hermannia multiflora</i> , <i>Lessertia fruticosa</i> , <i>Limeum aethiopicum</i> , <i>Pelargonium grandicalcaratum</i> , <i>Pteronia oblanceolata</i> , <i>P. sordida</i> , <i>Salvia disermas</i> , <i>Selago albida</i> , <i>S. polycephala</i> , <i>Tripteris sinuata</i> , <i>Ursinia pilifera</i> ,
Semiparasitic shrub	<i>Thesium lineatum</i>
Succulent Shrubs	<i>Tylecodon paniculatus</i> (d), <i>T. wallichii</i> subsp. <i>wallichii</i> (d), <i>Aridaria noctiflora</i> subsp. <i>straminea</i> , <i>Crassula tetragona</i> subsp. <i>connivens</i> ,



Growth Form	Description/Species
	<i>Drosanthemum lique</i> , <i>Euphorbia caterviflora</i> , <i>E. mauritanica</i> , <i>Lycium cinereum</i> , <i>Manochlamys albicans</i> , <i>Tetragonia robusta</i> var. <i>psiloptera</i> , <i>Tylecodon ventricosus</i> .
Herbaceous climber	<i>Fockea sinuata</i>
Succulent herbs	<i>Crassula tomentosa</i> , <i>C. umbella</i> , <i>Tetragonia microptera</i>
Tall shrubs	<i>Diospyros austro-africana</i> , <i>Gomphocarpus fruticosus</i> , <i>Montinia caryophyllacea</i> , <i>Rhus burchellii</i> , <i>R. undulata</i>
Woody climber	<i>Asparagus fasciculatus</i> , <i>A. multituberosus</i> , <i>Microlooma sagittatum</i>
Biogeographically Important Taxa	( <sup>RH</sup> Roggeveld-Hantam endemic, <sup>S</sup> Southern distribution limit, <sup>W</sup> Western distribution limit) <ul style="list-style-type: none"> <li>▪ Low Shrubs: <i>Felicia burkei</i><sup>S</sup>, <i>Nenax cinerea</i><sup>RH</sup>, <i>Pelargonium magenteum</i><sup>RH</sup>, <i>Pteronia aspalatha</i><sup>RH</sup>, <i>Selago polygala</i><sup>RH</sup>, <i>Stachys aurea</i><sup>RH</sup>.</li> <li>▪ Herbs: <i>Cromidon hamulosum</i><sup>RH</sup>, <i>Diascia macrophylla</i><sup>RH</sup>, <i>Jamesbrittenia thunbergii</i><sup>RH</sup>, <i>Lotononis maximiliani</i><sup>RH</sup>, <i>Nemesia anisocarpa</i><sup>S</sup>, <i>Polycarena aurea</i><sup>RH</sup>, <i>Trigonocarpus lichtensteinii</i><sup>RH</sup>.</li> <li>▪ Succulent Herb: <i>Crassula dodii</i><sup>RH</sup>.</li> <li>▪ Graminoids: <i>Ehrharta melicoides</i><sup>W</sup>, <i>Secale strictum</i> subsp. <i>africanum</i><sup>RH</sup>.</li> </ul>
Endemic Taxa	▪ Low Shrub: <i>Indigofera hantamensis</i> .
Conservation Status	Least Concern
Conservation Target	Target 19 % (National Biodiversity Assessment, 2018)
Conserved in	Only a very small portion statutorily conserved in Tankwa Karoo National Park.
Threat activities	No visible signs of transformation or invasion of alien plants. Erosion is moderate (59%) and low (41%).
Protection Level	<i>Moderately Protected</i>
Remark	Tanqua Escarpment Shrubland is part of the Hantam-Roggeveld Centre of Endemism (Van Wyk & Smith 2001) and remains one of the least studied vegetation types of the country.
Reference	Van Wyk & Smith (2001).

Also not directly associated with the project footprint, being found in the lower lying alluvial valleys to the west of the project area, Tanqua Wash Riviere elements are represented along watercourses in the valleys that drain towards the north, west and south of the project area.

The unit is found within the Western Cape and Northern Cape Provinces along alluvia of the Tankwa and Doring Rivers and sheet-wash plains of their less important tributaries embedded within SKv 5 Tanqua Karoo. It is found at altitude ranging from 300–1 000 m within deeply incised valleys of intermittent rivers supporting a mosaic of succulent shrublands with *Salsola* and *Lycium* alternating with *Acacia karroo* gallery thickets. The broad sheet-wash plains support sparse vegetation of various *Salsola* species, often building phytogenic hillocks interrupting the monotonous barren face of a sheet wash. Occasional rainfalls in early winter result in localised displays of annuals and early flowering geophytes along washes. Found within broad Quaternary alluvial floors and drainage lines filled with recent sediments mostly from eroded Karoo Supergroup sediments and having sodic loamy to sandy soils (Ia land type). The run-off

in these habitats is very low and spread over large areas. Climatically, the region is characterised by arid to hyper-arid climate, with MAP ranging between 100 mm and 170 mm and overall MAP 162 mm, mainly falling in autumn and winter. Mean daily maximum and minimum temperatures are 32.5 °C and 3.0 °C for January and July, respectively while overall MAT is slightly higher than 17 °C. Due to basin macro-topography the occurrence of frost is fairly frequent.

A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 5.

Table 5: Tanqua Wash Riviere

Growth Form	Description/Species*
Important Taxa	<p><u>Riparian thickets:</u> Small Tree: <i>Acacia karroo</i> (d).</p> <p><u>Alluvial shrublands &amp; herblands:</u> Low Shrub: <i>Galenia africana</i>. Succulent Shrubs: <i>Lycium cinereum</i> (d), <i>Malephora luteola</i>, <i>Salsola arborea</i>, <i>Sarcocornia mossiana</i> agg. Geophytic Herbs: <i>Moraea speciosa</i>, <i>Tritonia florentiae</i>. Graminoids: <i>Cladoraphis spinosa</i>, <i>Stipagrostis obtusa</i>.</p> <p><u>Sheet washes:</u> Succulent Shrubs: <i>Augea capensis</i>, <i>Salsola aphylla</i>. Herbs: <i>Euryops annuus</i>, <i>Gazania lichtensteinii</i>, <i>Osteospermum pinnatum</i>, <i>Ursinia nana</i>.</p>
Endemic Taxa	<p><u>Alluvial shrublands &amp; herblands:</u> Herbs: <i>Limonium</i> sp. nov. (<i>Mucina</i> 310104/1 STEU).</p> <p><u>Sheet washes:</u> Succulent Shrub: <i>Salsola ceresica</i> (d).</p>
Conservation Status	Least Concern
Conservation Target	Target 19 % (National Biodiversity Assessment, 2018)
Conserved in	About 13% statutorily conserved in the Tankwa National Park and in some private reserves (Inverdoorn, Jakkalsfontein, Uintjieskraal, Groote Kapelsfontein, Vaalkloof).
Threat activities	About 3% already transformed for cultivation or dam building (Oudebaaskraal Dam and Swartkop se Dam). Alien <i>Atriplex lindleyi</i> subsp. <i>inflata</i> and <i>Prosopis</i> species can become frequent in places.
Protection Level	<i>Moderately Protected</i>
Remark	This unit is of heterogeneous character at present and the ecological and floristic relationship between the <i>Acacia karroo</i> -dominated riparian vegetation on the one hand and the <i>Salsola</i> -dominated sheet-wash vegetation on the other, deserves re-evaluation in the light of new data still to be collected.
Reference	Rubin (1998).

It is notable across the vegetation types that a suite of species tends to be represented across most of the area, but dominant species vary depending on climatic factors which are influenced by aspect and altitude. Slight variations in community structure, composition and dominant species are also noted within the vegetation units represented on site.

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Within the Mountainous area, more specifically the Renosterveld, there is a distinct and visible difference between north and south facing slopes, with north-facing slopes being drier and having a strong succulent shrub composition. Wetter south-facing slopes have a notable lower succulent shrub composition, with herbaceous shrubs dominating. This difference is less noticeable in lower lying areas, within the Moordenaars Karoo, where north and south facing slopes tend to both have more prominent succulent shrub and herb component.

Within lower lying areas, dominant species include shrubs such as *Ruschia intricata*, *Eriocephalus microphyllus* var. *microphyllus*, *Chrysocoma ciliata*, *Hirpicium alienatum*, *Asparagus capensis*, *Amphiglossa tomentosa*, *Pteronia ciliata*, *Pteronia sordida*, *Pentzia incana*, *Tripteris sinuata* and *Oedera genistifolia*, grasses including *Ehrharta calycina* and *Merxmuellera stricta* and succulents such as *Tylecodon wallichii* and *Crassula tetragona* subsp. *connivens*.

There is a clear change in the vegetation discernible above 1 350 m, where the cooler and wetter conditions result in a change in composition compared to the lower elevation areas. Although the vegetation is broadly similar in terms of the dominant species as listed above, species which characterise these areas which are not present or uncommon at lower elevations include *Rosenia spinescens*, *Eriocephalus grandiflorus* (Rare), *Ehrharta eburnea* (NT) and *Tribolium purpureum*, *Pelargonium griseum*, *Zygophyllum spinosum*, *Berkheya heterophylla* var. *heterophylla* and *Ruschia lineolata*. The abundance of geophytes and other species of potential concern are significantly higher within the slopes and higher lying areas, compared to the lower lying plains and river valleys.

Observations made during the walkdown supplemented by previous ecological and biodiversity assessments undertaken on several adjacent G7 WEF projects by Todd (2011, 2014, 2016, 2019) identify the following vegetation and flora characteristics:

- 1) Most of the central uplands of the project area are classified as Central Mountain Shale Renosterveld, transitioning to Koedoesberge-Moordenaars Karoo on the south and east sides. Although the vegetation on the west side is designated as Koedoesberge-Moordenaars Karoo, the composition is clearly different to the same unit on the east side where the vegetation appears to transition towards Tanqua Karoo rather than Koedoesberge-Moordenaars Karoo. Furthermore, there is a transition towards Tanqua Escarpment Shrubland towards the north and Tanqua Karoo to the west, with elements of both these units being represented within the peripheral boundaries of the project area,

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even though they do not overlap with the mapped vegetation as per the National Vegetation Map (2018).

- 2) In the field the vegetation unit distinction is not always obvious and there is a large overlap in the species composition of the units with a distinct transitional aspect. At a local level, altitude, aspect and soil depth are the dominant drivers of vegetation composition. High-lying areas are dominated by typical Renosterveld species while the proportion of succulents and karroid species increased with decreasing altitude or on drier aspects, thus transitioning into the surrounding low-lying drier Karroid vegetation. Higher altitude south-facing slopes are also distinctly less arid compared to north-facing slopes.
- 3) High-lying areas and cooler southern aspects are typically dominated largely by woody shrubs such as *Elytropappus rhinocerotis*, *Euryops lateriflorus*, *Eriocephalus africanus* and *Eriocephalus grandiflorus*, *Pteronia ambrariifolia*, *Pteronia glomerata*, *Pteronia glauca*, *Rosenia glandulosa* and *Asparagus capensis*; succulents such as *Ruschia cradockensis*, *Leipoldtia schultzei*, *Crassula deltoidea*, *Crassula tetragona*. Grasses tend to be scarce but become more common in patches where there is some soil present. Common grasses tend to be restricted to the tufted species including *Tenaxia (Merxmuellera) stricta*, *Ehrharta calycina* and *Karoochloa purpurea*. Grasses tend to be scarce in the rocky outcrops, stone benches and rocky pavements. It has also been postulated that south-facing slopes are likely to represent an important climate change refugia for biodiversity, and these areas have been designated as such in the Namakwa Biodiversity Sector Plan (2008).
- 4) The drier, sunny aspects and lower lying areas contain a larger proportion of succulent species and are dominated by succulents such as *Ruschia cradockensis*, *Crassula rupestris*, *Crassula deltoidea*, *Crassula nudicaulis*, *Tylecodon reticulatus*, *Sarcocaulon patersonii*, common woody or herbaceous shrubs include *Pteronia glomerata*, *Pteronia sordida*, *Eriocephalus ericoides*, *Pelargonium magenteum* and *Pelargonium abrotanifolium*.
- 5) Although Renosterveld is usually a fire-prone ecosystem, there is little evidence of regular fires at the site. Discussions with the local farmers also confirmed that although fires do occasionally occur, they are not a regular feature and are not used by farmers as a veld management tool. Within arid Renosterveld types, the significance of fire is reduced, and it does not appear that fire is an important ecosystem driver that may be disrupted by the development. Fire scars in the broader area indicate that occasional fires may be caused by lightning ground-strikes, but their subsequent spread appears to be limited to high-lying areas of dense vegetation along south-facing slopes.
- 6) In terms of unique and sensitive habitats at the site, a few different potentially sensitive environments are identified.

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- a) In general, the slopes are more speciose and contained a greater variety of habitat types than the lower lying valleys and mountain ridges and crests, which tend to be more broadly homogenous. The varied aspects as well as microhabitats created by rocky outcrops on the slopes, is likely to be a contributing factor to the higher diversity.
  - b) There are several wetlands and rivers within the study area which should be avoided by the development as these are important habitats for plants as well as fauna and are especially sensitive to disturbance. Several specific sites have been identified that are at risk from the current layout plan.
  - c) *Brunsvigia josephinae* which is listed as Vulnerable, is widespread across the project area, from lower lying areas to mid-slope and occasionally on lower mountain tops. It is also found sporadically along riverbanks of watercourses with one notable sub-population found on an upper order tributary of the Groot River. Several small to large sized population of a few hectares was noted to be present in the broader area within or near project component footprints. This species will require relocation where affected by project components, but due to the extensive coverage in the wider project area, it is not anticipated that the project specific impact will be significant to the species as a whole.
  - d) Several other species of conservation concern were found to be present, as small scattered and localised populations or very few individuals to single individual occasionally noted within the areas surveyed. These include *Indigofera hantamensis*, *Antimima androsacea*, *Euryops sulcatus*, *Antimima loganii*, *Geissorhiza karooica*, *Lotononis venosa*, *Romulea eburnea*, *Romulea hallii*, *Romulea syringodeoflora* and *Romulea tortuosa*.
  - e) Although no quartz patches were observed at the site, several gravel patches and rock pavements are present, particularly along ridges. Although these often look biologically depauperate due to their low plant cover, they frequently contain rare or endemic geophytes and dwarf succulent species and should also not be disturbed. They are also likely to a somewhat unique landscape feature for specific faunal species, including reptiles.

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## 11.2 Faunal Habitat and Communities

Observations made during the walkdown supplemented by previous ecological and biodiversity assessments undertaken on several adjacent G7 WEF projects by Todd (2011, 2014, 2016, 2019) identify the following faunal attributes:

### 11.2.1 Mammals

At least 50 mammal species potentially occur at the site (Appendix 2). Due to the diversity of habitats available, which includes rocky uplands, densely vegetated kloofs and riparian areas, as well as open plains and low shrublands, the majority of species with a distribution that includes the site are likely to be present in at least part of the site. The mammalian community is therefore relatively rich and due to the remote and inaccessible nature of the area probably has not been highly impacted by human activities. Larger carnivores such as jackal and caracal are persecuted by the local farmers to reduce livestock losses. Nevertheless, discussions with the local farmers indicate that these species appear to remain relatively common in the area. There is likely to be quite a large differentiation in community composition between the lowlands and the uplands of the site. The uplands provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Smith's Red Rock Rabbit, *Pronolagus rupestris*, Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. The lowlands are likely to contain an abundance of species associated with lowland habitats such as deeper soils and floodplain habitats, which includes Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paebe* and Common Duiker *Sylvicapra grimmia*. In general, the ungulates present at the site are likely to be fairly widespread. Springbuck are confined by fences and occur only where farmers have introduced them or allowed them to persist and should be considered as part of the farming system rather than as wildlife per se. Both Duiker and Steenbok *Raphicerus campestris*, are adaptable species that can tolerate high levels of human activity and are not likely to be highly sensitive to the disturbance associated with the development. Klipspringer *Oreotragus oreotragus* and Grey Rhebok *Pelea capreolus* are somewhat more specialized in their habitat requirements and make use of the upper slopes of the site. Klipspringer are associated with steep slopes, cliffs and rocky outcrops and may be more vulnerable to impact from the development due to greater overlap between their habitat and the distribution of the wind turbines.

The Riverine Rabbit which is listed as Critically Endangered (IUCN 2010) and is regarded as the most threatened mammal in South Africa is known to occur within the broad area. Populations

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of this species occur between Sutherland and Fraserburg to the northeast as well as around Touwsriver to the southwest. Based on the available information, the habitat at the site does not appear to be suitable for this species and there are no known records from the area, indicating that it is highly unlikely that it occurs at the site. Should it occur at the site it would most likely be associated with the alluvial soils and riparian fringe along the major drainage lines that occur in the lowlands of the site which would not be directly impacted by the development which is restricted to the uplands. It is further established that the site is outside of the typical Riverine Rabbit distribution range.

### 11.2.2 Reptiles

There is a wide range of environments present for reptiles at the site, including rocky uplands and cliffs, open lowlands and densely vegetated riparian areas. As a result, the site has a rich reptile fauna which is potentially composed of 7 tortoise species, 20 snakes, 17 lizards and skinks, two chameleons and 10 geckos. The site falls within the range of the little-known Fisk's House Snake *Lamprophis fiskii* which is listed as Vulnerable and has usually been recorded in karroid sandy areas. This species may therefore occur within the lowlands of the site and as such would probably not be significantly impacted by the development especially given its nocturnal, largely subterranean and secretive nature. Several protected and listed lizard species are likely to occur at the site including the Namaqua Plated Lizard *Gerrhosaurus typicus* (Near Threatened), the Karoo Girdled Lizard *Cordylus polyzonus* (protected) and the Cape Crag Lizard *Pseudocordylus microlepidotus*. Since the Karoo Girdled Lizard and Cape Crag Lizard are associated with rocky outcrops, it is not likely that these species will be directly affected by the development if the turbines are not positioned in areas with steep slopes where such outcrops are likely to be located. The Namaqua Plated Lizard may be more common than believed (Alexander & Marais 2007) and occurs in karroid succulent veld where it digs burrows at the base of shrubs. This species is therefore likely to be restricted to the lowlands of the site which will be little impacted by the development.

Tortoises were relatively abundant at the site and many Angulate Tortoises, *Chersina angulata* were observed as were several Karoo Tent Tortoises, *Psammobates tentorius tentorius*. Tortoises may be negatively impacted by the development as they are vulnerable to collisions with motor vehicles and predation by avian predators while traversing open areas. Attractive species such as tent tortoises are also vulnerable to collection for use as pets or trade, and the increased accessibility resulting from the new roads that will be constructed as part of the development would raise the risk for these species.

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Several outcrops will be marginally affected by the turbine layout and construction. Rehabilitation measures should be implemented to reduce the overall effects.

### 11.2.3 Amphibians

Although there are no perennial rivers at the site, several of the larger drainage lines in the area were observed to contain rocky, sheltered pools that are likely to contain water on a permanent basis. Several wetlands with dense stands of sedges were also observed at the site and are likely to represent important amphibian habitats. Consequently, amphibians which require near-permanent water as well as those adapted to more arid conditions are likely to occur at the site. Nevertheless, only eight frog and toad species are likely to occur at the site, all of which are quite widespread species of low conservation concern. The Karoo Dainty Frog, *Cacosternum karoicum* is listed as Data Deficient reflecting the little-known distribution and ecology of this species. To date, the Karoo Dainty Frog has been recorded from a few scattered locations across the Karoo in the Western and Northern Cape, but it is likely that it occurs more widely across the karoo in general. The site also falls within the distribution of two other regional endemic species, the Cape Sand Frog, *Tomopterna delalandii* and the Raucous Toad, *Amietophrynus rangeri*. The Cape Sand Frog occurs in lowlands and valleys in fynbos and succulent karoo throughout most of the Western Cape and into Namaqualand. The Raucous Toad is more widely distributed and occurs throughout much of South Africa inland and along the east coast into Gauteng and Mpumalanga. There do not therefore appear to be any range-restricted species which occur at the site which would be vulnerable to population-level impacts. In general, the most important areas for amphibians at the site are the riparian areas, seeps and wetlands and the man-made earth dams which occur in the area. As these are widely recognized as sensitive habitats, the development is likely to avoid these areas as far as possible and the potential conflict between amphibians and the development is likely to be low. Amphibians are however extremely sensitive to pollutants and the large amount of construction machinery and materials present at the site during the construction phase would pose a risk to amphibians should any spills occur.

### 11.2.4 Invertebrates

An aggregating, ground-nesting bee (Hymenoptera) was observed at several places generally associated with lower-lying alluvial deposits. While it is not possible to accurately identify without collected specimens, it has been determined that it possibly within one of six bee families/subfamilies, based on the fact that they were ground-nesting on flat, non-friable soil



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with no turrets marking each nest; aggregating in a large population; and some photographed specimens appeared to have pollen on their bodies. These families/subfamilies are Melittidae, Andrenidae, Colletidae, Halictidae, Megachilidae (subfamily Fideliinae) and Apinae (Tribe Anthophorini). Based on the robustness of the bodies, it is more likely that they are Andrenids, Megachilids or in the Apinae, as the other groups mentioned above tend to have slimmer body designs (Owen, 2021). All of these groups are largely data-deficient, and it is thus difficult to find information on population sizes, ranges and conservation statuses. None the less, based on available literature sources, ground-nesting bees are vulnerable to any activities that will till the soil, such as agriculture or construction, or loss of their host plants from which they collect pollen or leaf material for nest provisioning (Owen, 2021). All of these groups are important pollinators, although undervalued because of the general focus on the African Honey Bee as a pollinator. Since the bees are found in populations that are not confined to a single burrow, but occupy numerous burrows in a wider area, making relocation not feasible, together with their important ecological role as pollinators, these populations should be retained where identified, as they were found to be uncommon across the broader project area of influence.

### 11.3 Bioregional Planning

Since the component projects and area of influence overlaps the Western Cape and Northern Cape boundary, these two regional plans (Western Cape Biodiversity Spatial Plan and Northern Cape Critical Biodiversity Areas) will be briefly considered for contextual purposes. Additional Plans that overlap with the project area include the Namakwa Bioregional Plan and the Succulent Karoo Ecosystem Planning (SKEP) project, which will be briefly incorporated where relevant aspects are identified that are relevant. These regional plans are not specifically relevant to the walkdown and were considered as part of the original ecological assessments undertaken for the project. They are however important to consider in terms of regional planning processes.

With reference to Figure 3, the project area overlaps with Critical Biodiversity Areas (CBA) 1 & 2 and Ecological Support Areas (ESA) designated as per the Western Cape Biodiversity Spatial Plan and Northern Cape Critical Biodiversity Areas. In general terms the CBA 1 area runs from the south-west (connecting with the Tanque Wash Riviere) of the project area through the south-western side towards the east and north, with CBA 2 in the north-east and ESA 1 corresponding with the Tanqua Wash Riviere draining to the north-west of the project area.



# Project : Euronotus

## Layout - Critical Biodiversity Areas

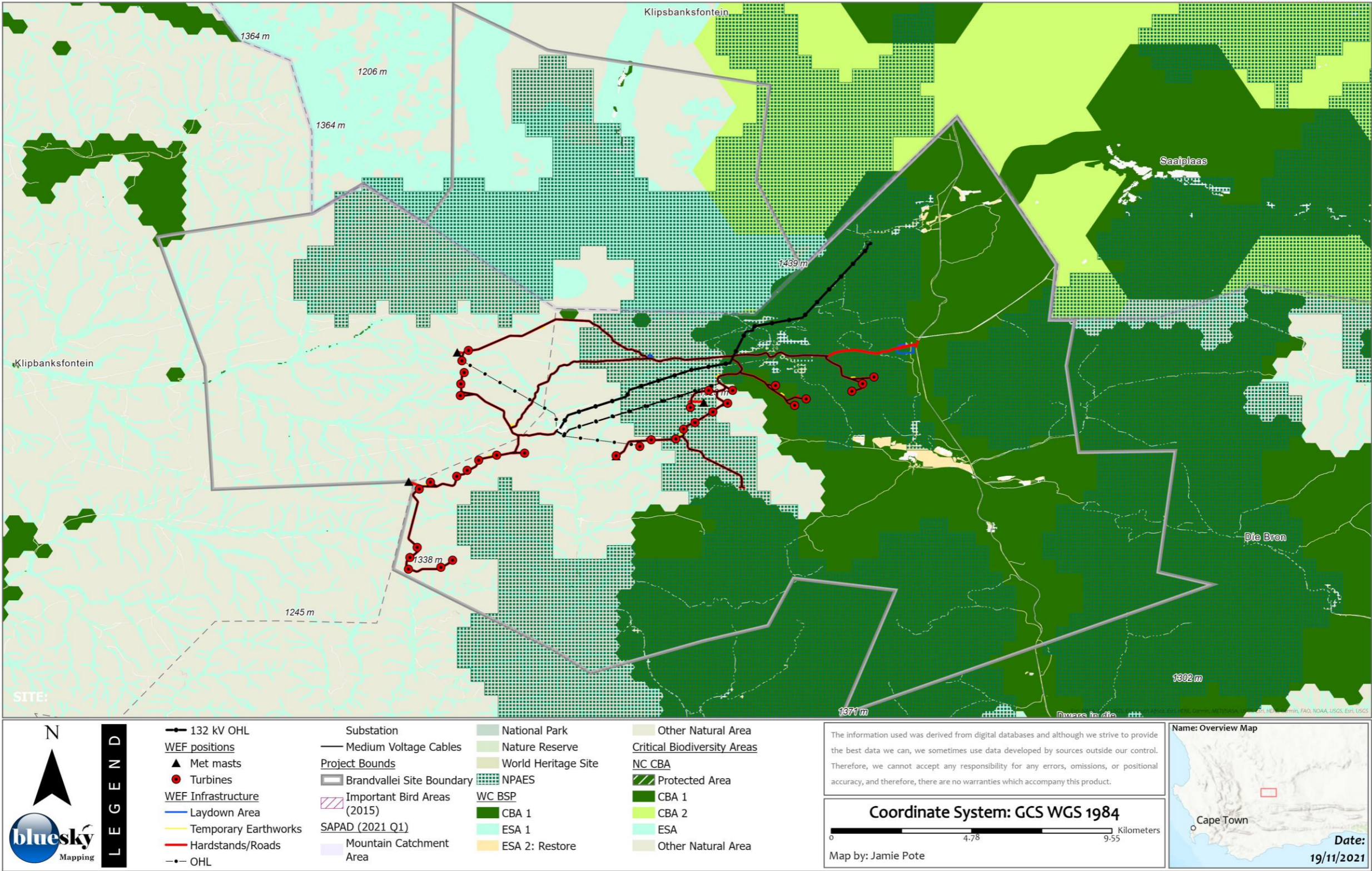


Figure 3: Bioregional Planning (Critical Biodiversity Areas)

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## 12 Walkdown Findings

### 12.1 Vegetation

Since the original ecological assessments were undertaken for each of the separate wind energy facility projects, this walkdown has been undertaken for the wider project area and thus it has been possible to refine and better understand the vegetation composition and local distribution of flagged species of conservation concern within the greater area of influence. Figure 4 below provides a refinement of the national vegetation map, based on broad level observations during the walkdown.

### 12.2 Flora

Flora species typical of the vegetation include...

Several Species of Conservation Concern were identified during the initial ecological assessments. In addition, with the inclusion of additional available information and surveying, additional species have been identified. Where these species have been identified as occurring, measures have been taken to try and better understand the species, the broader distribution of the species and local populations within the project site and broader area of influence. A list of flora species of conservation concern that have been identified or recorded or during the walkdown is provided in Table 6 below, with photos and additional information relating to the species and populations from respective databases and walkdown observations is provided in Table 7.

A list of species that are confirmed to be present for which permits will be required in terms of the Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) and the Northern Cape Nature Conservation Act (Act No 9 of 2009) are provided in Appendix 2.

# Project : Euronotus

## Layout - Sensitivity Overview

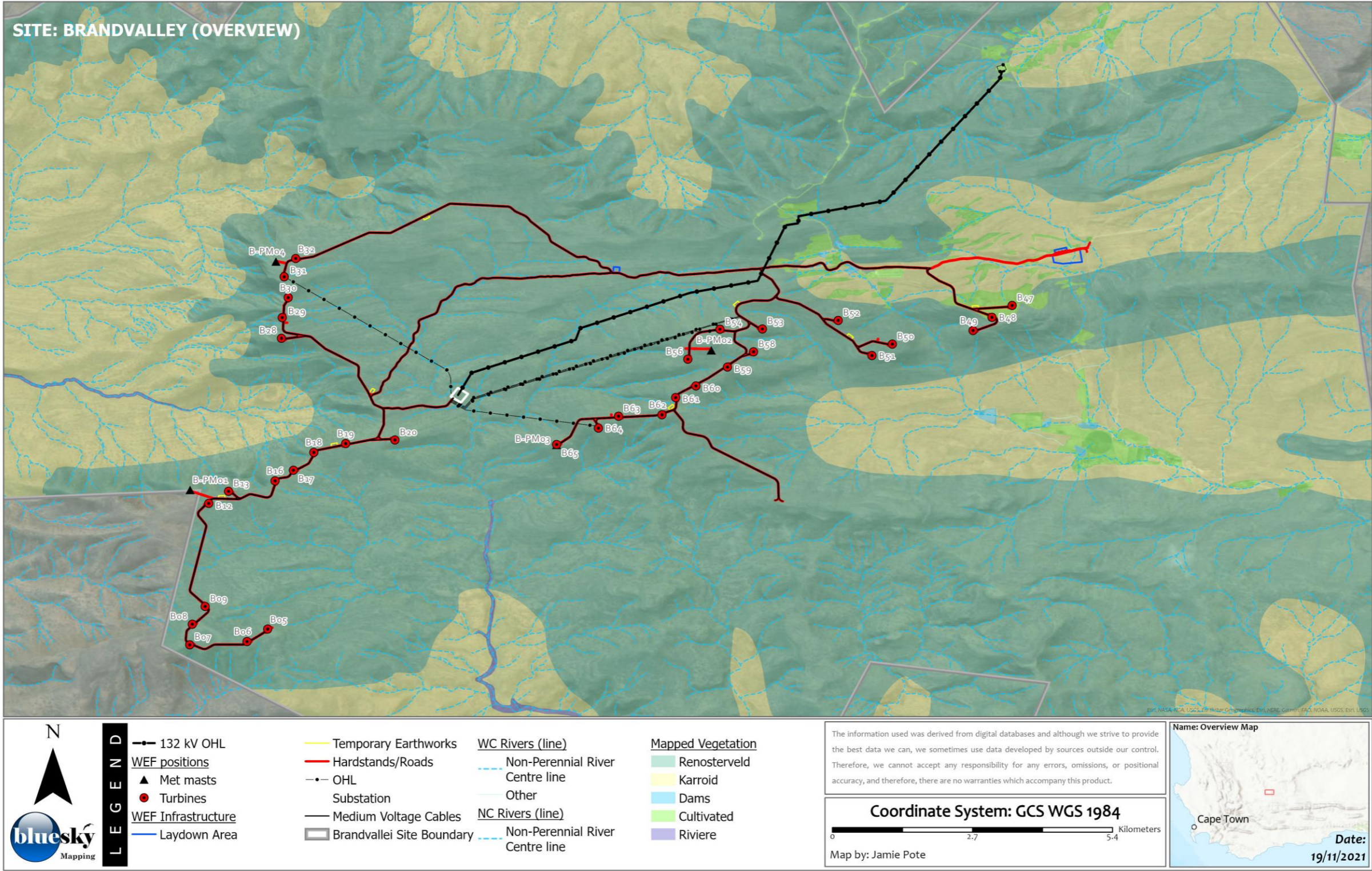


Figure 4: Refined vegetation mapping.

Table 6: Flora species of Conservation Concern confirmed to be present

Scientific Name	Family	IUCN Status*	Description and Distribution
<i>Antimima androsacea</i>	Aizoaceae	Critically Rare	A range-restricted species (EOO 10km <sup>2</sup> ), known from one site where it is not threatened. Sutherland, Roggeveld Escarpment.
<i>Antimima loganii</i>	Aizoaceae	Vulnerable	Poorly known and apparently rare species. Its distribution range is not well known, but occurrence records suggest that it is very small. There is currently one known location, but it is likely an underestimate, as it may be overlooked due to taxonomic uncertainty. It is potentially threatened by overgrazing. Endemic to Roggeveld Escarpment near Sutherland in the Northern Cape.
<i>Brunsvigia josephinae</i>	Amaryllidaceae	Vulnerable	Long-lived bulb occurs as widely scattered subpopulations in lowland areas that are subject to continued habitat loss to. Herbarium specimens record about 18 subpopulations, and an estimated further 70 unrecorded subpopulations may exist. All subpopulations consist of fewer than 50 adult plants and are declining due to collection on an ongoing basis for medicinal purposes. Nieuwoudtville to Baviaanskloof.
<i>Euryops sulcatus</i>	Asteraceae	Vulnerable	Has a restricted range, with an extent of occurrence (EOO) of 1083 km <sup>2</sup> . It has been recorded from five locations, but likely to occur at a few more within unexplored suitable habitat within its range. It continues to decline due to ongoing habitat degradation as a result of drought and overgrazing. Endemic to the Roggeveld and Nuweveld escarpments on the border between the Western and Northern Cape
<i>Geissorhiza karoocica</i>	Iridaceae	Near Threatened	A range restricted species, EOO 497 km <sup>2</sup> , known from six locations where it is potentially threatened by habitat loss and degradation as a result of overgrazing and erosion. Known from Roggeveld Mountains to Matjiesfontein.
<i>Indigofera hantamensis</i>	Fabaceae	Rare	A rare species, known from only three subpopulations scattered over a large area. Not threatened. Roggeveld to Calvinia.
<i>Lotononis venosa</i>	Fabaceae	Endangered	An endemic species to the Klein Roggeveld escarpment (extent of occurrence 84km <sup>2</sup> , and area of occupancy 16km <sup>2</sup> ). It is known from four locations. Some of the habitat has been transformed for crop cultivation in the past. Overgrazing by livestock and more frequent and persistent droughts are causing ongoing habitat degradation. Klein Roggeveld Mountains.
<i>Romulea eburnea</i>	Iridaceae	Vulnerable	A rare, localized endemic to the Roggeveld Escarpment, where it is known from two locations and potentially threatened by habitat degradation due to overgrazing. Klein Roggeveld.
<i>Romulea hallii</i>	Iridaceae	Vulnerable	A Roggeveld endemic known from two locations, (EOO 39km <sup>2</sup> ). It is potentially threatened by road maintenance and expansion and livestock overgrazing. Roggeveld Plateau southwest of Sutherland.
<i>Romulea</i>	Iridaceae	Near	A range restricted Roggeveld endemic (EOO

Scientific Name	Family	IUCN Status*	Description and Distribution
<i>syringodeoflora</i>		Threatened	474km <sup>2</sup> ), known from nine location and possibly occurring at a few more in unsurveyed parts of its range. Experiencing ongoing decline of habitat to crop cultivation as well as habitat degradation as a result of livestock overgrazing. Stony shale flats and slopes, Roggeveld Plateau.

\* IUCN/SANBI Status



*Antimima androsacea*



*Indigofera hantamensis*



*Antimima loganii*



*Lotononis venosa*



*Geissorhiza karoocica*



*Romulea syringodeoflora*



*Brunsvigia josephinae*



*Romulea eburnea*



*Euryops sulcatus*



*Romulea hallii*

Table 7: Flora species descriptions

Scientific Name	Occurrence within Area of Influence
<i>Antimima androsacea</i>	Large sub-population on north-facing slope as indicated on north side of Brandvalley WEF. Found to be common within the broader area. Population is unlikely to be at risk from irreversible loss on condition relocation is undertaken before commencement, where affected. Unlikely to be significantly affected.
<i>Antimima loganii</i>	Widespread within broader project area, on slopes and ridges, mostly to the west, south-west and north-west. Unlikely to be significantly affected.
<i>Brunsvigia josephinae</i>	Occurs throughout area, several large sub-populations outside of project footprint. Several sub-populations across the broader areas are far larger than the 'fewer than 50 adult plants' as described in the conservation assessment for the species. Population is unlikely to be at risk from irreversible loss on condition that all affected adults and juveniles are relocated before commencement.
<i>Euryops sulcatus</i>	Scattered, sporadic clumps on slopes and valleys. Appears to be more common in valleys to the west of the Brandvalley but extends eastward onto slopes and hilltops on the north side of the Brandvalley WEF extending through the south-western side of the Rietkloof WEF. Unlikely to be significantly affected.
<i>Geissorhiza karooica</i>	Present, scattered throughout the site in low-lying areas. Unlikely to be significantly affected.
<i>Indigofera hantamensis</i>	Few scattered individuals recorded near Karreebosch powerline. Unlikely to be



Scientific Name	Occurrence within Area of Influence
	significantly affected as on west-facing slopes outside of project footprints.
<i>Lotononis venosa</i>	Possibly recorded on site in original assessment by Todd. Not recorded during walkdown. Unlikely to be significantly affected.
<i>Romulea eburnea</i>	Recorded and common in seep areas and on south-facing slopes. Unlikely to be significantly affected.
<i>Romulea hallii</i>	Scattered on south-facing slopes and peaks. Unlikely to be significantly affected.
<i>Romulea syringodeoflora</i>	Scattered widespread clumps. Unlikely to be significantly affected.

## 12.3 Fauna

Fauna species of Conservation Concern typical of the vegetation and site include species listed in Table 8.

Table 8: Fauna species

Scientific Name	Family	IUCN Status	Occurrence/Comment
<b>MAMMALS</b>			
<i>Bunolagus monticularis</i> (Riverine Rabbit)	Lagomorpha	CR	<b>Not Present.</b> Confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo. Presence highly unlikely. Site is outside of known distribution range.
<i>Felis nigripes</i> (Black-footed cat)	Carnivora	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub. May be a transient species.
<b>REPTILES</b>			
<i>Psammobates tentorius tentorius</i> (Karoo Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads. Found throughout the project area but observed to be more common in lowland areas.
<i>Psammobates tentorius veroxii</i> (Bushmanland Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads. Found throughout the project area but observed to be more common in lowland areas.
<b>AMPHIBIANS</b>			
None of Concern			
<b>INVERTEBRATES</b>			
<i>Aloeides thyra orientis</i> (Red copper)	Lycaenidae	LC	In vicinity of known distribution range of related subspecies (Brenton Blue). No Lycaenidae species observed during walkdown.

## 12.4 Sensitive Areas and species populations

Sensitive areas are identified either in the original biodiversity assessment and/or observed during the walkdown include the following:

- Rocky Outcrops and Ridges on slopes and mountain peaks;
- Rivers, seeps, wetlands and pans; and
- Sub-populations of flagged species of conservation concern.

A summary of the Sensitive Areas is provided in Table 9 and shown in Figure 5.

Table 9: Sensitive Areas identified in proximity to project infrastructure

Label	Sensitivity	Vegetation	Comment
1	<i>Indigofera hantamensis</i>	Karroid	Few individuals of <i>Indigofera hantamensis</i> sp. To be avoided.
2	<i>Brunsvigia josephinae</i>	Karroid/ Renosterveld	Extensive population of scattered <i>Brunsvigia josephinae</i> . Due diligence during any activities.
3	<i>Brunsvigia josephinae</i>	Renosterveld	Sub population of dense <i>Brunsvigia josephinae</i> . No further loss without relocation.
4	<i>Brunsvigia josephinae</i>	Renosterveld	Sub population of dense <i>Brunsvigia josephinae</i> . No further loss without relocation.
5	Rocky Garden	Renosterveld	Sensitive rocky habitat. No infrastructure to be placed in vicinity. To be demarcated and signposted as no-go area.
6	<i>Brunsvigia josephinae</i>	Renosterveld	Extensive population of scattered <i>Brunsvigia josephinae</i> . Due diligence during any activities.
7	Pan (No-Go)	Karroid	No-Go ephemeral pan adjacent to site camp and road at risk from vehicles as a turning point. To be demarcated with fence and signage.
8	Seep (No-Go)	Renosterveld	Intact seep area. No-Go area. Not suitable for pylon placement.
9	Canal (No-Go)	Karroid	Canal traversing proposed site. At risk from flooding during rainfall. Not suitable for Site Camp.
10	<i>Brunsvigia josephinae</i>	Renosterveld	Extensive population of scattered <i>Brunsvigia josephinae</i> . Due diligence during any activities.
11	<i>Antimima androsacea</i> (dense)	Renosterveld	Dense population of Critically Rare species. Due diligence to be applied working in this area and infrastructure to be kept to minimum. Relocation required where necessary.
12	Seep/Watercourse (No-Go)	Renosterveld	Seep/canal area. At risk from flooding during rainfall. Not suitable for Site Camp.
13	<i>Brunsvigia josephinae</i>	Karroid	Moderate density <i>Brunsvigia josephinae</i> population. Not suited for proposed Karreebosch powerline.
14	High Biodiversity slope	Karroid	Elevated and rich biodiversity along southernmost slopes. Loss to be kept to minimum.
15	High Biodiversity slope	Karroid	Elevated and rich biodiversity along southernmost slopes. Loss or impacts to be kept to minimum.
16	Aggregating, ground-nesting Bee species	Karroid	Population of unknown aggregating, ground-nesting Bee species. To be avoided, as sensitive to disturbance and bees are critical ecologically as pollinators.
17	Aggregating, ground-nesting Bee species	Karroid	Population of unknown aggregating, ground-nesting Bee species. To be avoided, as sensitive to disturbance and bees are critical ecologically as

Label	Sensitivity	Vegetation	Comment
			pollinators.
18	Watercourse/Seep (No-Go)	Renosterveld	Extensive seep and watercourse area at risk from multiple road crossings. Road to be adjusted to reduce impact.
19	<i>Brunsvigia josephinae</i>	Renosterveld/ Karroid	Extensive population of large <i>Brunsvigia josephinae</i> associated with watercourse and riparian vegetation. Edge of new road to not extend closer to river than existing access track edge.
20	Watercourse (No-Go)	Karroid	Watercourse next to access track. To be avoided and not used for project access.
21	<i>Antimima androsacea</i> (sparse)	Renosterveld/ Karroid	Critically Rare species present sporadically. Not specifically at risk from project as generally more common on south facing slopes but small clumps also on summits. Due diligence to be implemented with pre-construction screening and relocation before commencement on footprint within this area.

# Project : Euronotus

## Layout - Sensitivity Overview

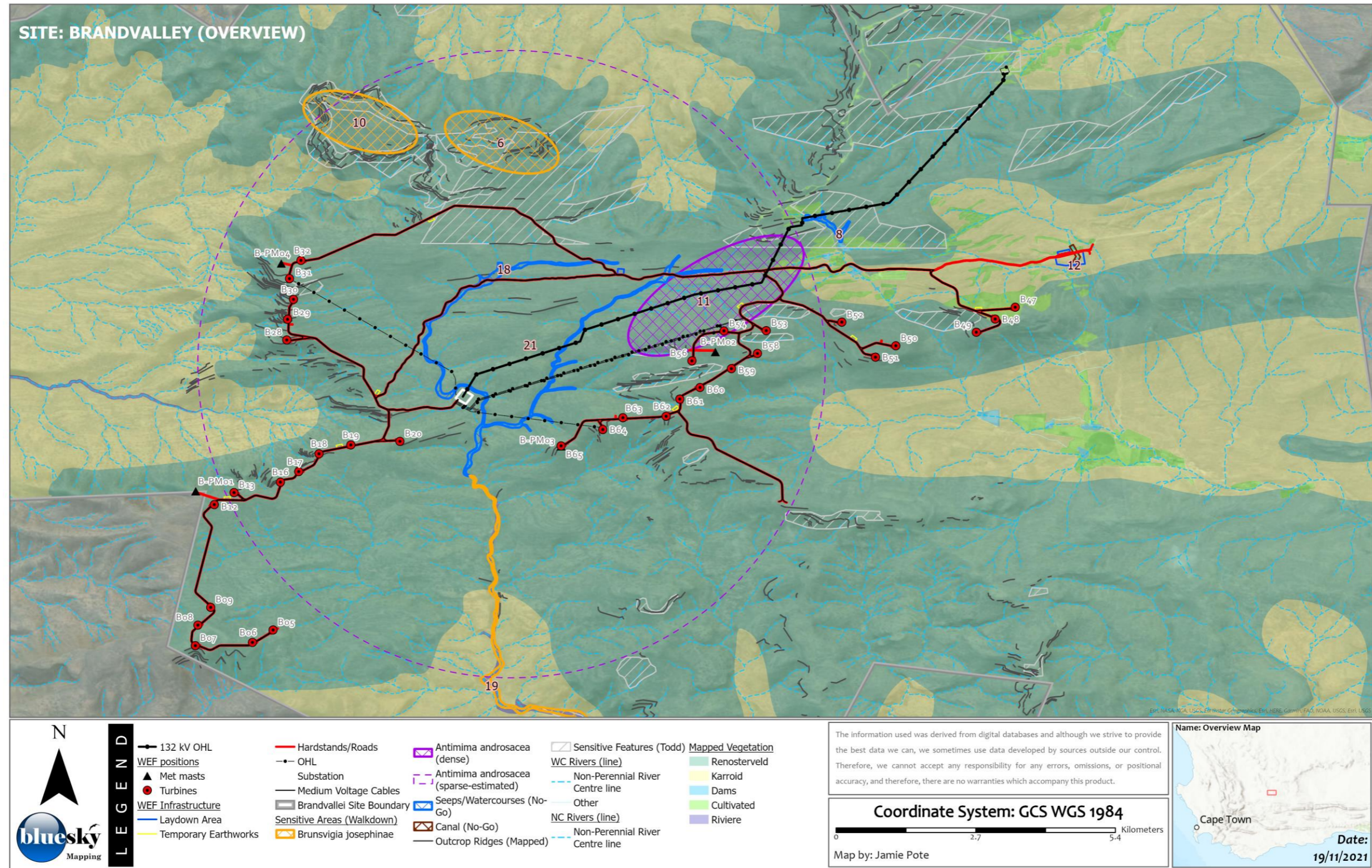


Figure 5: Sensitive and Critical Habitat features identified during walkdown (Overview).

## 12.4.1 Turbines, Roads and other Infrastructure

A summary analysis of specific infrastructure risks is provided in Table 10 and indicated in Figure 6.

Table 10: Summary of WEF and infrastructure vegetation and sensitivities.

Postion/ Segment	Vegetation	Species	Comment
1	Renosterveld		
2	Renosterveld		
3	Renosterveld		
4	Renosterveld		
5	Renosterveld		
6	Renosterveld		
7	Renosterveld		
8	Renosterveld		
9	Renosterveld		
12	Renosterveld		
13	Renosterveld		Rocky Outcrop
14	Renosterveld		Rocky Outcrop
15	Renosterveld		
16	Renosterveld		
17	Renosterveld		
18	Renosterveld		
19	Renosterveld		
20	Renosterveld		
24	Renosterveld		Rocky Outcrop
25	Renosterveld		
26	Renosterveld		Rocky Outcrop
28	Renosterveld		Rocky Outcrop
29	Renosterveld		Rocky Outcrop
30	Renosterveld		
31	Renosterveld		
32	Renosterveld		
34	Renosterveld		
35	Renosterveld		
37	Renosterveld	<i>Brunsvigia josephinae</i>	
40	Renosterveld	<i>Brunsvigia josephinae</i>	
41	Renosterveld	<i>Brunsvigia josephinae</i>	
44	Renosterveld	<i>Brunsvigia josephinae</i>	
45	Renosterveld	<i>Brunsvigia josephinae</i>	
46	Renosterveld	<i>Brunsvigia josephinae</i>	
47	Renosterveld		
48	Renosterveld		
49	Renosterveld		Rocky Outcrop
50	Renosterveld		
51	Renosterveld		
52	Renosterveld		
53	Renosterveld		
54	Renosterveld		
55	Renosterveld	<i>Antimima androsacea</i>	Site over cell phone mast
56	Renosterveld		
57	Renosterveld		

Postiion/ Segment	Vegetation	Species	Comment
58	Renosterveld		
59	Renosterveld		
60	Renosterveld		
61	Renosterveld		
62	Renosterveld		
63	Renosterveld		
64	Renosterveld		
65	Renosterveld		Rocky Outcrop
66	Renosterveld		
67	Renosterveld		
68	Renosterveld		
69	Renosterveld		
70	Renosterveld		
Site Camp	Renosterveld		Canal traverses proposed site camp (12). Not suitable as it may be prone to seasonal flooding.
Substation	Renosterveld		
Powerline			Central (east-west) portion traverses seep area (8), with pylons in seep. Should be realigned. Passes through species area (11), due care to be taken during construction within minimal pylons.
Northern Access Road	Renosterveld		Access road passes through and along seep area (18) multiple times. Access road should be realigned.
Southern Access Road	Karroid/ Renosterveld		
Central North-South Access Road	Renosterveld		Access road passes through and along seep area (18) multiple times and along watercourse with large <i>Brunsvigia josephinae</i> population (19). Access road should be aligned as far from watercourse as possible and should not extend closer to watercourse than inner side of existing access track.
WTG 1-9	Renosterveld		
WTG 12-20	Renosterveld		
WTG 24-32	Renosterveld		
WTG 34-46	Renosterveld		Scattered <i>Brunsvigia josephinae</i> sub-population (6, 10), will require search and rescue.
WTG 47-49	Renosterveld		
WTG 50-52	Renosterveld		
WTG 53-57	Renosterveld		
WTG 58-65	Renosterveld		
WTG 66-70	Renosterveld		

# Project : Euronotus

## Layout - Sensitivity Overview

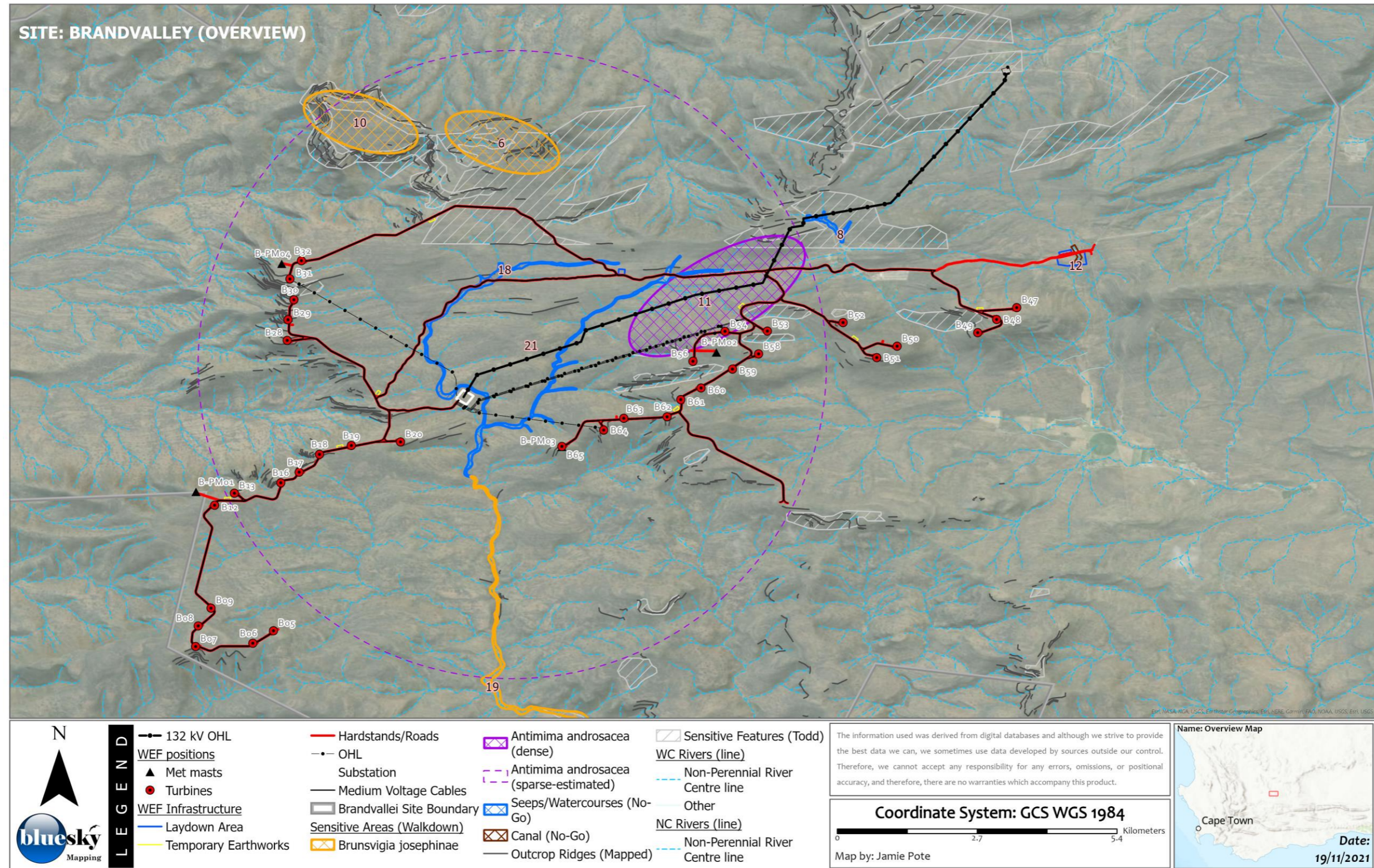


Figure 6: Sensitive Areas identified and WEF infrastructure.

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### 13 Walkdown Conclusions and Recommendations

The following general recommendations are made based on the findings of the walkdown, with reference to Table 10 and Figure 6:

- Turbines 13, 28, 29, 49 & 65 are located adjacent to outcrops. The outcrops should be avoided as far as possible during final surveying and pegging out.
- Central (east-west) portion of the overhead powerline traverses a seep area (8), where pylons would be required in the seep. This section must be realigned to avoid intrusion into or near the seep (remain 50 away from the seep).
- The overhead powerline also passes through an area having a high density of *Antimima androsacea* (11), due care to be taken during construction to avoid impact to this species.
- A water transfer canal traverses proposed site camp (12) and as such the site camp may be prone to seasonal flooding.
- The north-western access road passes multiple times through and directly adjacent to an extensive and well-defined watercourse with seep areas (18). The access road should be realigned to minimise impact to watercourse and in shall not traverse seep areas.
- The western access road passes through and along a well-defined watercourse with large *Brunsvigia josephinae* population (19) present within the riparian vegetation and directly adjacent to the watercourse. The access road should be aligned as far from watercourse as possible and should not extend closer to watercourse than inner side of the existing access track.
- *The species Antimima androsacea* was found to occur at low densities throughout a broader area as indicated (21)

The following specific recommendations should be included in any updated EMPr for the project.

- A flora and fauna search and rescue (relocation) must be undertaken before commencement of vegetation clearing and should preferable be undertaken in the Spring season. A comprehensive list of species for which permits will be required, is provided in Appendix 1: Plant Species of Conservation Concern (Red listed) and Appendix 2: Flora Protected in Terms of Provincial Acts and Ordinance(s).



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- Several turbine footprints are identified that overlap slightly with outcrops. Where possible, minor layout adjustments should be implemented during final surveying and pegging out to avoid such areas as far as possible.
  - Where there are further changes/updates to the vertical and horizontal alignments of the road network and site laydown area, such sections/areas must be reassessed in order to determine any further risks and impacts to the ecology and/or species.

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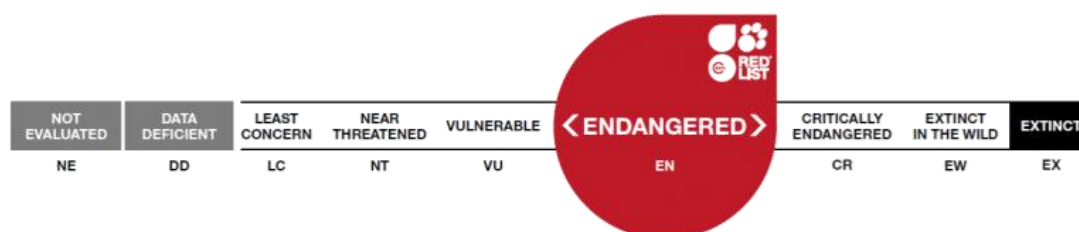
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## 15 Appendix 1: Plant Species of Conservation Concern (Red listed)

Species include those having elevated conservation status or identified as being having a distribution range overlapping or in proximity to the site. The list includes species from various online database sources that were also screened for possible occurrence, as well as data from original ecological assessments (Todd, 2011, 2014, 2016, 2019) have been included and verified for any recent name and status changes. Species that were previously noted, but now confirmed to either not having overlapping distribution ranges (due to improved databases and distribution records), or have not been recorded, are included for clarification.

The IUCN Red List Categories define the extinction risk of species assessed. Nine categories extend from NE (Not Evaluated) to EX (Extinct). Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) species are considered to be threatened with extinction. Additional non-IUCN status categories include Rare and Critically Rare, as determined by SANBI as possibly under threat, but not yet evaluated in terms of the IUCN criteria and categories.



Permits for the identified species would be required either in terms of the respective Provincial legislation and/or under the NEMBA Threatened or Protected Species (ToPS).

Highlighted species confirmed to be present.

Scientific Name	Family	Status*	Comment
<b>Plants</b>			
<i>Acmadenia argillophila</i>	Rutaceae	NT	Not recorded, found to the south in the Swartberg.
<i>Adromischus mammillaris</i>	Crassulaceae	EN, NC	Not recorded, known locations in Calitzdorp area
<i>Adromischus phillipsiae</i>	Crassulaceae	Rare, NC	Not recorded. NEST projected. Roggeveld Mountains to Kamiesberg. Sheltered rock crevices in loam soil.
<i>Agathosma acocksii</i>	Rutaceae	VU, NC	Not recorded. NEST projected. Witberg to the south, outside of project area in Fynbos.
<i>Aloidendron dichotomum</i>	Asphodelaceae	VU, WC, NC	Not recorded
<i>Aloinopsis loganii</i>	Aizoaceae	VU, WC, NC	Not recorded
<i>Amphithalea spinosa</i>	Fabaceae	VU	Not recorded. NEST projected, known locations to the south in the Hex River Valley/ Witteberg area

Scientific Name	Family	Status*	Comment
<i>Amphithalea villosa</i>	Fabaceae	NT	Not recorded
<i>Anisodonteia procumbens</i>	Malvaceae	Rare	Not recorded. NEST projected
<i>Antimima androsacea</i>	Aizoaceae	CR Rare, WC, NC	A range-restricted species (EOO 10km <sup>2</sup> ), known from one site where it is not threatened. Sutherland, Roggeveld Escarpment.
<i>Antimima emarcescens</i>	Aizoaceae	VU, WC, NC	Not recorded. NEST projected
<i>Antimima hamatilis</i>	Aizoaceae	VU, WC, NC	Not recorded, known locations to the south in the Robertson/Worcester area
<i>Antimima loganii</i>	Aizoaceae	VU, WC, NC	Poorly known and apparently rare species. Its distribution range is not well known, but occurrence records suggest that it is very small. There is currently one known location, but it is likely an underestimate, as it may be overlooked due to taxonomic uncertainty. It is potentially threatened by overgrazing. Endemic to Roggeveld Escarpment near Sutherland in the Northern Cape.
<i>Antithrixia flavicoma</i>	Asteraceae	VU	Not recorded. Outside of range (Namaqualand).
<i>Aspalathus candicans</i>	Fabaceae	EN	Not recorded, known locations in Worcester area to the south-west
<i>Aspalathus intricata</i> subsp. <i>anthospermoides</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Aspalathus intricata</i> subsp. <i>intricata</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Aspalathus intricata</i> subsp. <i>oxyclada</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Asparagus mollis</i>	Asparagaceae	VU	Not recorded. NEST projected
<i>Astroloba herrei</i>	Asphodelaceae	VU, WC, NC	Not recorded. NEST projected, known locations to the south in the Swartberg mountains around Matjiesfontein & Prince Albert
<i>Babiana sambucina</i>	Iridaceae	EN, WC, NC	Not recorded.
<i>Babiana cuneata</i>	Iridaceae	LC, WC, NC	Present on site
<i>Braunsia stayneri</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Brunsvigia josephinae</i>	Amaryllidaceae	VU, WC, NC	Long-lived bulb occurs as widely scattered subpopulations in lowland areas that are subject to continued habitat loss to. Herbarium specimens record about 18 subpopulations, and an estimated further 70 unrecorded subpopulations may exist. All subpopulations consist of fewer than 50 adult plants and are declining due to collection on an ongoing basis for medicinal purposes. Nieuwoudtville to Baviaanskloof.
<i>Bulbine torta</i>	Asphodelaceae	Rare, WC, NC	Not recorded
<i>Calamophyllum teretiusculum</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Calobota elongata</i>	Fabaceae	VU	Not recorded
<i>Cineraria lobata</i> subsp. <i>lasiocaulis</i>	Asteraceae	Rare	Not recorded. NEST projected

Scientific Name	Family	Status*	Comment
<i>Cleretum booyseii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Cliffortia arborea</i>	Rosaceae	VU	Not recorded. NEST projected
<i>Crassula alpestris</i> subsp. <i>massonii</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula brachystachya</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula congesta</i> subsp. <i>laticephala</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula dodii</i>	Crassulaceae	DD, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Crassula roggeveldii</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula vestita</i>	Crassulaceae	Rare, NC	Not recorded
<i>Cromidon hamulosum</i>	Scrophulariaceae	DD	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Delosperma sphalmanthoides</i>	Aizoaceae	VU, WC, NC	Not recorded. NEST projected
<i>Didymaotus lapidiformis</i>	Aizoaceae	VU, WC, NC	Not recorded, known locations generally to the south-west in Tanqua karoo and Wash Riviere.
<i>Drosanthemum comptonii</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Drosanthemum worcesterense</i>	Aizoaceae	EN, WC, NC	Not recorded. NEST projected
<i>Duvalia parviflora</i>	Apocynaceae	VU, NC	Not recorded, known locations in the south around Ladismith & Oudshoorn
<i>Erica glandulipila</i>	Ericaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Eriocephalus grandiflorus</i>	Asteraceae	Rare	Not recorded. Present in area
<i>Eriocephalus microphyllus</i> var. <i>carnosus</i>	Asteraceae	EN	Not recorded. NEST projected
<i>Eriospermum exile</i>	Ruscaceae	Rare	Not recorded
<i>Euryops marlothii</i>	Asteraceae	Rare	Not recorded
<i>Euryops namaquensis</i>	Asteraceae	VU	Not recorded. Outside of range (Namaqualand/ Knersvlakte) quartz patches.
<i>Euryops sulcatus</i>	Asteraceae	VU	Has a restricted range, with an extent of occurrence (EOO) of 1083 km <sup>2</sup> . It has been recorded from five locations, but likely to occur at a few more within unexplored suitable habitat within its range. It continues to decline due to ongoing habitat degradation as a result of drought and overgrazing. Endemic to the Roggeveld and Nuweveld escarpments on the border between the Western and Northern Cape
<i>Gasteria disticha</i>	Asphodelaceae	CR, WC, NC	Not recorded, known locations in Worcester area to the south-west
<i>Geissorhiza karoocica</i>	Iridaceae	NT, WC, NC	A range restricted species, EOO 497 km <sup>2</sup> , known from six locations where it is potentially threatened by habitat loss and degradation as a result of overgrazing and erosion. Known from Roggeveld Mountains to Matjiesfontein.
<i>Geissorhiza spiralis</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Globulariopsis wittebergensis</i>	Scrophulariaceae	Rare	Not recorded. NEST projected



Scientific Name	Family	Status*	Comment
<i>Gnidia cyanea</i>	Thymelaeaceae	Rare	Not recorded. NEST projected
<i>Haemanthus tristis</i>	Amaryllidaceae	VU, WC, NC	Not recorded
<i>Haworthia lockwoodii</i>	Asphodelaceae	VU, WC, NC	Not recorded
<i>Haworthia mirabilis</i>	Asphodelaceae	DDT, WC, NC	Not recorded, found to the west near Nieuwoudtville
<i>Haworthia wittebergensis</i>	Asphodelaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Helictotrichon barbatum</i>	Poaceae	VU	Not recorded. NEST projected
<i>Helictotrichon namaquense</i>	Poaceae	VU	Not recorded. NEST projected
<i>Helictotrichon roggeveldense</i>	Poaceae	EN	Not recorded. NEST projected
<i>Heliophila elata</i>	Brassicaceae	VU	Not recorded
<i>Hermannia pillansii</i>	Malvaceae	CR Rare	Not recorded. NEST projected
<i>Hesperantha flava</i>	Iridaceae	Rare, WC, NC	Not recorded. Present in area
<i>Hesperantha glabrescens</i>	Iridaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Hoodia pilifera</i>	Apocynaceae	NT, NC	Not recorded
<i>Hypodiscus sulcatus</i>	Restionaceae	VU, WC, NC	Not recorded, known locations in the south around Laingsburg/Touwsrivier (Matjiesfontein Shale Renosterveld)
<i>Indigofera hantamensis</i>	Fabaceae	Rare	A rare species, known from only three subpopulations scattered over a large area. Not threatened. Roggeveld to Calvinia.
<i>Ixia mollis</i>	Iridaceae	VU, WC, NC	Not recorded
<i>Ixia oxalidiflora</i>	Iridaceae	VU, WC, NC	Not recorded. Present in area
<i>Ixia parva</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Ixia rivulicola</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Lachenalia congesta</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia longituba</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia martinae</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia whitehillensis</i>	Hyacinthaceae	NT, WC, NC	Not recorded
<i>Lampranthus amoenus</i>	Aizoaceae	EN, WC, NC	Not recorded, known locations in the Cape Flats to the south-west
<i>Leobordea globulosa</i>	Fabaceae	VU	Not recorded. NEST projected
<i>Leucadendron cadens</i>	Proteaceae	Rare, WC, NC	Not recorded
<i>Leucadendron sp. nov. (Acocks 23716 NBG)</i>	Proteaceae	CR EN, WC, NC	Not recorded. NEST projected
<i>Lotononis comptonii</i>	Fabaceae	EN	Not recorded, known locations to the south in the Swartberg
<i>Lotononis densa subsp. congesta</i>	Fabaceae	VU	Not recorded, known locations to the west (Piketberg)
<i>Lotononis gracilifolia</i>	Fabaceae	EN	Not recorded, known locations to the south in the Laingsburg/Worcester area
<i>Lotononis venosa</i>	Fabaceae	EN	An endemic species to the Klein Roggeveld escarpment (extent of occurrence 84km <sup>2</sup> , and area of

Scientific Name	Family	Status*	Comment
			occupancy 16km <sup>2</sup> ). It is known from four locations. Some of the habitat has been transformed for crop cultivation in the past. Overgrazing by livestock and more frequent and persistent droughts are causing ongoing habitat degradation. Klein Roggeveld Mountains.
<i>Moraea aspera</i>	Iridaceae	VU, WC, NC	Not recorded. Outside of range (Hantam).
<i>Moraea contorta</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Moraea fenestrata</i>	Iridaceae	NT, WC, NC	Not recorded
<i>Moraea tanquana</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Moraea virgata subsp. karooica</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Muraltia karroica</i>	Polygalaceae	VU	Not recorded, found to the south in the Swartberg.
<i>Nenax velutina</i>	Rubiaceae	Rare	Not recorded. NEST projected
<i>Octopoma nanum</i>	Aizoaceae	VU, WC, NC	Not recorded
<i>Oftia glabra</i>	Scrophulariaceae	Rare	Not recorded. NEST projected
<i>Oxalis marlothii</i>	Oxalidaceae	EN, NC	Not recorded. Present in area
<i>Pauridia breviscapa</i>	Hypoxidaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Peersia frithii</i>	Aizoaceae	VU, WC, NC	Not recorded. Present in area
<i>Pelargonium torulosum</i>	Geraniaceae	Rare, NC	Not recorded
<i>Phiambolia hallii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Phylica comptonii</i>	Rhamnaceae	Rare, NC	Not recorded. NEST projected
<i>Phylica retorta</i>	Rhamnaceae	Rare, NC	Not recorded. NEST projected
<i>Phyllobolus amabilis</i>	Aizoaceae	Rare, WC, NC	Not recorded
<i>Polhillia involucrata</i>	Fabaceae	EN, NC	Not recorded. NEST projected
<i>Protea convexa</i>	Proteaceae	CR, EN, WC, NC	Not recorded. NEST projected, known locations in Northern Cederberg, Witteberg and Klein Swartberg mountains.
<i>Protea lepidocarpodendron</i>	Proteaceae	NT, WC, NC	Not recorded
<i>Psoralea karoensis</i>	Fabaceae	Rare	Not recorded. NEST projected
<i>Pterygodium inversum</i>	Orchidaceae	EN, WC, NC	Not recorded, found to the west in the Ceres/Malmesbury area
<i>Restio aridus</i>	Restionaceae	VU	Not recorded. NEST projected
<i>Restio esterhuyseniae</i>	Restionaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Rhodocoma vleibergensis</i>	Restionaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Romulea eburnea</i>	Iridaceae	VU, WC, NC	A rare, localized endemic to the Roggeveld Escarpment, where it is known from two locations and potentially threatened by habitat degradation due to overgrazing. Klein Roggeveld.
<i>Romulea hallii</i>	Iridaceae	VU [D2],	A Roggeveld endemic known from two

Scientific Name	Family	Status*	Comment
		WC, NC	locations, (EOO 39km <sup>2</sup> ). It is potentially threatened by road maintenance and expansion and livestock overgrazing. Roggeveld Plateau southwest of Sutherland.
<i>Romulea multifida</i>	Iridaceae	VU, WC, NC	Not recorded. Present in area. South African endemic. Roggeveld Plateau. Roggeveld Shale Renosterveld.
<i>Romulea syringodeoflora</i>	Iridaceae	NT, WC, NC	A range restricted Roggeveld endemic (EOO 474km <sup>2</sup> ), known from nine location and possibly occurring at a few more in unsurveyed parts of its range. Experiencing ongoing decline of habitat to crop cultivation as well as habitat degradation as a result of livestock overgrazing. Stony shale flats and slopes, Roggeveld Plateau.
<i>Ruschia acocksii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Ruschia altigena</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Secale strictum subsp. africanum</i>	Poaceae	CR EN	Not recorded. NEST projected. Roggeveld-Hantam endemic, Found on riverbanks.
<i>Selago albomontana</i>	Scrophulariaceae	Rare	Not recorded. NEST projected
<i>Strumaria karooica</i>	Amaryllidaceae	Rare, WC, NC	Not recorded
<i>Strumaria karoopoortensis</i>	Amaryllidaceae	VU, WC, NC	Not recorded
<i>Strumaria pubescens</i>	Amaryllidaceae	Rare, WC, NC	Not recorded
<i>Strumaria undulata</i>	Amaryllidaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Tanquana archeri</i>	Aizoaceae	VU, WC, NC	Not recorded. Found south of the site in Koedoesberge-Moordenaars Karoo. Limited population, severely threatened by plant traded harvesting.
<i>Tanquana hilmarii</i>	Aizoaceae	CR, WC, NC	Not recorded, known locations to the south of Laingsburg
<i>Thesium marlothii</i>	Santalaceae	DDT	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Trachyandra sanguinorhiza</i>	Asphodelaceae	Rare, WC, NC	Not recorded
<i>Trichodiadema hallii</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Tritonia florentiae</i>	Iridaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Tylecodon faucium</i>	Crassulaceae	Rare, NC	Not recorded. Karoo Endemic, A range-restricted habitat specialist endemic to the Ceres Karoo and Roggeveld. Site overlaps with possible range, may be present in shaded crevices on south facing slopes.
<i>Wurmbea capensis</i>	Colchicaceae	VU	Not recorded. Outside of range (Swartland area).
<i>Zaluzianskya mirabilis</i>	Scrophulariaceae	Rare	Not recorded. NEST projected
Mammals			
<i>Bunolagus monticularis</i> (Riverine rabbit)	Lagomorpha	CR	<b>Not Present.</b> Confined to riparian bush on the narrow alluvial fringe of

Scientific Name	Family	Status*	Comment
			seasonally dry watercourses in the Central Karoo. Presence highly unlikely. Site is outside of known distribution range.
<i>Felis nigripes</i> (Black-footed cat)	Carnivora	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub. May be a transient species.
<b>Birds</b>			
<i>Aquila verreauxii</i> (Verreaux's Eagle)	Accipitridae	VU	Nesting pairs within or peripheral to the site and may be subject to loss of foraging habitat and the risk of collision with the turbine blades.
<i>Polemaetus bellicosus</i> (Martial Eagle)	Accipitridae	EN	Nesting pairs within or peripheral to the site and may be subject to loss of foraging habitat and the risk of collision with the turbine blades. (Vulnerable globally - IUCN)
<i>Circus maurus</i> (Black Harrier)	Accipitridae	EN	Nesting pairs within or peripheral to the site and may be subject to loss of foraging habitat and the risk of collision with the turbine blades. <b>(Endangered Globally - IUCN)</b>
<i>Neotis ludwigii</i> (Ludwig's Bustard)	Otididae	EN	Seasonal influxes of this threatened endemic may be displaced from foraging areas and exposed to collision risk with the turbine blades and with new power lines. (Endangered Globally - IUCN)
<b>Reptiles</b>			
<i>Psammobates tentorius</i> (Karoo Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads
<i>Psammobates tentorius veroxii</i> (Bushmanland Tent Tortoise)	Testudinidae	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads
<b>Amphibians</b>			
None of Concern			
<b>Invertebrates</b>			
<i>Aloeides thyra orientis</i> (Red copper)	Lycaenidae	LC	In vicinity of known distribution range of related subspecies (Brenton Blue). Host plants are not present on site.

\* IUCN Red List Categories: **LC** – Least Concern; **NT** - Near Threatened; **VU** – Vulnerable; **En** – Endangered; **CR** – Critically Endangered; **NE** – Not Evaluated. **WC** – Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000); **NC** – Northern Cape Nature Conservation Act (Act No 9 of 2009). **ToPS** – Threatened or Protected Species in terms of NEMBA.

## 16 Appendix 2: Flora Protected in Terms of Provincial Acts and Ordinance(s)

Highlighted species confirmed to be present.

Scientific Name	Family	Status*	Occurrence/Comment
<i>Adromischus maculatus</i>	Crassulaceae	LC, NC	Present on site
<i>Adromischus mammillaris</i>	Crassulaceae	EN, NC	Not recorded, known locations in Calitzdorp area
<i>Adromischus phillipsiae</i>	Crassulaceae	Rare, NC	Not recorded. NEST projected. Roggeveld Mountains to Kamiesberg. Sheltered rock crevices in loam soil.
<i>Agathosma acocksii</i>	Rutaceae	VU, NC	Not recorded. NEST projected. Witberg to the south, outside of project area in Fynbos.
<i>Albuca concordiana</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Aloe comptonii</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Aloe longistyla</i>	Asphodelaceae	LC, WC, NC	Not recorded, Widespread species
<i>Aloidendron dichotomum</i>	Asphodelaceae	VU, WC, NC	Not recorded
<i>Aloinopsis loganii</i>	Aizoaceae	VU, WC, NC	Not recorded
<i>Antimima androsacea</i>	Aizoaceae	CR Rare, WC, NC	A range-restricted species (EOO 10km <sup>2</sup> ), known from one site where it is not threatened. Sutherland, Roggeveld Escarpment.
<i>Antimima emarcescens</i>	Aizoaceae	VU, WC, NC	Not recorded. NEST projected
<i>Antimima hamatilis</i>	Aizoaceae	VU, WC, NC	Not recorded, known locations to the south in the Robertson/Worcester area
<i>Antimima karroidea</i>	Aizoaceae	LC, WC, NC	Not recorded. Karoo Endemic, widespread.
<i>Antimima loganii</i>	Aizoaceae	VU, WC, NC	Poorly known and apparently rare species. Its distribution range is not known, but occurrence records suggest that it is very small. There is currently one known location, but it is likely an underestimate, as it may be overlooked due to taxonomic uncertainty. It is potentially threatened by overgrazing. Endemic to Roggeveld Escarpment near Sutherland in the Northern Cape.
<i>Aspalathus intricata</i> subsp. <i>anthospermoides</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Aspalathus intricata</i> subsp. <i>intricata</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Aspalathus intricata</i> subsp. <i>oxyclada</i>	Fabaceae	Rare, NC	Not recorded. NEST projected
<i>Astroloba corrugata</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Astroloba herrei</i>	Asphodelaceae	VU, WC, NC	Not recorded. NEST projected, known locations to the south in the Swartberg mountains around Matjiesfontein & Prince Albert
<i>Astroloba robusta</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Babiana cuneata</i>	Iridaceae	LC, WC, NC	Present on site
<i>Babiana sambucina</i>	Iridaceae	EN, WC, NC	Not recorded.
<i>Boophone disticha</i>	Amaryllidaceae	LC, WC,	Present on site

Scientific Name	Family	Status*	Occurrence/Comment
		NC	
<i>Braunsia apiculata</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Braunsia stayneri</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Brunsvigia comptonii</i>	Amaryllidaceae	LC, WC, NC	Present on site. Widespread and not in danger of extinction. Common and widespread in project area.
<i>Brunsvigia josephinae</i>	Amaryllidaceae	VU, WC, NC	Long-lived bulb occurs as widely scattered subpopulations in lowland areas that are subject to continued habitat loss to. Herbarium specimens record about 18 subpopulations, and an estimated further 70 unrecorded subpopulations may exist. All subpopulations consist of fewer than 50 adult plants and are declining due to collection on an ongoing basis for medicinal purposes. Nieuwoudtville to Baviaanskloof.
<i>Brunsvigia striata</i>	Amaryllidaceae	LC, WC, NC	Present on site
<i>Bulbine abyssinica</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Bulbine succulenta</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Bulbine torta</i>	Asphodelaceae	Rare, WC, NC	Not recorded
<i>Bulbinella cauda-felis</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Calamophyllum teretiusculum</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Cerochlamys gemina</i>	Aizoaceae	LC, WC, NC	Not recorded. Karoo Endemic, localised population south of the site.
<i>Cheiridopsis namaquensis</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Cleretum booyensii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Conophytum minimum</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Conophytum truncatum</i>	Aizoaceae	NE, WC, NC	Not recorded
<i>Cotyledon cuneata</i>	Crassulaceae	LC, NC	Present on site
<i>Cotyledon orbiculata</i>	Crassulaceae	LC, NC	Present on site
<i>Cotyledon tomentosa</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula alpestris</i> subsp. <i>massonii</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula altropurpurea</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula brachystachya</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula clavata</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula columnaris</i>	Crassulaceae	LC, WC, NC	Present on site
<i>Crassula congesta</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula congesta</i> subsp. <i>laticephala</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula cotyledonis</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula dodii</i>	Crassulaceae	DD, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Crassula hemisphaerica</i>	Crassulaceae	LC, NC	Not recorded, Widespread species

Scientific Name	Family	Status*	Occurrence/Comment
<i>Crassula muscosa</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula orbicularis</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula pageae</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula rogeveldii</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula rupestris</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula tecta</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula tetragona</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula tomentosa</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula umbella</i>	Crassulaceae	LC, NC	Present on site
<i>Crassula vestita</i>	Crassulaceae	Rare, NC	Not recorded
<i>Deilanthus peersii</i>	Aizoaceae	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Delosperma sphalmanthoides</i>	Aizoaceae	VU, WC, NC	Not recorded. NEST projected
<i>Diascia macrophylla</i>	Scrophulariaceae	LC, WC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Didymaotus lapidiformis</i>	Aizoaceae	VU, WC, NC	Not recorded, known locations generally to the south-west in Tanqua karoo and Wash Riviere.
<i>Drimia arenicola</i>	Hyacinthaceae	LC, WC, NC	Not recorded. Known from Northern Cape, range overlaps with site.
<i>Drimia karooica</i>	Hyacinthaceae	LC, WC, NC	Not recorded, Widespread species
<i>Drosanthemum comptonii</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Drosanthemum framesii</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Drosanthemum hispidum</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Drosanthemum worcesterense</i>	Aizoaceae	EN, WC, NC	Not recorded. NEST projected
<i>Duvalia caespitosa</i>	Apocynaceae	LC, NC	Present on site
<i>Duvalia parviflora</i>	Apocynaceae	VU, NC	Not recorded, known locations in the south around Ladismith & Oudshoorn
<i>Erica glandulipila</i>	Ericaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Euphorbia loricata</i>	Euphorbiaceae	LC, NC	Present on site
<i>Euphorbia mauritanica</i>	Euphorbiaceae	LC, NC	Present on site
<i>Euphorbia multiceps</i>	Euphorbiaceae	LC, NC	Present on site
<i>Euphorbia multifolia</i>	Euphorbiaceae	LC, NC	Present on site
<i>Gasteria disticha</i>	Asphodelaceae	CR, WC, NC	Not recorded, known locations in Worcester area to the south-west
<i>Geissorhiza karooica</i>	Iridaceae	NT, WC, NC	A range restricted species, EOO 497 km <sup>2</sup> , known from six locations where it is potentially threatened by habitat loss and degradation as a result of overgrazing and erosion. Known from Roggeveld Mountains to Matjiesfontein.
<i>Geissorhiza spiralis</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Gibbaeum gibbosum</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Gibbaeum pubescens</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Gladiolus venustus</i>	Iridaceae	LC, WC, NC	Present on site
<i>Gonialoe variegata</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Haemanthus coccineus</i>	Amaryllidaceae	LC, WC, NC	Present on site
<i>Haemanthus tristis</i>	Amaryllidaceae	VU, WC, NC	Not recorded

Scientific Name	Family	Status*	Occurrence/Comment
		NC	
<i>Haworthia arachnoidea</i>	Asphodelaceae	LC, WC, NC	Present on site
<i>Haworthia blackburniae</i>	Asphodelaceae	NE, WC, NC	Not recorded
<i>Haworthia cooperi</i>	Asphodelaceae	NE, WC, NC	Not recorded
<i>Haworthia cymbiformis</i>	Asphodelaceae	NE, WC, NC	Not recorded
<i>Haworthia lockwoodii</i>	Asphodelaceae	VU, WC, NC	Not recorded
<i>Haworthia marumiana</i>	Asphodelaceae	NE, WC, NC	Not recorded
<i>Haworthia mirabilis</i>	Asphodelaceae	DDT, WC, NC	Not recorded, found to the west near Nieuwoudtville
<i>Haworthia nortieri</i> var. <i>pehlemanniae</i> .	Asphodelaceae	LC, WC, NC	Not recorded. Karoo Endemic, widespread.
<i>Haworthia pulchella</i>	Asphodelaceae	NE, WC, NC	Not recorded
<i>Haworthia wittebergensis</i>	Asphodelaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Hereroa crassa</i>	Aizoaceae	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Hesperantha flava</i>	Iridaceae	Rare, WC, NC	Not recorded. Present in area
<i>Hesperantha glabrescens</i>	Iridaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Holothrix aspera</i>	Orchidaceae	LC, WC, NC	Present on site
<i>Holothrix secunda</i>	Orchidaceae	LC, WC, NC	Present on site
<i>Holothrix villosa</i>	Orchidaceae	LC, WC, NC	Present on site
<i>Hoodia pilifera</i>	Apocynaceae	NT, NC	Not recorded
<i>Hypodiscus sulcatus</i>	Restionaceae	VU, WC, NC	Not recorded, known locations in the south around Laingsburg/Touwsrivier (Matjiesfontein Shale Renosterveld)
<i>Ixia mollis</i>	Iridaceae	VU, WC, NC	Not recorded
<i>Ixia oxalidiflora</i>	Iridaceae	VU, WC, NC	Not recorded. Present in area
<i>Ixia parva</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Ixia rivulicola</i>	Iridaceae	VU, WC, NC	Not recorded. NEST projected
<i>Jamesbrittenia thunbergii</i>	Scrophulariaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Lachenalia aurioliae</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lachenalia comptonii</i>	Hyacinthaceae	LC, WC, NC	Not recorded. Karoo Endemic, Tanqua Karoo to the Roggeveld Escarpment south-west of Sutherland and Matjiesfontein.
<i>Lachenalia congesta</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia ensifolia</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lachenalia isopetala</i>	Hyacinthaceae	LC, WC, NC	Present on site



Scientific Name	Family	Status*	Occurrence/Comment
		NC	
<i>Lachenalia juncifolia</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lachenalia longituba</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia martinae</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia obscura</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lachenalia violacea</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lachenalia whitehillensis</i>	Hyacinthaceae	NT, WC, NC	Not recorded
<i>Lachenalia zebrina</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Lampranthus amoenus</i>	Aizoaceae	EN, WC, NC	Not recorded, known locations in the Cape Flats to the south-west
<i>Lampranthus haworthii</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Leucadendron cadens</i>	Proteaceae	Rare, WC, NC	Not recorded
<i>Leucadendron sp. nov. (Acocks 23716 NBG)</i>	Proteaceae	CR EN, WC, NC	Not recorded. NEST projected
<i>Malephora lutea</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Massonia depressa</i>	Hyacinthaceae	LC, WC, NC	Present on site
<i>Mesembryanthemum nodiflorum</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Monsonia crassicaulis</i> ( <i>Sarcocaulon crassicaule</i> )	Geraniaceae	LC, NC	Present on site
<i>Moraea aspera</i>	Iridaceae	VU, WC, NC	Not recorded. Outside of range (Hantam).
<i>Moraea ciliata</i>	Iridaceae	LC, WC, NC	Present on site
<i>Moraea contorta</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Moraea cuspidata</i>	Iridaceae	LC, WC, NC	Present on site
<i>Moraea fenestrata</i>	Iridaceae	NT, WC, NC	Not recorded
<i>Moraea miniata</i>	Iridaceae	LC, WC, NC	Present on site
<i>Moraea polyanthos</i>	Iridaceae	LC, WC, NC	Present on site
<i>Moraea polystachya</i>	Iridaceae	LC, WC, NC	Present on site
<i>Moraea tanquana</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Moraea virgata subsp. karooica</i>	Iridaceae	Rare, WC, NC	Not recorded
<i>Nemesia anisocarpa</i>	Scrophulariaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Octopoma nanum</i>	Aizoaceae	VU, WC, NC	Not recorded
<i>Ornithogalum juncifolium</i>	Hyacinthaceae	LC, WC, NC	Not recorded
<i>Oxalis convexula</i>	Oxalidaceae	LC, NC	Present on site
<i>Oxalis dregei</i>	Oxalidaceae	LC, NC	Present on site
<i>Oxalis marlothii</i>	Oxalidaceae	EN, NC	Not recorded. Present in area
<i>Oxalis melanosticta</i>	Oxalidaceae	LC, NC	Present on site
<i>Oxalis pes-caprae</i>	Oxalidaceae	LC, NC	Present on site

Scientific Name	Family	Status*	Occurrence/Comment
<i>Pauridia breviscapa</i>	Hypoxidaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Pectinaria articulata</i>	Apocynaceae	LC, NC	Present on site
<i>Pectinaria longipes</i> subsp. <i>longipes</i>	Apocynaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Peersia frithii</i>	Aizoaceae	VU, WC, NC	Not recorded. Present in area
<i>Pelargonium magenteum</i>	Geraniaceae	LC, NC	Present on site
<i>Pelargonium alternans</i>	Geraniaceae	LC, NC	Present on site
<i>Pelargonium magenteum</i>	Geraniaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Pelargonium stipulaceum</i> subsp. <i>ovato-stipulatum</i>	Geraniaceae	LC, NC	Not recorded. Karoo Endemic, widespread.
<i>Pelargonium torulosum</i>	Geraniaceae	Rare, NC	Not recorded
<i>Phiambolia hallii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Phylica comptonii</i>	Rhamnaceae	Rare, NC	Not recorded. NEST projected
<i>Phylica retorta</i>	Rhamnaceae	Rare, NC	Not recorded. NEST projected
<i>Phyllobolus amabilis</i>	Aizoaceae	Rare, WC, NC	Not recorded
<i>Piранthus comptus</i>	Apocynaceae	LC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Piранthus geminatus</i>	Apocynaceae	LC, NC	Present on site
<i>Pleiospilos nelii</i>	Aizoaceae	LC, WC, NC	Not recorded. Outside of range.
<i>Polhillia involucreta</i>	Fabaceae	EN, NC	Not recorded. NEST projected
<i>Protea convexa</i>	Proteaceae	CR EN, WC, NC	Not recorded. NEST projected, known locations in Northern Cederberg, Witteberg and Klein Swartberg mountains.
<i>Protea lepidocarpodendron</i>	Proteaceae	NT, WC, NC	Not recorded
<i>Pterygodium inversum</i>	Orchidaceae	EN, WC, NC	Not recorded, found to the west in the Ceres/Malmesbury area
<i>Quaqua parviflora</i> subsp. <i>gracilis</i>	Apocynaceae	LC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Restio esterhuyseniae</i>	Restionaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Restio karoicus</i>	Restionaceae	LC, WC, NC	Not recorded. NEST projected
<i>Rhinephyllum graniforme</i>	Aizoaceae	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Rhodocoma vleibergensis</i>	Restionaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Romulea eburnea</i>	Iridaceae	VU, WC, NC	A rare, localized endemic to the Roggeveld Escarpment, where it is known from two locations and potentially threatened by habitat degradation due to overgrazing. Klein Roggeveld.
<i>Romulea hallii</i>	Iridaceae	VU [D2], WC, NC	A Roggeveld endemic known from two locations, (EOO 39km <sup>2</sup> ). It is potentially threatened by road maintenance and expansion and livestock overgrazing. Roggeveld Plateau southwest of Sutherland.

Scientific Name	Family	Status*	Occurrence/Comment
<i>Romulea multifida</i>	Iridaceae	VU, WC, NC	Not recorded. Present in area. South African endemic. Roggeveld Plateau. Roggeveld Shale Renosterveld.
<i>Romulea syringodeoflora</i>	Iridaceae	NT, WC, NC	A range restricted Roggeveld endemic (EOO 474km <sup>2</sup> ), known from nine location and possibly occurring at a few more in unsurveyed parts of its range. Experiencing ongoing decline of habitat to crop cultivation as well as habitat degradation as a result of livestock overgrazing. Stony shale flats and slopes, Roggeveld Plateau.
<i>Romulea tortuosa</i>	Iridaceae	LC, WC, NC	Present on site. Common on site on flat rocky outcrops. Widespread endemic. Occasional on south-facing slopes, not affected.
<i>Ruschia acocksii</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Ruschia altigena</i>	Aizoaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Ruschia cradockensis</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Ruschia crassa</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Ruschia karrooica</i>	Aizoaceae	LC, WC, NC	Not recorded. Karoo Endemic, widespread.
<i>Ruschia perfoliata</i>	Aizoaceae	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Sericocoma pungens</i>	Amaranthaceae	LC, WC, NC	Not recorded, Widespread species
<i>Stapelia rufa</i>	Apocynaceae	LC, NC	Present on site
<i>Strumaria karooica</i>	Amaryllidaceae	Rare, WC, NC	Not recorded
<i>Strumaria karoopoortensis</i>	Amaryllidaceae	VU, WC, NC	Not recorded
<i>Strumaria pubescens</i>	Amaryllidaceae	Rare, WC, NC	Not recorded
<i>Strumaria undulata</i>	Amaryllidaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Tanquana archeri</i>	Aizoaceae	VU, WC, NC	Not recorded. Found south of the site in Koedoesberge-Moordenaars Karoo. Limited population, severely threatened by plant traded harvesting.
<i>Tanquana hilmarii</i>	Aizoaceae	CR, WC, NC	Not recorded, known locations to the south of Laingsburg
<i>Trachyandra sanguinorhiza</i>	Asphodelaceae	Rare, WC, NC	Not recorded
<i>Trichodiadema hallii</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Trichodiadema marlothii</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Trichodiadema mirabile</i>	Aizoaceae	LC, WC, NC	Present on site
<i>Tridentea gemmiflora</i>	Apocynaceae	LC, NC	Present on site
<i>Tridentea parvipuncta</i> subsp. <i>parvipuncta</i>	Apocynaceae	LC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Tritonia florentiae</i>	Iridaceae	Rare, WC, NC	Not recorded. NEST projected
<i>Tylecodon faucium</i>	Crassulaceae	Rare, NC	Not recorded. Karoo Endemic, A range-

Scientific Name	Family	Status*	Occurrence/Comment
			restricted habitat specialist endemic to the Ceres Karoo and Roggeveld Mountains (extent of occurrence 1516 km <sup>2</sup> ), known from five subpopulations, this species has no recorded threats and is listed Rare nationally and Least Concern globally. Shaded rock crevices, often on south-facing slopes. Site overlaps with possible range, may be present in shaded crevices on south facing slopes.
<i>Tylecodon paniculatus</i>	Crassulaceae	LC, NC	Present on site
<i>Tylecodon reticulatus</i>	Crassulaceae	LC, NC	Present on site
<i>Tylecodon wallichii</i>	Crassulaceae	LC, NC	Present on site

\* IUCN Red List Categories: **LC** – Least Concern; **NT** - Near Threatened; **VU** – Vulnerable; **En** – Endangered; **CR** – Critically Endangered; **NE** – Not Evaluated. **WC** – Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000); **NC** – Northern Cape Nature Conservation Act (Act No 9 of 2009). **ToPS** – Threatened or Protected Species in terms of NEMBA.

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## 17 Appendix 3 - About **Trusted Partners**

**Trusted Partners** is owned and managed by three Partners, two based in South Africa (Cape Town & Johannesburg) and one in England (London). The Partners have comprehensive experience across the continent and beyond, having collective experience in more than 30 African countries and islands, as well as in the Middle East and Europe. As such, Trusted Partners brings together reputable and experienced professionals and experts who are actively engaged in the African, Middle Eastern and European ESG Risk and Impact Management arenas.

The Partners actively lead projects in order to deliver bespoke ESG Risk Management and Impact Advisory to the Corporate, Financial and Industrial sectors, through our proven gravitas and extensive industry experience. Trusted Partners strives to unlock and drive effective sustainability into our clients' respective portfolios and projects. We take pride in our ability to respond rapidly and competitively.

Our three Partners and network of experienced Associate Partners believe in investing in long-term partnerships with our clients. We support our clients to achieve their strategic goals, rapidly respond to their needs and develop an intimate knowledge of their businesses. Our low-overheads and flexible resourcing model allows us to deliver a high-quality service at a much more affordable rate than our competitors.

**Trusted Partners** provides hands-on professional ESG risk management and impact advice across Africa. The Partners have extensive experience assessing and managing ESG risks and impacts across the continent in all major sectors on-behalf of investors, development finance institutions and businesses.

Our in-depth understanding of ESG risks and impacts coupled with our extensive knowledge of the Equator Principles, International Finance Corporation (IFC) Performance Standards, World Bank Environmental and Social Safeguards, European Bank for Reconstruction and Development (EBRD) Performance Requirements, and the Development Bank of Southern Africa (DBSA) Environmental and Social Safeguards as well as other International Development Financial Institutions Standards, and country specific environmental and social related regulations across Africa and the Middle East make us Trusted Advisors to our clients.

We are committed to ensuring the highest standards of integrity and honesty in our work and engagement with clients. Our low-overhead approach and flexible resourcing model allows the delivery of high-quality value for money service.

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Our services include:

#### STRATEGIC ADVISORY

- Environmental & Social Impact Assessments
- Environmental & Social Risk Management
- Environmental & Social Management Systems (IFC/EBRD)
- ISO 14001 & ISO 45001
- Environmental & Social Strategic Planning
- Responsible Investment Advisory

#### TRANSACTION SERVICES

- Environmental & Social Governance Advisory
- Environmental & Social Due Diligence
- Corporate Governance Due Diligence & Assurance
- Equator Principles Assurance
- IFC Performances Standards Assurance
- EIB/EBRD Performance Requirements Assurance
- World Bank Environmental & Social Safeguards Assurance
- Lenders ESG/ESRM Technical Advisor

#### PROJECT SUPPORT

- Botanical and Ecological Assessments
- Critical Habitats & Biodiversity Assessments
- Stakeholder Engagement & Conflict Resolution
- Resettlement Action Plans & Livelihood Improvement Plans
- Advanced GIS Systems & Analysis
- High Resolution 3D Visualisations & Visual Impact Assessments
- Land Use Planning (Environmental & Social Planning)
- Environmental, Health & Safety Performance Assurance
- Environmental, Health & Safety Compliance Assurance
- Climate Change Risk Assessments
- Environmental, Health & Safety Site Assessments



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## 17.1 Malcolme Logie, Partner

Malcolme Logie is a leading strategic thinking and performance-focused Environmental and Social Management Advisor with 30 years of experience in consulting across Africa and Eastern Europe. As a proven Advisor, Malcolme has guided public listed companies throughout Africa and Eastern Europe on their EHS & Social Strategies, Impacts and Liabilities. He is a motivational leader known for clearly defining mission and goals, aligning people and resources, and consistently delivering results that exceed expectations.

He is an expert in:

- Strategic Environmental Advisory;
- Environmental & Social Risk Management;
- Environmental & Social Governance;
- Equator Principles;
- World Bank - Environmental & Social Safeguards;
- International Finance Corporation - Environmental & Social Performance Standards;
- European Investment Bank - Environmental & Social Standards;
- European Bank for Reconstruction and Development - Environmental & Social Performance Requirements;
- Development Bank of Southern Africa - Environmental & Social Safeguards;
- Environmental & Social Due Diligence;
- Environmental & Social Impact Assessment;
- Critical Habitat & Biodiversity Assessments;
- EHS Compliance and Performance Assurance;
- ISO 14001/ISO 45001 Management Systems; and
- Technical Environmental Advisory.

As a recognised authority in Environmental & Social Risk Management he has led multi-disciplinary teams on projects in South Africa, Angola, Botswana, Cote de Ivoire, Czech Republic, Democratic Republic of Congo, Egypt, Ethiopia, Ghana, Hungary, Kenya, Madagascar, Mauritania, Mozambique, Namibia, Nigeria, Pakistan, Poland, Romania, Slovak Republic, South Sudan, Tanzania, Uganda, and Zambia.

Malcolme has consulted in the following industrial sectors: Aerospace, Agriculture, Forestry, Fisheries, Automotive and Rail Transport, Beverage and Foodstuff Industries, Chemicals and Chemical Products, Constructions, Education, Electricity Supply, Explosive and Munitions, Gas Supply, Glass Ceramics, Health Care Service, Processing of Minerals and Ores, Leather and Leather Products, Manufacture of Coke and Refined Petroleum Products, Manufacturing and Mechanical Engineering, Metals Refining and Processing and Production of Metals, Mining and Quarrying, Oil and Gas, Pharmaceuticals, Production of Cement and Concrete, Pulp and Paper, Renewable Energy, Rubber and Plastic Goods, Ship Building, Textile Industries, Transport and Communication, Waste and Recycling, Water Supply and Wood Industries.

In 2018/20 Malcolme led a Team of International Experts that developed the Environmental & Social Impact Assessment Guidelines for the Oil & Gas Sector in Kenya – encompassing the Onshore and Offshore Environmental, Social, Community, Health & Safety Risks in the Upstream, Midstream and Downstream Activities. The project was funded by the World Bank.

In 2020/21, Malcolme was part of an International team that developed the Environmental and Social Tariff for the Pakistan Energy Sector: Wind, Solar, Run-of-River Hydro, Large Hydro, Biogas, and Fossil Fuel (Coal, HFO, LNG). The project was funded by the IFC.

Malcolme was a specialist Environmental & Social Risk Management Advisor to the IFC (Johannesburg) during the period November 2017- July 2021, where he has provided expert advice on Environmental & Social Risk Management and Management Systems the Consulting and Financial Sectors in South Africa, Ghana and Nigeria. The ESRM Programme aims to increase the uptake of Environmental and Social standards by financial institutions and loan clients in the sub-Saharan region. Malcolme has also lectured at the Rhodes University Business School on Industrial Environmental Management and EHSS Management Systems.

Malcolme was a member on the South African committee SABS:TC207 which formed part of the global committee that wrote the original ISO 14001:1996 Environmental Management Systems specifications standard. Malcolme was also responsible for the development of the SAATCA requirements for the registration of Environmental Auditors and was elected (under a Grandfather clause) as the first Environmental Verification Auditor in South Africa. Malcolme has more than 16 800 hours of EHS Auditing experience and has led integrated EHSQ certification level audits.

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During 2006-2010 Malcolme served on the Education Review Panel for the South African Council for Natural Scientific Professions (SACNASP) where his role was to review the suitability of education and experience of individuals applying for registration as Professional Natural Scientists. Malcolme served on the Application Review Panel at SACNASP for 2016-2017.

#### Education

- PhD (Biotechnology), Rhodes University, 1995
- MSc (Botany), Rhodes University, 1992
- BSc Honours (Botany), Rhodes University 1990
- BSc (Plant Science & Biochemistry), Rhodes University, 1989

\*Certificates available on request

#### Professional Memberships

- South African Council of Natural Scientific Professions – Environmental Scientist (N#: 400102/95)
- Environmental Assessment Practitioners Association of South Africa (EAPASA: N#: 2020/1403)
- International Association of Impact Assessors
- Royal Society of South Africa

\*Certificates available on request





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

### DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

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)

#### PROJECT TITLE

BRAND VALLEY WEF: TERRESTRIAL BIODIVERSITY ASSESSMENT

#### Kindly note the following:

1. This form must always be used for 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 01 September 2018. 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.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

#### Departmental Details

##### Postal address:

Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Private Bag X447  
Pretoria  
0001

##### Physical address:

Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Environment House  
473 Steve Biko Road  
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

**1. SPECIALIST INFORMATION**

Specialist Company Name:	<b>Trusted Partners</b>		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	<b>4</b>	Percentage Procurement recognition
Specialist name:	<b>Malcolme Logie</b>		
Specialist Qualifications:	<b>BSc; BSc (Hons); MSc; PhD</b>		
Professional affiliation/registration:	<b>SACNASP Environmental Scientist Reg. EAP (EAPASA N# 2020/1403)</b>		
Physical address:	<b>27 Lighthouse Rd, Kommetjie, 7976, Cape Town</b>		
Postal address:	<b>PO Box 48148, Kommetjie, 7975, Cape Town</b>		
Postal code:	<b>7975</b>	Cell:	<b>083 655 6123</b>
Telephone:		Fax:	
E-mail:	<b>Malcolme@TrustedPartners.Africa</b>		

**2. DECLARATION BY THE SPECIALIST**

I, Dr Malcolme Logie *Malcolme Logie*, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

*Malcolme Logie*  
 Signature of the Specialist

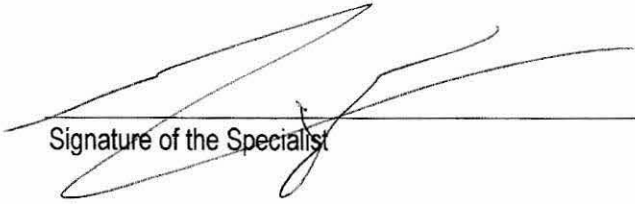
**Trusted Partners**

Name of Company:

2021/10/06  
 Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

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



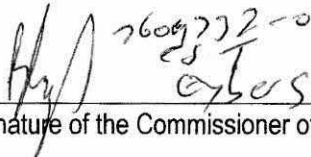
Signature of the Specialist

**Trusted Partners**

Name of Company

2021/10/06

Date

  
2609772-0  
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07605

Signature of the Commissioner of Oaths

2021/10/06

Date



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## 17.2 Jamie Pote, Associate Partner

Jamie is a highly experienced Biodiversity consultant, specialising in terrestrial Ecological and Vegetation Assessments. Over the past 16 years, he has been involved in a diverse range of projects and regions, primarily in Southern but also Western and Central Africa as part of multidisciplinary teams. His experience in South Africa includes most provinces (in particular the Eastern Cape, Western Cape, Northern Cape and Limpopo provinces) and a wide range of bio-geographic regions, and has also worked professionally in Namibia, Mozambique, Democratic Republic of Congo, Republic of Congo and Ghana.

He is an expert in:

- Botanical and Terrestrial Ecology Assessments
- Critical Habitat & Biodiversity Assessments.
- Terrestrial Biodiversity Assessments
- GIS mapping and analysis

Projects include over 300 independent Biodiversity, Ecological and/or Botanical Assessments throughout Southern, Western and Central Africa within the Energy, Infrastructure, Housing, Agriculture, Forestry, Mining and Industrial Sectors.

In addition, he recently initiated and grew a leading Environmental Business unit at a Civil Engineering company in Port Elizabeth and was the Senior Ecologist and Environmental Assessment Practitioner (EAP) on over 50 environmental applications in the infrastructure, housing, agricultural and mining sectors. He has furthermore played a key role within the road maintenance and construction sphere within the Eastern Cape, undertaking key projects for both the Department of Roads and Public Works and SANRAL, which includes over 40 mining applications for the licensing of more than 300 gravel borrow pits in districts throughout the Eastern Cape.

Jamie has also been lead environmental consultant in construction compliance and monitoring on over 50 civil infrastructure and housing projects.

Key fields of expertise include Terrestrial Biodiversity and Ecological Assessments, Environmental and Ecological Risk-Assessments, Rehabilitation and Restoration Plans, Environmental Management Plans & Programmes, GIS Mapping & Analysis, Alien Invasive Plant Management Plans, Environmental Compliance & Monitoring, Flora Relocation Plans (including implementation), Environmental and Mining applications and Permits and Licensing (including Water Use licensing and Protected Trees, Flora and Fauna).

Jamie's Tertiary Education Qualifications are:

- BSc Honours (Botany), Rhodes University 2003
- BSc (Botany & Environmental Science), Rhodes University, 2002

\*Certificates available on request

Jamie's Professional Registrations/Memberships are:

- South African Council of Natural Scientific Professions – Professional Natural Scientist: Ecological Science (N#: 115233)
- International Association of Impact Assessors (N#: 5045)

\*Certificates available on request



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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Date Received:	

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#### PROJECT TITLE

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#### Kindly note the following:

1. This form must always be used for 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 01 September 2018. 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.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

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Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Private Bag X447  
Pretoria  
0001

##### Physical address:

Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Environment House  
473 Steve Biko Road  
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

## 1. SPECIALIST INFORMATION

Specialist Company Name:	N/A			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100 %
Specialist name:	Jamie Pote			
Specialist Qualifications:	BSc (Hons)			
Professional affiliation/registration:	SACNASP			
Physical address:				
Postal address:	Postnet Suite 13130, P Bag X13130			
Postal code:	6013	Cell:	076 888 9890	
Telephone:		Fax:		
E-mail:	<a href="mailto:jamiepote@live.co.za">jamiepote@live.co.za</a>			

## 2. DECLARATION BY THE SPECIALIST

I, Mr Jamie Pote \_\_\_\_\_, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

N/A

Name of Company:

25/08/2021

Date:

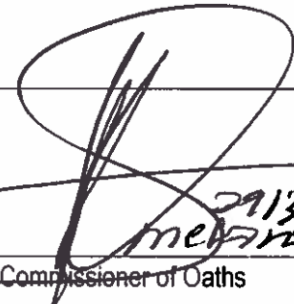
**3. UNDERTAKING UNDER OATH/ AFFIRMATION**

I, Mr 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.

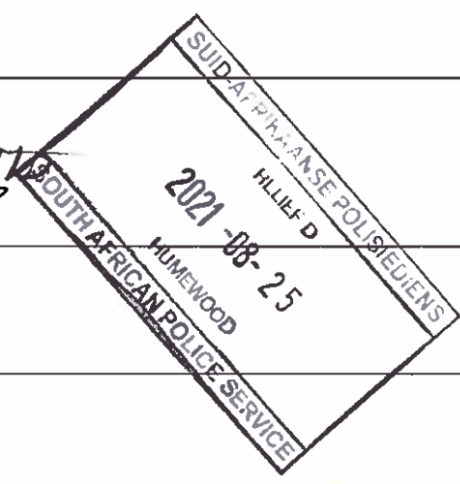
JAMIE POTE   
Signature of the Specialist

N/A  
Name of Company

25 August 2021  
Date

  
Signature of the Commissioner of Oaths

2021-08-25  
Date



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