



# TrustedPartners

ESG RISK MANAGEMENT AND IMPACT ADVISERS

Project N#: TP220511-01A

## KARREEBOSCH WIND ENERGY FACILITY BIODIVERSITY & TERRESTRIAL ECOLOGY ASSESSMENT KARREEBOSCH 132KV POWERLINE AND SUBSTATION

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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> )
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
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).
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)
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
MAP	Mean Annual Precipitation
masl	meters above sea level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
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
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
ToPS	Threatened of Protected Species (NEM:BA)



## 7 Definitions

Area of Influence	<p>Area of Influence WB OP 4.01, Annex A, para. 6:</p> <p><i>“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.”</i></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>
Critically Rare	<p>A species is Critically Rare when it is known to occur at a single site, but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.</p> <p>A non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).</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 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.</p>
Disturbance	<p>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.</p>
Ecological Function	<p>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.</p>
Ecological Processes	<p>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</p>

	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 a <u>very high risk</u> of extinction in the wild ( <u>IUCN</u> ).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
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 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> )
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems ( <u>Millennium Ecosystem Assessment</u> ).

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 ( <u>IUCN</u> ).
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 ( <u>IUCN</u> ).
Not Evaluated (NE)	A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in Plants of southern Africa: an online checklist are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.
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	A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows: <i>Restricted range</i> : Extent of Occurrence (EEO) <500 km <sup>2</sup> , OR <i>Habitat specialist</i> : Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km <sup>2</sup> , OR <i>Low densities of individuals</i> : Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR <i>Small global population</i> : Less than 10 000 mature individuals. A non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).
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 ( <u>BBOP</u> ).
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 ( <u>IFC</u> ).
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.
Species of Conservation Concern (SCC)	Species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs ( <u>WCED</u> ).

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 a terrestrial biodiversity & ecological assessment for the proposed Karreebosch) 132 KV Overhead Powerline (OHPL) and 33/132kV substation required for the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3), extending from the KB WEF via the existing Bon Espirange substation to the existing Komsberg substation.

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 to more effectively contextualise the broader environment and the area of influence as well as to better understand the *'bigger picture'*, since the natural environment is interconnected, and as will become evident the local environment is strongly influenced by the surrounding area.

### 8.1 Project Description

#### 8.1.1 Permitting Process

The entire extent of the proposed 132kV Karreebosch OHPL, 33/132kV Substation and associated infrastructure is located within one (1) of the Strategic Transmission Corridors, namely the Central Corridor, as defined in and in terms of the procedures laid out in Government Notice (GN) No. 113. The proposed OHPL project will therefore be subject to a Basic Assessment (BA) Process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) (as amended) and Appendix 1 of the EIA Regulations, 2014 promulgated in Government Gazette 40772 and GN R326, R327, R325 and R324 on 7 April 2017. The competent authority for this BA process is the national Department of Forestry, Fisheries and Environment (DFFE).

#### 8.1.2 Project Location

The proposed Karreebosch OHPL will evacuate power from the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3, which is currently undergoing a Part 2 EA amendment, final layout and EMP approval process), located in the Northern Cape Province, and will connect to the existing Komsberg substation. The proposed Karreebosch OHPL is proposed to be located over thirteen (13) properties (Table 1). The location and layout of the properties on which the OHPL is located is provided in Figures 1 and 3 below.

Table 1: Properties on which the OHPL is located

OHPL AND SUBSTATION ALTERNATIVE	FARM NAME AND NUMBER	21 DIGIT SG CODE	MUNICIPALITY / PROVINCE	FARM SIZE (HA)
Komsberg Substation Bon Espirange to Komsberg Route	Portion 2 of Farm Standvastigheid No. 210	C072000000002100002	Karoo Hoogland LM / Namakwa DM / Northern Cape	43.30
Bon Espirange to Komsberg Route	Remainder of Farm Standvastigheid No. 210	C072000000002100000	Karoo Hoogland LM / Namakwa DM / Northern Cape	4716.71
Bon Espirange to Komsberg Route	Farm Aprils Kraal No. 105	C043000000001050000	Laingsburg LM / Central Karoo DM / Western Cape	559.68
Bon Espirange to Komsberg Route	Portion 1 of farm Bon Espirange No. 73	C0430000000007300001	Laingsburg LM / Central Karoo DM / Western Cape	1916.64
Bon Espirange Substation Bon Espirange to Komsberg Route Route 3	Remainder of farm Bon Espirange No. 73	C0430000000007300000	Laingsburg LM / Central Karoo DM / Western Cape	1764.25
Option 1A Option 1B Option 1C Option 2B Option 2C Route 3	Remainder of farm Ek Kraal No. 199	C0720000000019900000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1407.48
Option 2B Option 2C	Portion 1 of farm Ek Kraal No. 199	C0720000000019900001	Karoo Hoogland LM / Namakwa DM / Northern Cape	1772.90
Option 2B Option 2C	Portion 2 (Nuwe Kraal) of farm Ek Kraal No. 199	C0720000000019900002	Karoo Hoogland LM / Namakwa DM / Northern Cape	824.94
Option 2B Option 2C	Remainder of farm Karreebosch No. 200	C0720000000020000000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1538.34
Substation Option 2 Option 2A Option 2B Option 2C	Remainder of farm Wilgebosch Rivier No. 188	C0720000000018800000	Karoo Hoogland LM / Namakwa DM / Northern Cape	2898.91
Option 2A	Portion 1 of farm Klipbanks Fontein No. 198	C0720000000019800001	Karoo Hoogland LM / Namakwa DM / Northern Cape	1886.62

OHPL AND SUBSTATION ALTERNATIVE	FARM NAME AND NUMBER	21 DIGIT SG CODE	MUNICIPALITY / PROVINCE	FARM SIZE (HA)
Substation Option 1 Option 1A Option 1B Option 1C Option 2A	Remainder of farm Klipbanks Fontein No. 198	C0720000000019800000	Karoo Hoogland LM / Namakwa DM / Northern Cape	1886.62
Option 1A Option 1B Option 1C	Farm Rietfontein No. 197	C0720000000019700000	Karoo Hoogland LM / Namakwa DM / Northern Cape	5873.66



Figure 1: Location of the Karreebosch OHPL

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### 8.1.3 Project Description

Karreebosch Wind Farm RF (Pty) Ltd is proposing to develop a 132kV OHPL and associated infrastructure to feed the electricity generated by the authorised Karreebosch WEF into the national grid via the Komsberg transmission substation.

The site locality is indicated in Figure 1 above.

The servitude is required to ensure safe construction, maintenance and operation of the powerline. Registration of the servitude grants the operator the right to erect, operate and maintain the powerline and communications and to access the land to carry out such activities, but it does not constitute full ownership of the land. It should be noted that the OHPL will be ceded to Eskom post-construction. Construction and operation activities and access to the powerline will be carried out with due respect to the affected landowners. The servitude required for the Project will be registered at the Deeds Office and will form part of the title deed of the relevant properties once the environmental authorisation has been obtained, should a positive decision be issued.

#### OVERHEAD POWERLINE

The OHPL will be a 132kV twin tern double circuit overhead powerline. The powerline towers will either be steel lattice or monopole structures. Figure 2 below provides an example of a conventional lattice tower compared with a monopole structure. Pole positions will only be available once the powerline detail design has been completed by the Eskom Design Review Team (DRT). However, a 400m wide assessment corridor is being considered and has been walked down by the specialists for approval to allow for micro siting of tower positions once the detailed design has been completed. It is anticipated that towers will be located on average 200m to 250m apart; however, longer spans may be needed due to terrain and watercourse crossings.

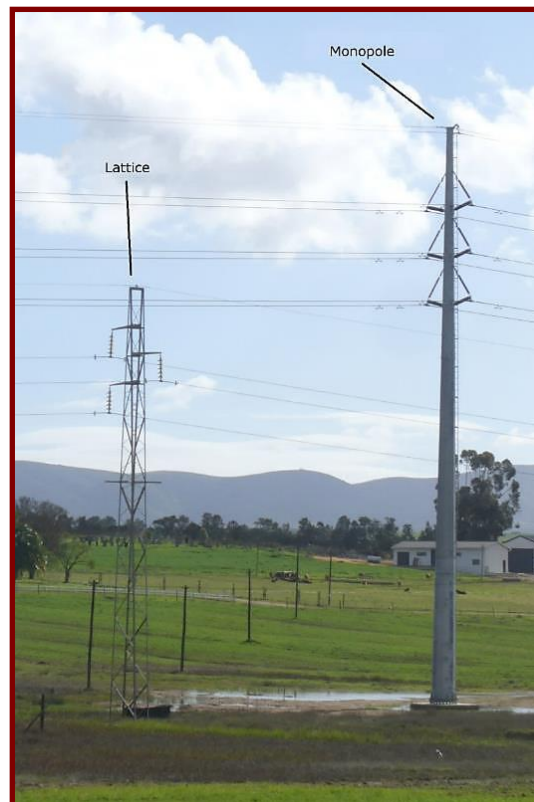


Figure 2: Conventional lattice powerline tower compared with a steel monopole structure

#### SERVITUDE

A 400m wide OHPL corridor (200m on either side of the centre line) has been assessed by the specialists for the purposes of the Basic Assessment Report (BAR). The registered servitude will fall within this 400m wide assessment corridor and will be 31m wide (15.5 m on either side of the centre line). The Right of Way



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servitude (servitude road) will be up to 14m wide (7m on either side of centre line), resulting in a total servitude width of 45m in total. The length of the longest powerline route alternative (Option 2C – see “Alternatives” section below) is 20.52 km, which will result in a servitude area of up to 92.3 ha. However, the physically impacted area is a small subsection therein.

The servitude is required to ensure safe construction, maintenance and operation of the powerline. Registration of the servitude grants the operator the right to erect, operate and maintain the powerline and to access the land to carry out such activities, but it does not constitute full ownership of the land. It should be noted that the OHPL will be ceded to Eskom post-construction. Construction and operation activities and access to the powerline will be carried out with due respect to the affected landowners. The servitude required for the Project will be registered at the Deeds Office and will form part of the title deed of the relevant properties once the environmental authorisation has been obtained.

## SUBSTATIONS

Two alternative 33/132kV onsite substation locations at the Karreebosch WEF site have been assessed as part of this BAR, each with a 200m x 150m (3 ha) footprint. A 200m assessment area surrounding the proposed substation alternatives have been included as part of this assessment for micro siting, with a slight funnel leading into the existing Bon Espirange and Komsberg substations to allow for greater flexibility for micro siting for incoming proposed line connections. The proposed Karreebosch OHPL may require an extension of the existing 400kV Komsberg substation, and therefore, the entire Komsberg substation property has been assessed as part of this BAR.

## SITE ACCESS

The OHPL and associated infrastructure will be accessed via roads forming part of the authorised Karreebosch WEF (EA Ref: 14/12/16/3/3/2/807/AM3), where possible. The preferred OHPL routing will require an associated servitude road (following beneath the proposed OHPL) to be constructed which will be used to construct, operate and maintain the powerline. Existing roads will be used as much as possible, where feasible. However, additional access roads may be required to provide access to sections of the powerline route. New sections of access roads will deviate off existing roads (within the 400m wide assessment corridor), as needed to access tower positions. Access roads will be mostly two-track gravel roads up to 14m in width following beneath the OHPL in order to access tower structures for construction and maintenance purposes.

## ALTERNATIVES

There are certain sections of the OHPL that are subject to alternatives and some sections which are technically limited to one route due to geographical and land rights reasons. The alternatives proposed remains compliant to NEMA requirements and for this reason the options are presented on a section basis.

Only one (1) OHPL route is technically feasible for the section of the proposed powerline directly preceding the existing Bon Espirange Substation (Route 3) and for the section connecting the Bon Espirange substation to the Komsberg substation (Bon Espirange to Komsberg Route), which is approximately 9.2 km in length. No alternatives can therefore be provided for these two sections of the OHPL (Route 3 and Bon Espirange to Komsberg Route, as per Figure 3 below).

Six (6) OHPL route alternatives (Options 1A, 1B, 1C, 2A, 2B and 2C) are proposed between the Karreebosch WEF onsite 33/132kV substation (with substation alternatives: Option 1 and Option 2) and Route 3 preceding the existing Bon Espirange Substation. As noted above, all of the six OHPL route alternatives follow the same routing from their point of convergence on Remainder of farm Ek Kraal No.199, approximately 3.1 km before the Bon Espirange Substation, to the Komsberg Substation situated on Portion 2 of Farm Standvastigheid No. 210. These alternatives, as depicted in Figure 3, are described below:

- **OHPL Route Option 1:** Three (3) OHPL route alternatives are being considered for the link between Substation Option 1 and the Bon Espirange Substation and Komsberg Substation:
  - Option 1A (approximately 14.51 km in length in its entirety from Substation Option 1 to the Komsberg Substation);
  - Option 1B (approximately 17.28 km in length in its entirety from Substation Option 1 to the Komsberg Substation); and

- 
- Option 1C (approximately 13.91 km in length in its entirety from Substation Option 1 to the Komsberg Substation).
  - **OHPL Route Option 2:** Three (3) powerline corridor route alternatives were considered for the link between Substation Option 2 and the Bon Espirange Substation and Komsberg Substation:
    - Option 2A (approximately 20.47 km in length in its entirety from Substation Option 2 to the Komsberg Substation);
    - Option 2B (approximately 16.63 km in length in its entirety from Substation Option 2 to the Komsberg Substation); and
    - Option 2C (approximately 20.52 km in length in its entirety from Substation Option 2 to the Komsberg Substation).

Alternatives 1A-C feed out of Substation Option 1 proposed in the south-central portion of the Farm Klipbanksfontein 198/1. Alternatives 2A-C feed out of Substation Option 2 proposed in the south-eastern corner of Wilgebosch Rivier 188/RE.

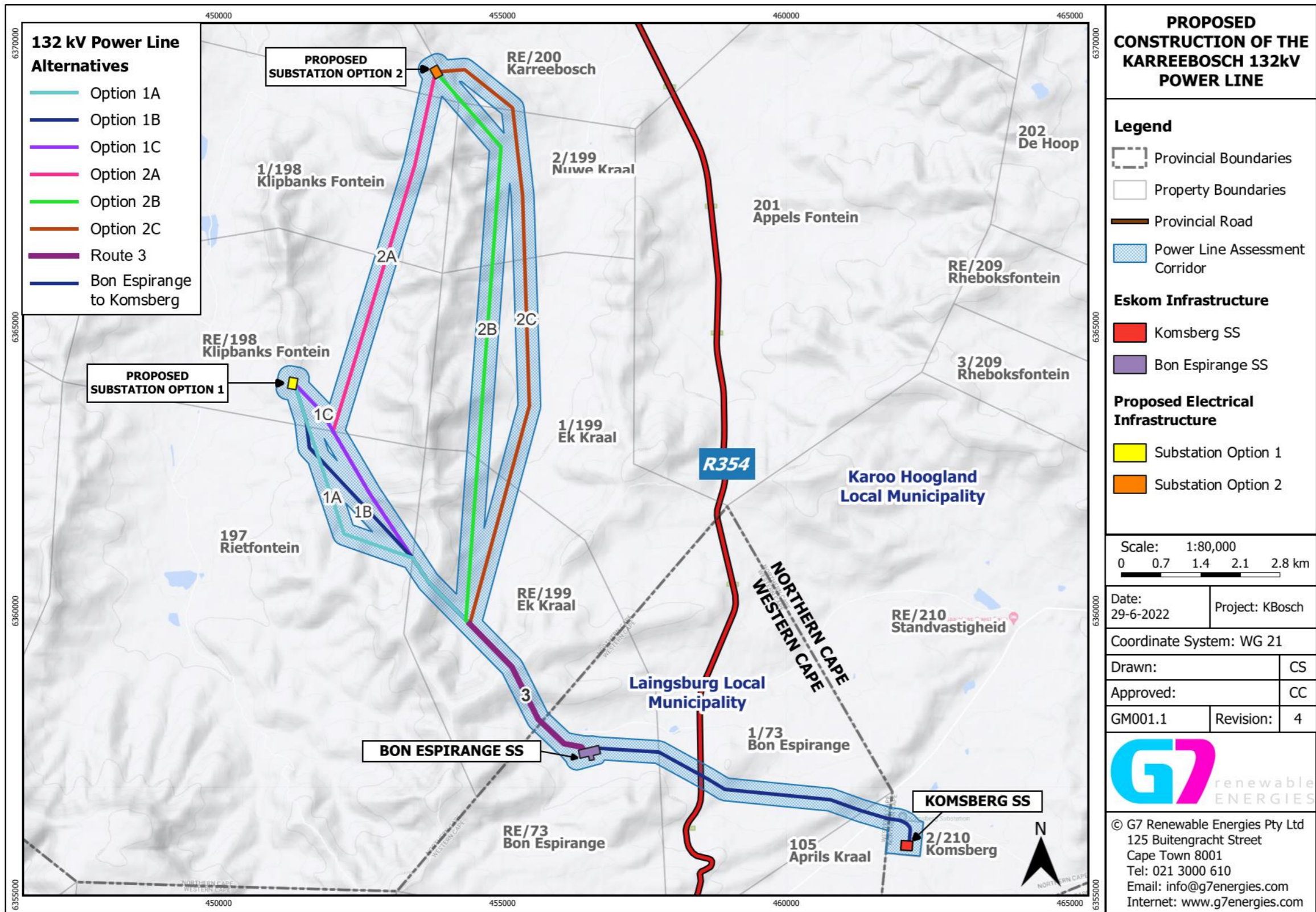


Figure 3: Powerline Route and Substation Alternatives for the Karreebosch OHPL

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## 8.2 Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes

The report will be compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal (species) themes**, this report includes these requirements.

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

## 8.3 Methodology and Approach

The proposed methodology and approach are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity Assessment Report. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to assess the following:
  - a) Detailed field survey of vegetation, flora and habitats present.
  - b) Comprehensive species list, highlighting species that are of special concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and the Northern Cape Nature Conservation Act (Act no. 9 of 2009) and The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000).
  - c) Detailed mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and Species of Conservation Concern, the outcome being a detailed sensitivity map ranked into high, medium or low classes.
- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for the BAR, a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will address the following:
  - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
  - A detailed species list highlighting the various Species of Conservation Concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
  - Description and assessment of the habitat units and site sensitivities ranked into high, medium or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
  - A statement of cumulative impact, noting that there has been no access to or assessment of the other adjacent wind energy projects in the Komsberg Renewable Energy Development Zone has not provided.
  - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
  - A comprehensive EMP for inclusion in the reports and EMP with specific management actions for construction and Operation.
  - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
  - A map indicating buffers (if required) to accommodate Regional Planning and other requirements.

This terrestrial biodiversity assessment and report has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in

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terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 8.3.1 Site visit

**Trusted Partners** have undertaken numerous assessments over the past four years (2018-2022) for the KB-WEF and adjacent WEFs, notably Roggeveld WEF, Brandvalley WEF and Rietkloof WEF – all of which feed into the Bon Espirange substation and then onto the Eskom Komberg substation.

Most recent site assessment by **Trusted Partners** include:

- Karreebosch WEF Terrestrial Ecology & Biodiversity Assessment: August-September 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;
- June 30, 2022 assessment of the grazing withdrawal area and conservation plan for KB WEF.
- July 19-20, 2022 assessment of the updated KB- WEF layout (separate report) and powerline alignment and substation (i.e. this report).
- Brandvalley WEF Terrestrial Ecology & Biodiversity Assessment and its connectivity to the Bon Espirange substation, September 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;
- Rietkloof WEF Terrestrial Ecology & Biodiversity Assessment and its connectivity to the Bon Espirange substation, September 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;
- Roggeveld WEF Terrestrial Ecology & Biodiversity Assessment and its connectivity to the Bon Espirange and Komsberg substations, June 2021.

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, but this does not detract from the confidence in this report considering the level of investigation over the years in this area.

For the purposes of this report, the site sampling strategy, within the context of the proposed limited footprint activity, is deemed to be adequate. Additionally, the findings of this assessment are supplemented by findings of other specialist assessments conducted in the same area over several seasons and time periods. The site visit has broadly assessed the layout options, within an approximately 400 m wide possible servitude. Additional species may occur that were not observed during the sampling period, however due to the limited footprint of the proposed activity, as well as the extensive coverage and low conservation status of the specific vegetation units. Furthermore, when the final tower positions are known, where necessary, plant search and rescue should be undertaken within the defined footprint areas.

### 8.3.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 18. Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.

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- 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, 2010, & 2018) and South Africa Protected Area database (2020) – protected area information.
  - Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
  - The Western Cape Biodiversity Spatial Plan (2017) – 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>).
  - 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.

### 8.3.3 Assumptions, Uncertainties and Gaps in Knowledge

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

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report. This is covered separately in the freshwater biodiversity report.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

# Kareebosch 132 kV Powerline Layout - Aerial Map

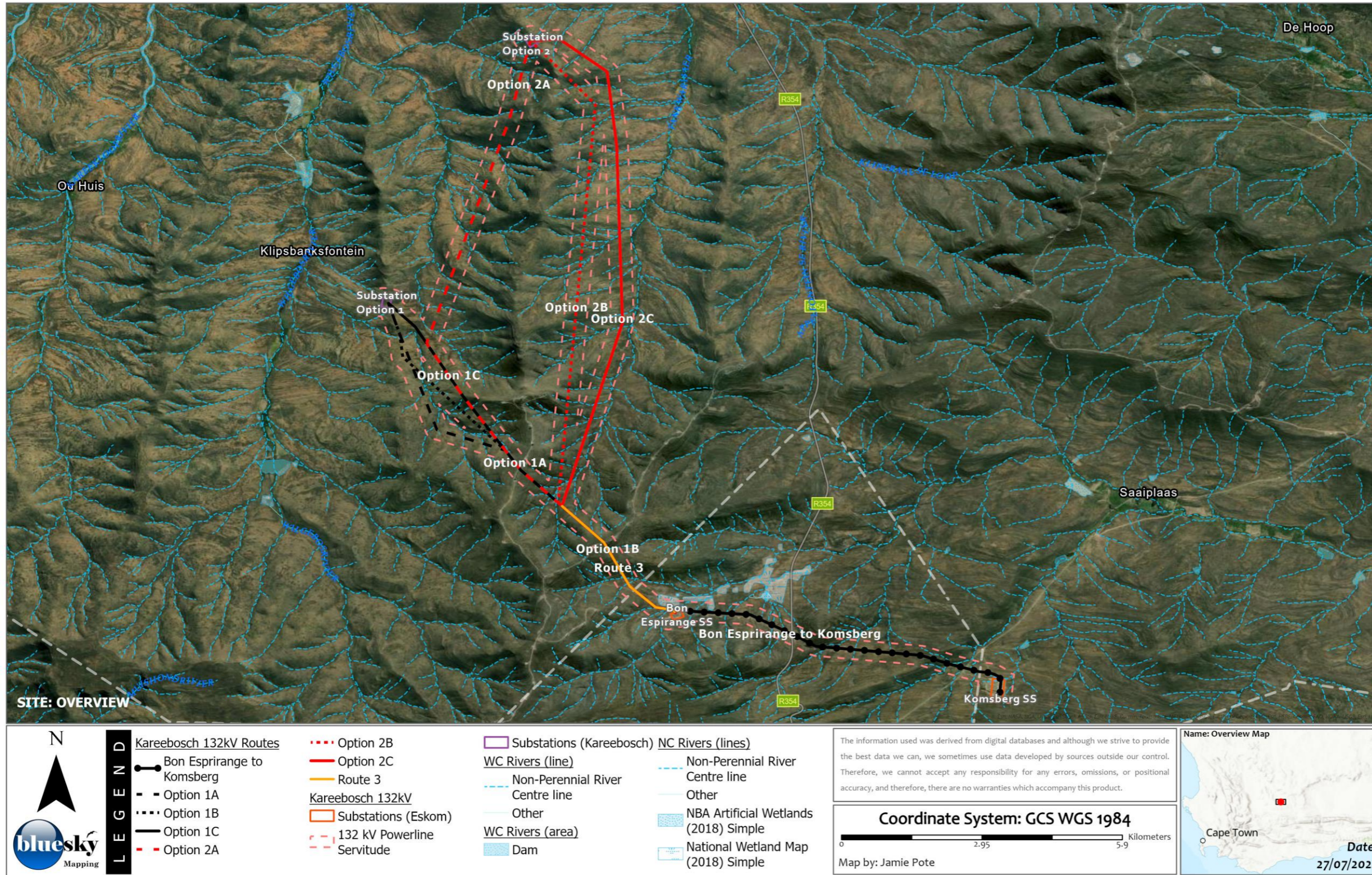


Figure 4: Location of Karreebosch WEF and Powerline Alternatives.

### 8.3.4 Aspects of the project that could potentially have Biodiversity related Impact

The proposed plan (OHPL Alternatives 1 A, 1 B & 1 C and 2 A, 2 B & 2C, and substation Options 1 & 2) will require some clearing of vegetation at powerline pylon and substation footprints as well as some clearing of vegetation for an OHPL access road. Blanket clearing of vegetation will only be required for the substation components. The key components of the project and their respective impacts upon the terrestrial vegetation and faunal environment are as follows:

Component	Potential Biodiversity and Ecological Impacts
<b>Powerline</b>	
The construction of the proposed facility will require selective clearing for pylon construction.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the pylons and will be limited to a minimal area where the pylon foundations will be constructed as well as a limited work area surrounding this.
<b>Access roads</b>	
The construction of the proposed facility will require selective clearing of vegetation along the access roads that will run parallel, usually underneath, the powerline.	An access road will be required in order to access the powerline route during construction as well as during operations for maintenance purposes. It is likely that the road will be heavily used during construction phase after which traffic will be relatively light, dependant on maintenance needs. 2-track type 'farm' road (within the Right of Way Servitude of up to 14m in width) will suffice, as is the norm for powerlines rather than a specifically constructed road.
<b>Substations</b>	
The construction of the proposed facility will require limited blanket clearing of the substation sites.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the various substation facilities. The area will be limited to the specific substation footprint area (up to 3ha).



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## 9 Policy

### 9.1 Company Policy

No company policy is applicable to this assessment.

### 9.2 Sustainable Development Goals

Every country needs to determine, for itself, how best to approach the preparation and implementation of its national sustainable development strategy depending upon the prevailing political, historical cultural, ecological circumstances. A "blueprint" approach for national sustainable development strategies is neither possible nor desirable. The particular label applied to a national sustainable development strategy is not important, as long as the underlying principles characterizing a national sustainable development strategy are adhered to and that economic, social, and environmental objectives are balanced and integrated.

When incorporating the 2030 Agenda for sustainable development and its 17 SDGs into national context, all the underlying core principles are deeply embedded in the national implementation of SDGs worldwide. As seen at the Voluntary National Reviews at the High-Level Political Forum on Sustainable Development, issues such as country ownership and strong political commitment, the integration of economic, social, and environmental objectives across sectors, territories, and generations; broad participation and effective partnerships, the development of capacity and enabling environment, as well as the mobilization of means of implementations remain at the centre of policy debates at all levels.

*Source:* National Sustainable Development Strategies (NSDS):  
<https://sdgs.un.org/topics/national-sustainable-development-strategies>

Goal 15: Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

**The approach, assessment methodology and recommendations contained within this report are directly in line with this sustainable development goal.**

### 9.3 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on this report<sup>1</sup>:

#### 9.3.1 Listing Notice 1 (GNR):

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

*Depending on the final layout and any access road crossing requirements, the powerline is unlikely to trigger this activity.*

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

(i) the undertaking of a linear activity; or

*The clearing of vegetation for substation requirements will likely exceed the clearance of 1 Ha, but less than 20 Ha of indigenous vegetation, hence triggers a basic assessment.*

#### 9.3.2 Listing Notice 2 (GNR):

None are applicable.

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<sup>1</sup> The listed activities itemized are only those with Biodiversity relevance to this report and is not a comprehensive list.

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### 9.3.3 Listing Notice 3 (GNR):

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

(a) *Western Cape provinces:*

ii. *Within critical biodiversity areas identified in bioregional plans;*

(g) *Northern Cape*

ii. *Within critical biodiversity areas identified in bioregional plans*

*It is likely that the development will require clearing of more than 300 square metres within designated Critical Biodiversity Areas (CBA 1, NC CBA, 2019), for construction of substations in the northern portion and cumulatively for pylon footprint placements.*

### 9.3.4 IMPLICATIONS:

The proposed activity will trigger LN1, activity 27, exceeding the clearance of greater than 1 Ha of indigenous vegetation for the substation (up to 3ha). The powerline and associated road infrastructure are linear activities and it thus not a triggering activity.

No Endangered and Critically Endangered vegetation units are present; however the northern grid connection does fall within a designated Critical Biodiversity Area (Figure 10: Northern Cape and Western Cape Critical Biodiversity Areas.), hence additional triggers will be affected (LN1, activity 12):

- CBA 1:
  - Northern Cape: Substation Option 2, north sections of OHPs Option 2A, 2B, 2C and Option 3; and
  - Western Cape : Southern Eastern Portion of Option 3 and the Bon Espiragene-Komberg OHP.
- CBA 2:
  - Northern Cape: Substation Option 1, south sections of OHPs Options 1A, 1C, 2A, 2B and 2C and the immediate south-eastern section the Bon Espiragene-Komberg OHP.

Construction (including any new road crossings) may result in the excavation or infill of more than 10 cubic metres from a watercourse.

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

- NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development.
- One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- National Forests Act 84 of 1998 with Amendments: Lists Protected trees, requiring permits for removal Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate

that 'natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits'.

- Northern Cape Nature Conservation Act (Act no. 9 of 2009): Lists Protected species, requiring permits for removal (Northern Cape Department of Environmental Affairs and Nature Conservation).
- Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000): Lists Protected species, requiring permits for removal (CapeNature) relating to The Nature and Environmental Conservation Ordinance, 1974.
- Water Use Authorisations: The National Water Act (No. 36 of 1998): Requires that provision be made both in terms of water quantity and quality for 'the reserve', namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal (refer to Table 16).

#### 9.4 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 2), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Critical Biodiversity Areas and Ecological Support Areas
- Vulnerable Ecosystems
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and NPAES (2010 & 2018)
- Critical Habitat for Red Listed, Endemic or Protected Species or Ecological Processes.

Table 2: Summary of Regional Planning Biodiversity features.

FEATURE <sup>2</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool (Terrestrial Biodiversity)	Low & Very High Terrestrial Biodiversity High, Medium & Low Animal Species Medium Plant Species Very High & Low Aquatic Sensitivity	CBA 1 & 2, ESA 1 & 2, FEPA Sub-catchments & Protected Areas Expansion Strategy Animal & Plant species potentially present (refer species assessment section). Aquatic CBAs, Rivers, Wetlands and Estuaries, FEPA quinary catchments.
National Vegetation Map (NVM, 2018) & National Biodiversity Assessment (2018)	Central Mountain Shale Renosterveld Koedoesberge-Moordenaars Karoo	Least Concern  Least Concern
Critically Endangered & Endangered Ecosystems (NBA, 2018)	None	N/A
Vulnerable Ecosystems (NBA, 2018)	None	N/A
Northern Cape Conservation Plan (2016)	CBA 1 & 2, ESA 1, ONA	Connectivity as well as ecological function to be maintained and loss of habitat to be avoided. Due to limited footprint of pylons, access road and substation, loss of habitat and impacts to ecological function and connectivity will be minimal.

<sup>2</sup> Refer to Figure 9 to Figure 15.

FEATURE <sup>2</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
Western Cape Biodiversity Spatial Plan (2017)	CBA 1, ESA 2	Connectivity as well as ecological function to be maintained and loss of habitat to be avoided. Due to limited footprint of pylons, access road and substation, loss of habitat and impacts to ecological function and connectivity will be minimal.
Regional Planning: Succulent Karoo Ecosystem Planning (SKEP, 2002)	South of Bokkeveld-Hantam-Roggeveld and Roggeveld Edge/Overberg Pass. East of Ceres Karoopoort and north of Laingsburg/Matjiesfontein (Witberg) expert mapped plant areas.	No sensitive areas as identified by the SKEP will be affected.
Regional Planning: Namakwa Biodiversity Sector Plan (2008)	South facing mountain slopes are considered a climate change important habitats in respective of being climate change secure sanctuaries/refuge.	Impact to south facing slopes will be minimal.
Protected Areas (SAPAD, 2020)	None directly affected, Tankwa National Park 56 km to the north-west. Anysberg Nature Reserve 41 km to the south and several small private nature reserves over 50 km to the south and west.	These protected areas nor any ecological processes associated with them are affected by the proposed development.
NPAES (2010 & 2018)	Portions of proposed powerline do fall within designated National Protected Area Expansion Strategy (NPAES) areas.	Loss of habitat and impacts to terrestrial biodiversity ecological processes will be minimal.
Strategic Water Source Areas (SWSA)	Not situated within any designated SWSA	N/A
Freshwater Ecosystem Priority Areas (FEPA's)	The OHPL will traverse two catchments, J11D draining to the south and east and E23A draining to the north-west. Powerline will traverse the upper reaches of several unnamed non-perennial watercourses and seeps. The OHPL route will traverse the upper reaches of the non-perennial Tanwa River, will also cross an unnamed tributary of the (Meintjiesplaas/Buffels River) in the vicinity of the Bon Espirange substation. The Wilgebos River is situated over 1.5 km to the west of the nearest powerline component. All rivers are thus non-perennial and have a Class C: Moderately Modified NFEPA designation.	Development of the site is unlikely to significantly impact on these watercourses, if applicable measures are implemented including not placing pylons within the functional zone of watercourses and seeps and any road crossings to be planned and constructed to minimise impact. A separate Freshwater Biodiversity Assessment (including a Floodline Assessment and Stormwater Management Plan) has been undertaken.
Within 100 m of Rivers	The OHPL route will traverse the upper reaches of the non-perennial Tanwa River, with sections of OHPL alternative 2C within 100 – 200 m of the river. The route will also cross an unnamed tributary of the (Meintjiesplaas/Buffels River) in the vicinity of the Bon Espirange substation. The Wilgebos River is situated over 1.5 km to the west of the nearest powerline component. All rivers are thus non-perennial and have a Class C: Moderately Modified NFEPA designation.	<p>Terrestrial impact to any non-perennial river associated with construction of the proposed facility will likely be negligible.</p> <p>No perennial watercourses will be impacted or are in proximity.</p> <p>Pylons should not be placed within 32 m of any watercourse, without the respective Water Use License and as far as possible, any road crossings should utilise existing road crossings as much as possible.</p>

FEATURE <sup>2</sup>	DESCRIPTION	IMPLICATIONS/COMMENT
Regional Hotspots & Regions of Endemism	Site is in proximity to the Bokkeveld-Hantam-Roggeveld Centre of Endemism	Several endemic species, as well as species having a limited distribution are known from the wider surrounding area and will be assessed accordingly in the respective species assessment section.
Important Bird Areas (IBA's)	The site is not within or in close proximity to any Important Bird Areas (IBA's). Anysberg (41 km to south), Cedarberg - Koue Bokkeveld Complex (66 km to the west) and Swartberg mountains (66 km to the south-east).	The specific activity will have no impact on any designated IBA's, or ecological processes associated with IBA's. Avifaunal impacts will be assessed as a separate Avifaunal Assessment.
Heritage Sites	The site is not located within or in close proximity to any Biodiversity Heritage Sites.	The specific activity will have no impact on any designated World Heritage Sites or ecological processes associated with World Heritage Sites. A separate Heritage, Archaeological and desktop Paleontological Assessment has been undertaken.
Key Biodiversity Areas (KBA's)	None	N/A
Marine/Coastal areas	None	N/A
RAMSAR sites	None	N/A
Within 32 m of Watercourses	Pylons and access roads may be within 32m of non-perennial watercourses	Terrestrial impact to any non-perennial watercourse will be negligible associated with construction of the proposed OHPL, which will most likely avoid such areas. New access roads may be required to cross watercourses.
Seeps	Seeps are commonly associated with non-perennial watercourses and drainage lines within the project area both on slopes and lower lying areas.	Pylons and roads should avoid seep areas, being ecological important and sensitive to disturbances.
Within 500 m of Wetlands	Several man-made dams are present across the site and in the surrounding area. Several natural but modified wetlands are present in the vicinity of the Bon Espirange substation (to the north) and no pylons or infrastructure should be placed within these wetland areas.	Most of the site is outside of functional zones of these features, which, may provide habitat for several species including birds and amphibians. The proposed activity is not anticipated to have any direct or indirect impact of significance. No pylons or infrastructure including roads to be placed within or traverse and wetlands or seeps.
Estuaries	The site is outside of any estuarine functional zone.	N/A
Forest	None directly affected.	No forest pockets nor any ecological processes associated with them are affected by the proposed project.
Surrounding Land Uses	Mostly agriculture (grazing) with some cultivated lands. Low to Moderate levels of disturbance are present in surrounding landscape associated with agriculture but with extensive areas of intact vegetation. High levels of transformation are not prevalent as indicated by the low conservation status of the vegetation units. Overgrazing may have been prevalent historically but does not appear to be as extensive in recent times.	
Critical Habitat for listed endemic/ protected species	Several endemic or other protected species are known from the broader area including populations of threatened species. There are a number of red listed species in the surrounding area and vegetation units that are known to have limited distributions, refer to Sections 0 & 0 for species assessment.	

#### 9.4.1 IMPLICATIONS:

- No vegetation units affected have an elevated conservation status.
- The site is situated within CBA and ESA designated areas; however, the limited terrestrial disturbance footprint associated with 132 kV powerlines, limited to monopole or lattice structures, two track access roads and substation sites, the local habitat loss and disruption to ecological processes and ecological corridors will be negligible.

- Non-perennial watercourses, seeps and wetlands are present, and any powerline infrastructure must span these features within minimal impact to them.

### 9.4.2 National Environmental Screening Tool

The DFFE Screening Tool indicates the following:

- Terrestrial Biodiversity is Low & Very High (Figure 5: ).
- Plant species sensitivity is Medium (Figure 6: ).
- Animal Species sensitivity is High and Medium (Figure 7).
- Aquatic Sensitivity is Low & Very High (Figure 8).

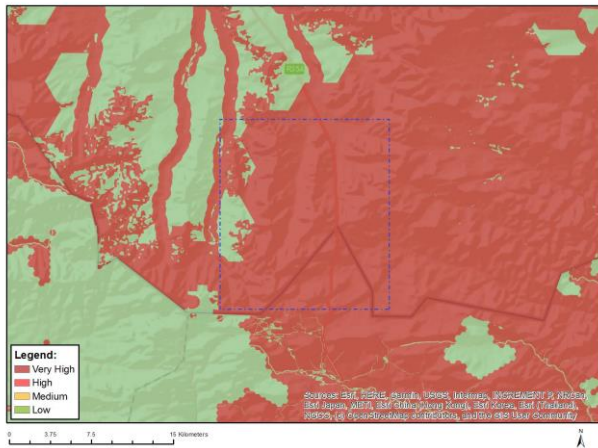


Figure 5: Terrestrial Biodiversity Sensitivity.

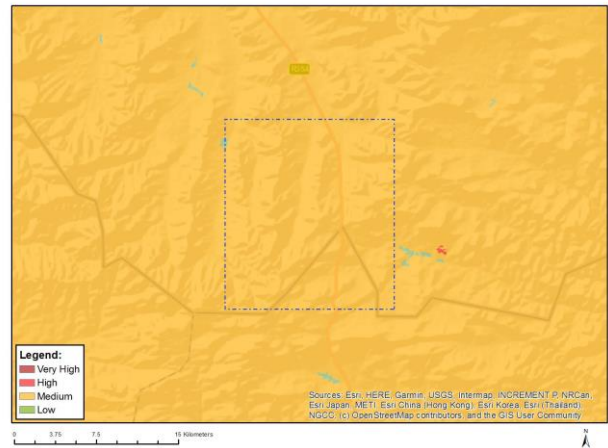


Figure 6: Plant Species Sensitivity

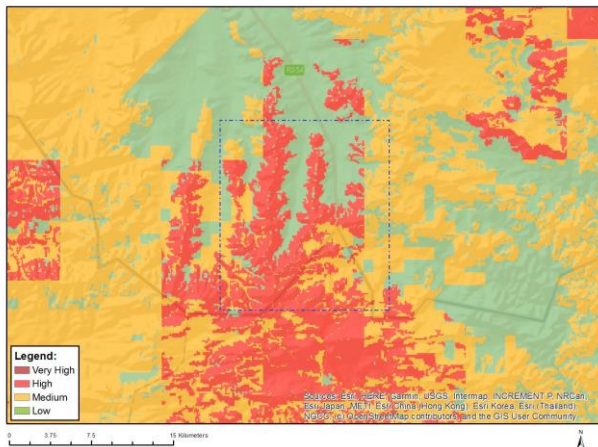


Figure 7: Animal Species Sensitivity

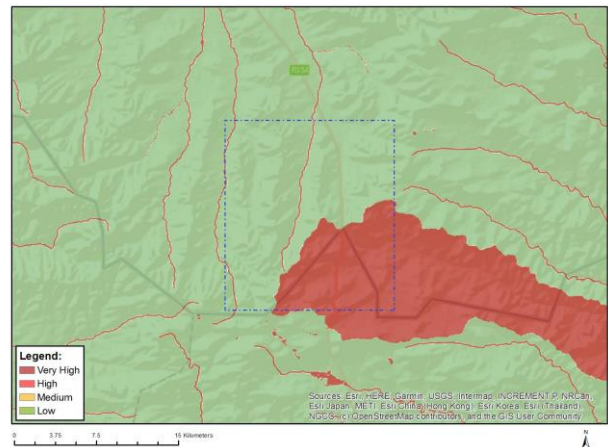


Figure 8: Aquatic Sensitivity

Feature(s) in Proximity	
<b>Terrestrial Sensitivity</b>	
Very High	CBA 1 & 2, ESA 1 & 2, FEPA Sub-catchments & Protected Areas Expansion Strategy
High	None
Medium	None
Low	Present
<b>Plant Sensitivity</b>	
Very High	None
High	None
Medium	<i>Asparagus mollis</i> , <i>Adromischus phillipsiae</i> , <i>Pauridia breviscapa</i> , <i>Zaluzianskya mirabilis</i> , <i>Lotononis venosa</i> , <i>Eriocephalus grandiflorus</i> , Sensitive species 1138, 346, 338, 711, 936, 620, 142, 1107, 886 & 722

Feature(s) in Proximity	
Low	Present
<b>Animal Sensitivity</b>	
Very High	None
High	<i>Aquila verreauxii</i> , <i>Neotis ludwigii</i> (birds)
Medium	<i>Neotis ludwigii</i> , <i>Sagittarius serpentarius</i> & <i>Aquila verreauxii</i> (birds), <i>Bunolagus monticularis</i> (mammal)
Low	Present
<b>Aquatic Sensitivity</b>	
Very High	Aquatic CBAs, Rivers, Wetlands and Estuaries, FEPA quinary catchments.
High	None
Medium	None
Low	Present

As apparent from the DFFE [National Environmental Screening Tool](#), the Terrestrial Biodiversity Theme is Very High, with CBA 1 & 2, ESA 1 & 2, FEPA Sub-catchments & Protected Areas Expansion Strategy being present. The Plant Species Theme is Medium with several flora species *conservation concern* (*Asparagus mollis*, *Adromischus phillipsiae*, *Pauridia breviscapa*, *Zaluzianskya mirabilis*, *Lotononis venosa*, *Eriocephalus grandiflorus*, Sensitive species 1138, 346, 338, 711, 936, 620, 142, 1107, 886 & 722) possibly occurring in the vicinity of the site. Animal Species Theme is High & Medium with possibly species including *Neotis ludwigii*, *Sagittarius serpentarius* & *Aquila verreauxii* (birds) and *Bunolagus monticularis* (mammal)). The Aquatic Theme indicates the possible presence of Aquatic CBAs, Rivers, Wetlands and Estuaries and FEPA quinary catchments (Very High). These will be assessed further in the relevant report section for flora and fauna. Avifaunal (bird) species are assessed in a separate specialist assessment and are thus not considered further in this report

The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report. Avifaunal species are not specifically assessed in this report as they are addressed in a separate Avifaunal Specialist Report.

### 9.4.3 Vegetation of Southern Africa

Two vegetation units (Table 2, Figure 9) are traversed by the proposed powerline (National Vegetation Map, 2018). The site is located within Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo (both of Least Concern status). A general description of the vegetation unit is provided below (as per Mucina & Rutherford, 2018) as a reference point for the baseline vegetation composition.

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 *Tankwa Karoo* influences in the west and *Tankwa Escarpment Shrubland* in the north. *Tankwa Wash Riviere* elements are found encroaching towards the site from the west, into the lower lying valleys running south, north and westwards (Figure 9). 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 *Tankwa Karoo* than with the *Moordenaars-Karoo* found to the east.

# Kareebosch 132 kV Powerline Layout - Vegetation & Status (NBA)

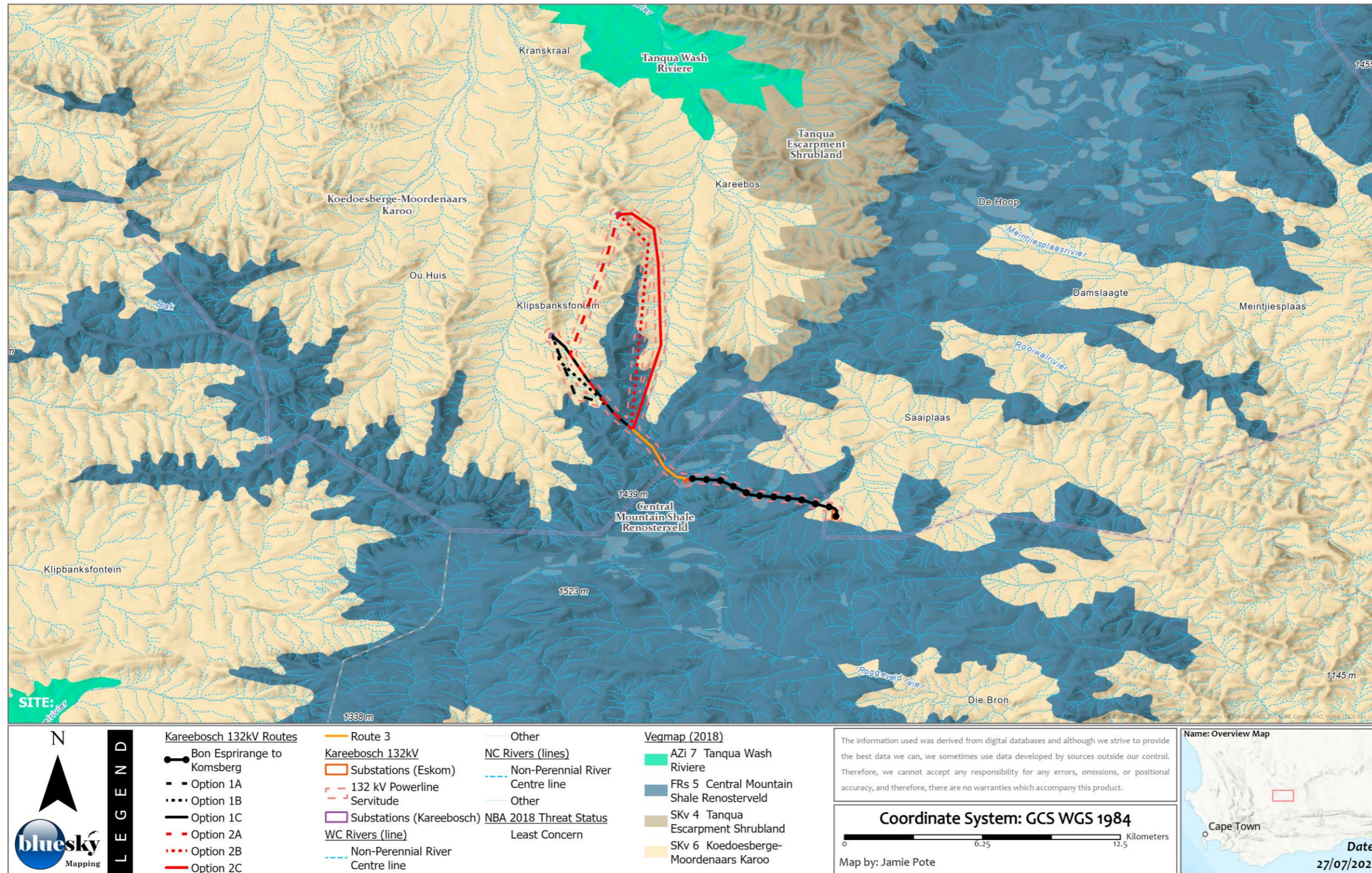


Figure 9: National Vegetation Map (NVM, 2018) and Conservation Status (NBA, 2019).



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 3.

Table 3: 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. pauperrimus</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 ambrariiifolia</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 Tankwa 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.

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

Table 4: 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. karroense</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>Piранthus 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. scabrada</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>Microlooma 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. rapunculooides</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> , <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 nellii</i><sup>GKB</sup>, <i>Rhinophyllum 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> </ul>

Growth Form	Description/Species
	<ul style="list-style-type: none"> <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>Piранthus comptus</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>Tankwana 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).

Tankwa 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 Tankwa 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 Tankwa 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 Tankwa 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 Tankwa Basin.

Although not directly associated with the project footprint, influences from Tankwa 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.

Also not directly associated with the project footprint, being found in the lower lying alluvial valleys to the west of the project area, Tankwa 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 Tankwa Karoo (SKv 5). 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 (la land type). The run-off in these habitats is very low and spread over large areas.

#### 9.4.4 National Biodiversity Assessment

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

The outcome of the most recent National Biodiversity Assessment (2018) indicates that all affected vegetation units have a Least Concern Conservation Status (Table 2). This indicates that more than 60% of the unit is intact, and that ecosystem functioning is not under any threat resulting from loss of natural habitat. The Area of Occupancy (AOO) and the Extent of Occurrence (EOO) is indicated in Table 5 below. All units are currently poorly protected. There is a low level of utilization and transformation of these units due to minimal transformation in the broader, predominantly rural farming area. Overgrazing is cited as a main cause of ongoing degradation.

Table 5: Coverage and protection levels of vegetation units

Vegetation Unit	Cons Target	AOO	EOO	Status, Protection Level
Central Mountain Shale Renosterveld	27%	30	3 273.1	Least Concern, Not Protected
Koedoesberge-Moordenaars Karoo	19%	85	9 096.7	Least Concern, Not Protected

##### 9.4.4.1 IMPLICATIONS:

- The affected vegetation units are all categorised as having a **Least Concern** Conservation Status and are not under threat, with more than 60% considered to be natural. The conservation targets range from 19% to 27% and neither are protected.
- Conservation importance at a regional level for the site is low, although the site does fall within areas currently considered for protected area expansion (NPAES).
- The proposed activity (powerline and associated infrastructure including access road and substation) is unlikely to significantly affect conservation of the vegetation unit, due to the limited footprint, and it will not result in a significant cumulative loss. The project footprint will be significantly less than 0.1% of the remaining intact vegetation coverage.

#### 9.4.5 Western Cape Biodiversity Spatial Plan (2017)

The development and implementation of the Western Cape Biodiversity Spatial Plan (WC BSP, 2017) is a core output for the Provincial Biodiversity Strategy and Action Plan (2016) which is aligned to the Aichi Targets for the United Nations Convention on Biological Diversity as well as the National Biodiversity Strategy and Action Plan (2015). The *Western Cape Biodiversity Spatial Plan* provides stakeholders with the strategic and practical guidance on how to ensure that planning and decision-making build resilience of our ecological infrastructure. Critically, the WC BSP must be used to inform how we invest in ecological infrastructure to ensure that our natural resources are managed to improve resilience and water security into the future. This will be crucial in enabling “future proof” development as part of our response to climate change, including adaptation and disaster risk reduction.

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The CBA map (Figure 10) indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate areas that need to be safeguarded in order to meet national biodiversity thresholds; areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or important locations for biodiversity features or rare species. Critical Biodiversity Areas are present within the site or immediate vicinity. Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature.

CBAs and ESAs are present within the site or immediate vicinity. Table 6 provides a summary of defining criteria and recommended land uses of these designated classes.

# Kareebosch 132 kV Powerline Layout - Critical Biodiversity Areas

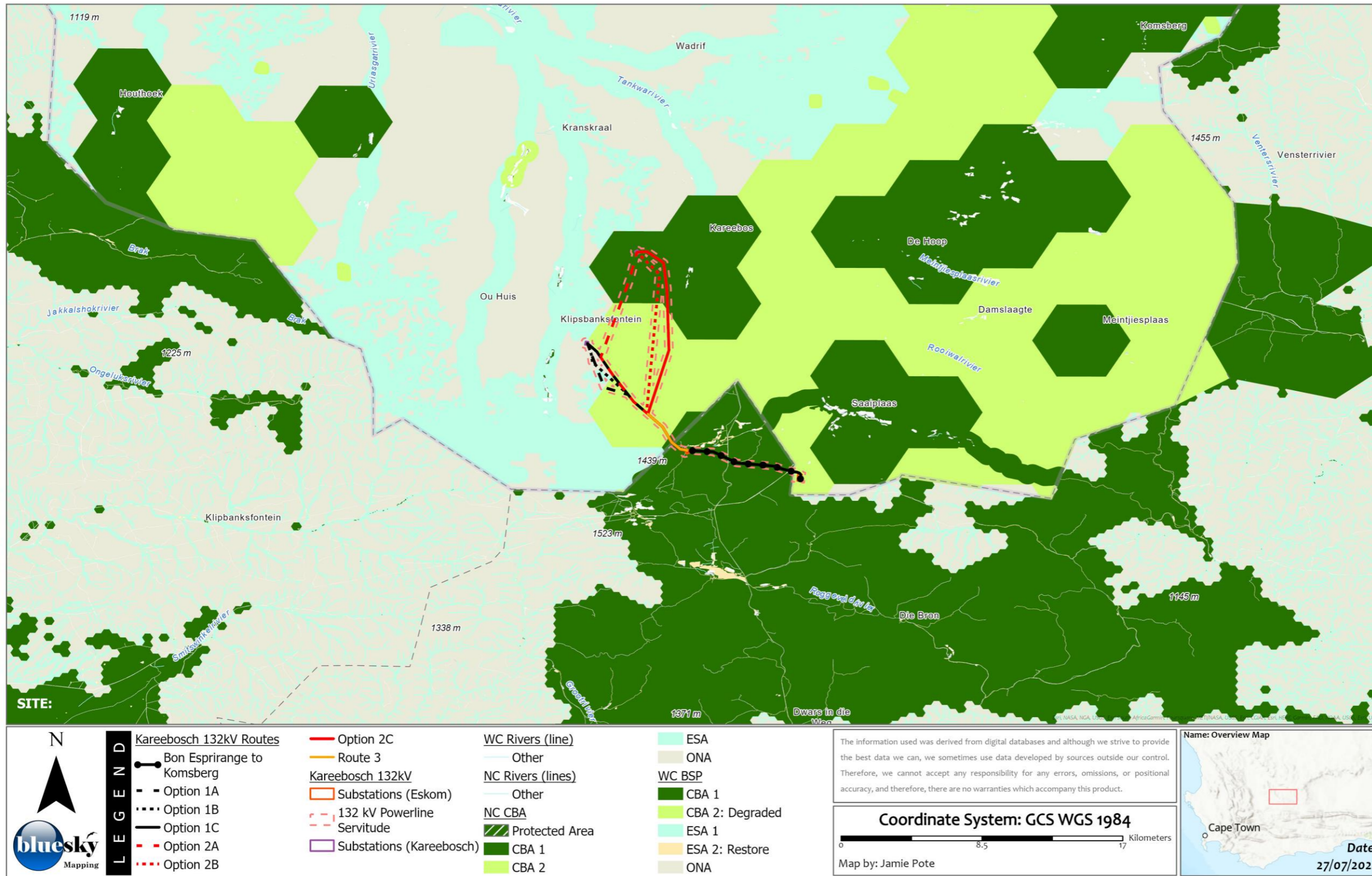


Figure 10: Northern Cape and Western Cape Critical Biodiversity Areas.

Table 6: Criteria defining Critical Biodiversity Areas

CBA MAP CATEGORY:	DEFINING CRITERIA
Protected Areas	<ul style="list-style-type: none"> <li>▪ Areas that are proclaimed as protected areas under national or provincial legislation.</li> <li>▪ Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.</li> </ul>
Critical Biodiversity Areas 1 (CBA)	<ul style="list-style-type: none"> <li>▪ Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.</li> <li>▪ Maintain in a natural or near natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.</li> </ul>
Critical Biodiversity Areas 2 (CBA 2)	<ul style="list-style-type: none"> <li>▪ Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.</li> <li>▪ Maintain in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.</li> </ul>
Ecological Support Areas 1 (ESA 1)	<ul style="list-style-type: none"> <li>▪ Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.</li> <li>▪ Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.</li> </ul>
Ecological Support Areas 2 (ESA 2)	<ul style="list-style-type: none"> <li>▪ Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PA's or CBA's and are often vital for delivering ecosystem services.</li> <li>▪ Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.</li> </ul>
Other Natural Areas (ONA)	<ul style="list-style-type: none"> <li>▪ Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.</li> <li>▪ Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high-impact land uses.</li> </ul>
No Natural Area Remaining (NNAR)	<ul style="list-style-type: none"> <li>▪ Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still</li> <li>▪ provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action.</li> <li>▪ Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.</li> </ul>

(Source: WC BSP, 2017)

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#### 9.4.6 Northern Cape Critical Biodiversity Areas (2016)

The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan (Desmet and Marsh, 2008), the Succulent Karoo Ecosystem Plan (Driver et al., 2003), national estuary priorities (Turpie et al., 2012), and the National Freshwater Ecosystem Priority Areas (NFEPA) (Nel et al., 2011) were incorporated.

Targets for terrestrial ecosystems were based on established national targets (Driver et al., 2012), while targets used for other features were aligned with those used in other provincial planning processes. The required representation of biodiversity features was achieved in a spatially efficient manner which avoided incompatible land uses and activities where possible. The assessment approach and map categories are designed to be compatible with the Guideline Regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans (DEAT, 2009). Where possible, all targets were met in the identified set of CBAs. Targets ranged from 16% to 36% of original area for particular vegetation types (with most targets being in the range 19-24%), up to 100% of known habitat for key threatened species (especially for Critically Endangered and Endangered species with small known distributions). Targets for vegetation types were those used in the National Biodiversity Assessment (NBA) (Driver, et al., 2012).

Some additional targets were set for rare and threatened habitat types (Holness & Oosthuizen, 2016) based on additional expert defined criteria, none of which are present on or in the immediate vicinity of site. These include the following:

- Ecosystem Threat status: The standard National Biodiversity Assessment (Driver, et al., 2012) method for evaluating threat status was used. The following ecosystem types triggered CBA status on this basis- Alexander Bay Coastal Duneveld (Critically Endangered), Namib Seashore Vegetation (Endangered) & Lower Gariep Alluvial Vegetation (Endangered with known under-mapped degradation and transformation).
- Rarity (under 5 000 Ha in the province and not widely distributed elsewhere) - Cape Vernal Pools & Vanrhynsdorp Shale Renosterveld.
- Extreme rarity and endemism (rare types with under 5 000 Ha originally or remaining often at a single site which are not widely distributed outside the province) - Arid Estuarine Salt Marshes, Kamiesberg Granite Fynbos, Kobbie Succulent Shrubland, Namaqualand Seashore Vegetation, Namib Lichen Fields & Vyftienmyl se Berge Succulent Shrubland.
- Ecosystem process importance or high biodiversity value with significant loss underway - Upper Gariep Alluvial Vegetation (evidence gathered by DENC suggests that degradation of this vegetation type is just as intense as the Lower Gariep Alluvial. Further, it has significant process value for maintenance of hydrological processes); Richtersveld Coastal Duneveld (critical for coastal processes and evidence of significant loss with approximately 30% of complete loss already recorded with significant additional fragmentation issues) & Nieuwoudtville Shale Renosterveld (a vulnerable type with extremely high biodiversity value and limited extent within the province).

The Northern Cape Province covers approximately 37.3 million hectares. The CBA designation (NC CBA, 2016) and coverage is indicated in Table 7.



Table 7: Northern Cape CBA coverage.

CBA Category	Area (km <sup>2</sup> )	Percent
Protected Area	18 139.9 km <sup>2</sup>	4.9
Critical Biodiversity Area 1	30 627.4 km <sup>2</sup>	8.2
Critical Biodiversity Area 2	75 777.5 km <sup>2</sup>	20.3
Ecological Support Area	52 631.0 km <sup>2</sup>	14.1
Other Natural Area	191 618.2 km <sup>2</sup>	51.4
Not designated (including transformed and any undesignated)	4 206.0	1.1
<b>TOTAL</b>	<b>373 000 km<sup>2</sup></b>	<b>100.0</b>

Based on the above, it is noted that land-based protected areas currently contribute less than 5% of the Northern Cape landcover. An additional 28.5% constitutes Critical Biodiversity Area with 14.1% Ecological Support Area. Over 50% is designated Other Natural Area, typically being most suited to development requiring large scale clearing.

#### 9.4.6.1 IMPLICATIONS:

- The site is within area having a Critical Biodiversity Areas (CBA) 1 & 2 and Ecological Support Area (ESA) 1 designation with some Other Natural Area also present.
- CBA and ESA areas generally do allow for limited linear infrastructure and the significance of such impacts to loss of habitat will likely be minimal because of the proposed activity.
- Fragmentation and loss of habitat within CBA and ESA, because of the development and associated infrastructure is likely to be minimal, as the footprint required for the powerline construction will be limited to pylon footprints and access roads, which will be negligible in relation to regional coverages.
- The impact to ecological processes associated with powerline construction are likely to be localised and not likely to be significant, as well as the fact that any disturbed areas, other than substations, are likely to rehabilitate to some extent within 2 years (as per terrestrial biodiversity reporting protocol).

#### 9.4.7 Namakwa Biodiversity Sector Plan (2008)

Located within the Succulent Karoo, one of only two semi-arid biodiversity hotspots in the world and exhibiting by far the highest plant diversity of any arid ecosystem. It covers both Succulent Karoo (winter rainfall) and Nama Karoo (summer rainfall) arid systems as well as a small part of the Mediterranean-climate Fynbos (*and Renosterveld*) in the extreme SW of the District. Having both summer and winter rainfall arid zones means that it is an area containing an exceptional variety of biodiversity.

The scarcity of water resources is a defining feature of this arid environment. The two main river systems – the Orange River in the north and the Oliphant's/Doring River system that flows in a north-westerly direction through the Hantam and Karoo Hoogland Municipalities – are both under pressure from the clearing of land for agriculture and the encroachment of alien vegetation along riverbanks. Similarly, the high yielding water catchment areas of the high mountain areas – some of which provide a significant amount of fresh water to surrounding towns – are also demonstrating lower yields because of a lack of efficient water management strategies. In order to maintain ecosystem health and thereby ensure the sustainability of existing towns and land use practices it is critical to safeguard these areas. Effective water resource management is essential in the Northern Cape, especially since it is an extremely water limited area.

# Kareebosch 132 kV Powerline Layout - Aquatic Map

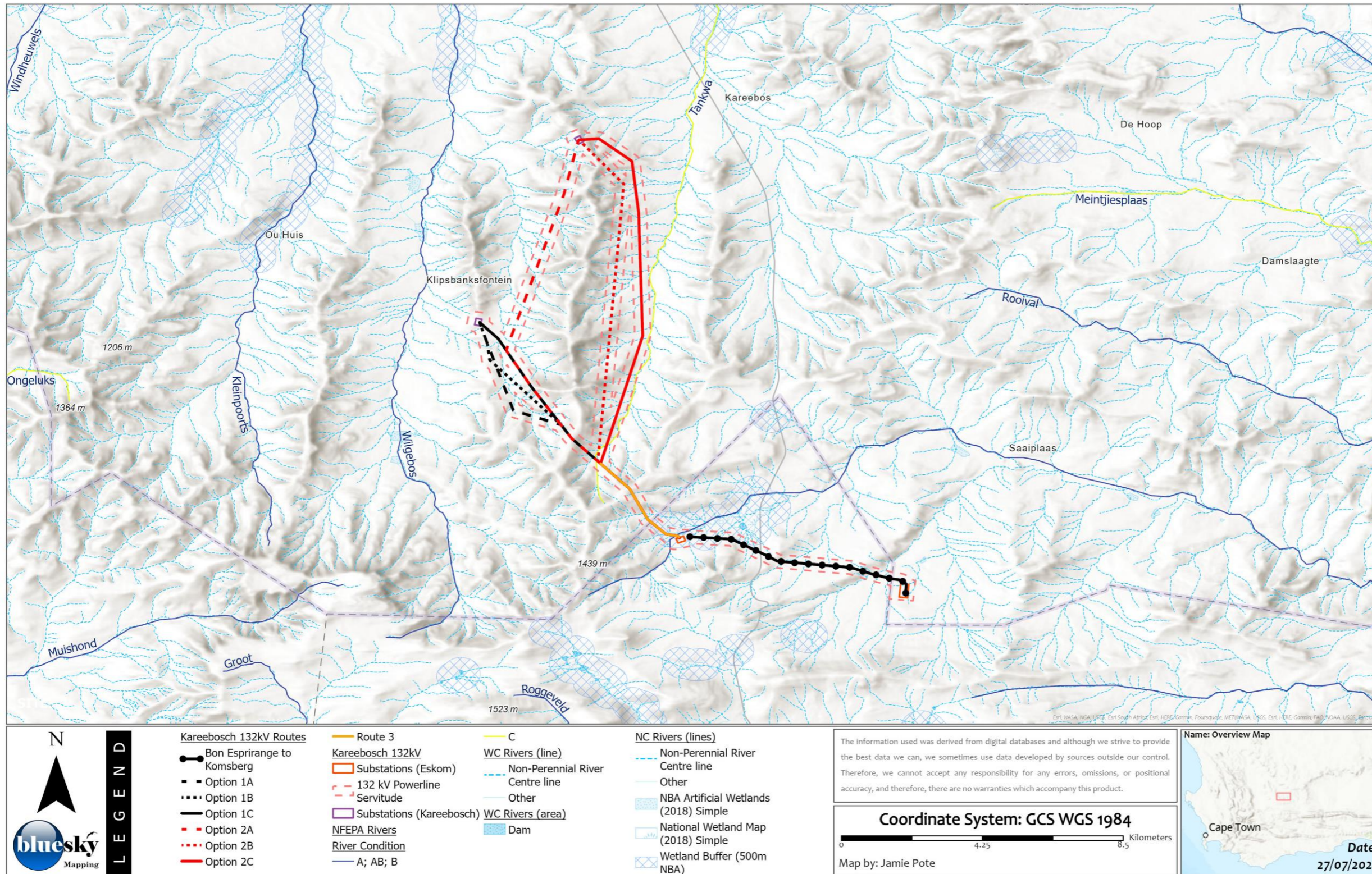


Figure 11: Namakwa Bioregional Plan.

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#### 9.4.7.1 Land Use

Land use is generally defined by livestock grazing and mining – the two major economic drivers in the region. Another significant economic factor for the NDM's economy is “flower” tourism that is based on the fantastic annual wildflower displays that cover regions in a kaleidoscope of colour each spring. This is a distinctly seasonal aspect of the economy, lasting only eight to ten weeks, and being highly dependent on the timing and duration of the previous winter rains. However, there are indications that in recent years the regional ecotourism industry is diversifying (e.g., 4x4 and nature tourism) with greater numbers of tourists arriving throughout the year.

Although livestock grazing is, in theory, a viable and biodiversity friendly land use in the region, in practice this is often not the case. Over grazing, especially considering the effects of climate change, constitutes the biggest threat to biodiversity, mostly by virtue of it being the most widely practiced land use activity in the region. Effective veld management plans and practices (especially around catchment areas) is critical for sustainable land use. Goat and sheep farming is a major land use – which could render large areas unable to support its ecosystem functions. The resultant erosion and reduction in vegetation cover would not only affect the productivity of the land, but also affect water quality and wetland health – thus having a direct impact upon human wellbeing.

Mining practices have had multiple impacts upon both the economy and the landscape. The remnants of mining activities can be seen in each local municipality, in the form of mine dumps and excavations, although not prevalent in the specific area.

#### 9.4.7.2 Critical Biodiversity and Ecological Process Areas

The Namakwa Bioregional Plan only identifies south facing slopes as being sensitive features within the site, being sensitive to projected climate change, as indicated in Figure 11. In line with the objectives for ecological processes, the proposed powerline is unlikely to compromise ecological connectivity on these south-facing slopes.

The illegal collection of unique plant species – especially from areas such as quartz patches that are located near to roads is a major threat to biodiversity in the Succulent Karoo. Such quartz patches are not common in the site and surrounding area.

#### 9.4.8 Succulent Karoo Ecosystem Plan (SKEP, 2003)

The Succulent Karoo stretches along the western side of South Africa and Namibia and is one of only two global hotspots that are entirely arid (Conservation International 2006). As indicated in Figure 12, SKEP does not identify any expert mapped sensitive features that overlap with the site, other than plant (biodiversity) to the west. These specific sensitivities will be assessed in further detail in the respective sections of the report.

The natural vegetation of the Succulent Karoo provides a significant ecosystem service in the form of forage for livestock production. Livestock production has both monetary and social value. One threat to Biodiversity in the area is the less-than-ideal farming practices. Due to a lack of infrastructure, especially fencing, optimal farm management is not implemented. The main reason for this is that farms in the region have a low income because of the unfavourable and harsh environmental conditions. Farms in the region yield a low income because of the harsh environmental conditions and the unpalatable grazing. Additionally, the monetary value of the land is low and the cost of infrastructure so high that it is not financially viable for a farmer to invest too much in infrastructure as it will not be possible to recover these costs. There is willingness amongst farmers for improved farm management and infrastructure development; however, their financial means usually do not allow it (van der Merwe, 2008a) which is where an operational wind farm with long term income can make a difference. Although damage can happen fast, recovery in the Karoo is slow, because it depends upon unpredictable rainfall events (Esler et al. 2006).

A possible indirect impact of the powerline and associated Karreebosch WEF will be the *diversification of income streams*, where the current landowners, currently dependant on grazing and tourism will on implementation receive remuneration from the WEF provider. This could result in a decreased dependence on livestock which could in theory have a positive impact on biodiversity where reliance on livestock grazing will be decreased, thus reducing grazing pressure on the vegetation.

# Kareebosch 132 kV Powerline

## Layout - Succulent Karoo Ecosystem Planning (SKEP)

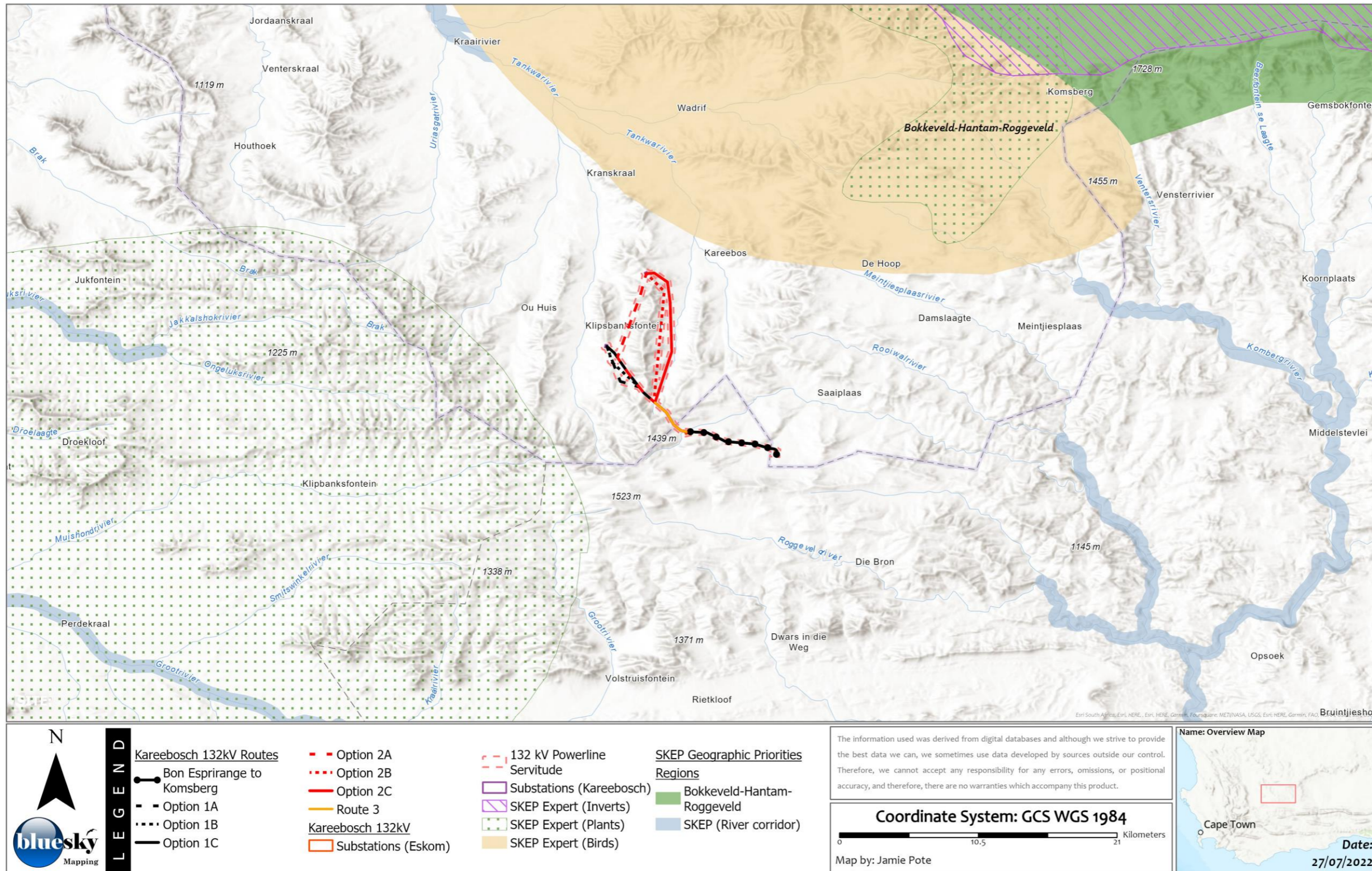


Figure 12: SKEP expert layers.

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#### 9.4.9 Other Biodiversity Sector Plans

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

#### 9.4.10 Protected Areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Table 8, Figure 13). The Tankwa National Park is the closest National Park, situated 56 km to the north-west. Other nearby protected areas include the Anysberg Nature Reserve, being the closest Nature Reserve (41 km to the south) with several other small nature reserves and protected areas to the south and west, all greater than 50 km away.

*Table 8: List of Protected Areas in vicinity*

NAME	DISTANCE
Tankwa National Park. and	56 km to the north-west
Anysberg Nature Reserve	41 km to the south
Other Private Nature Reserves	Several > 50 km to the south and west

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria.

##### 9.4.10.1 Implications:

- Neither these protected areas nor any ecological processes associated with them are likely to be affected by the proposed powerline.
- The site does fall within designated National Protected Areas Expansion Strategy (NPAES) areas, however the direct loss of habitat and impact to ecological processes will be negligible.

# Kareebosch 132 kV Powerline

## Layout - Protected Areas

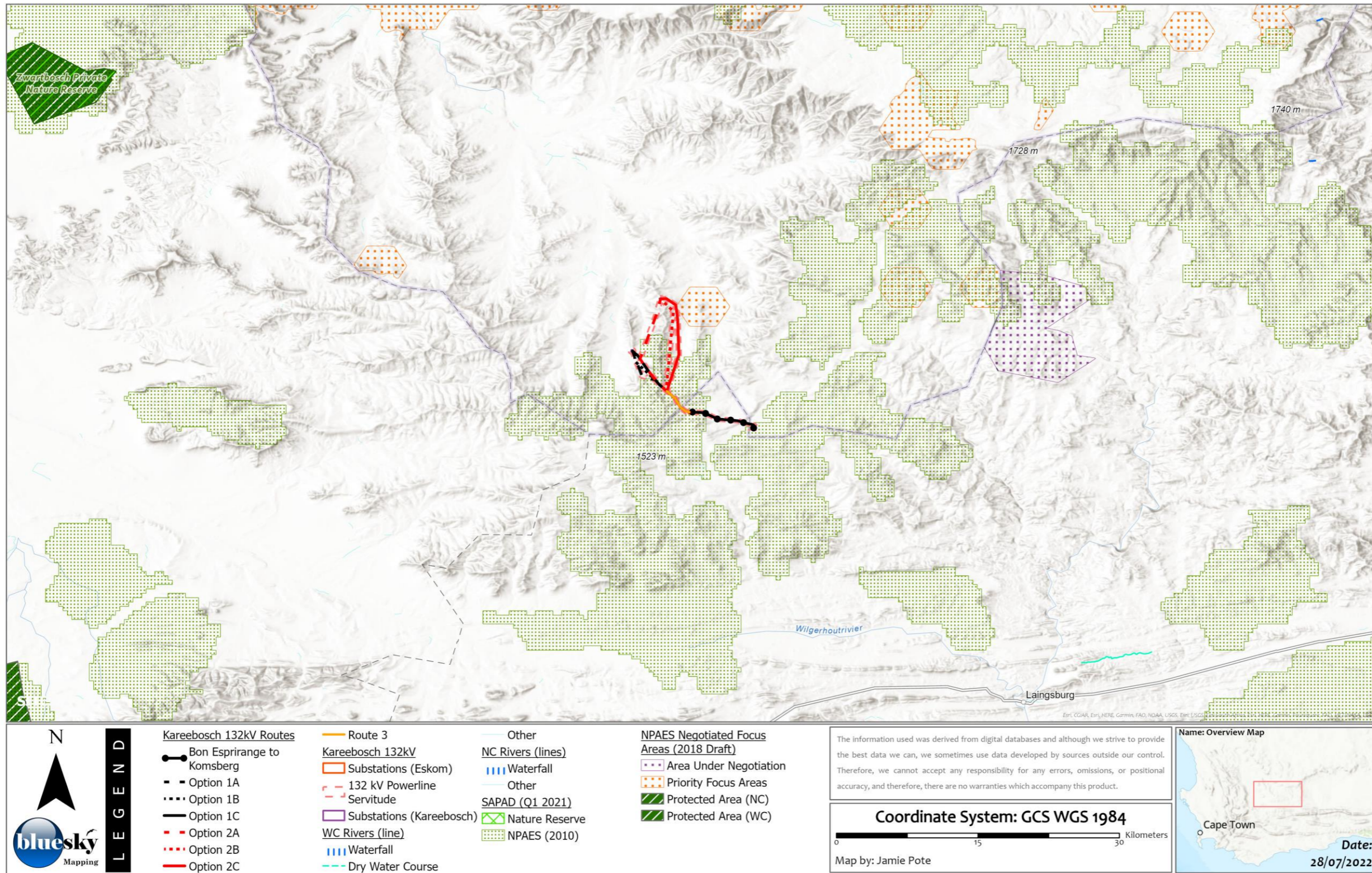


Figure 13: Protected Areas in the vicinity of the site.

### 9.4.11 Strategic Water Source Areas

Strategic water source areas (Figure 14) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas can be regarded as natural "water factories", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

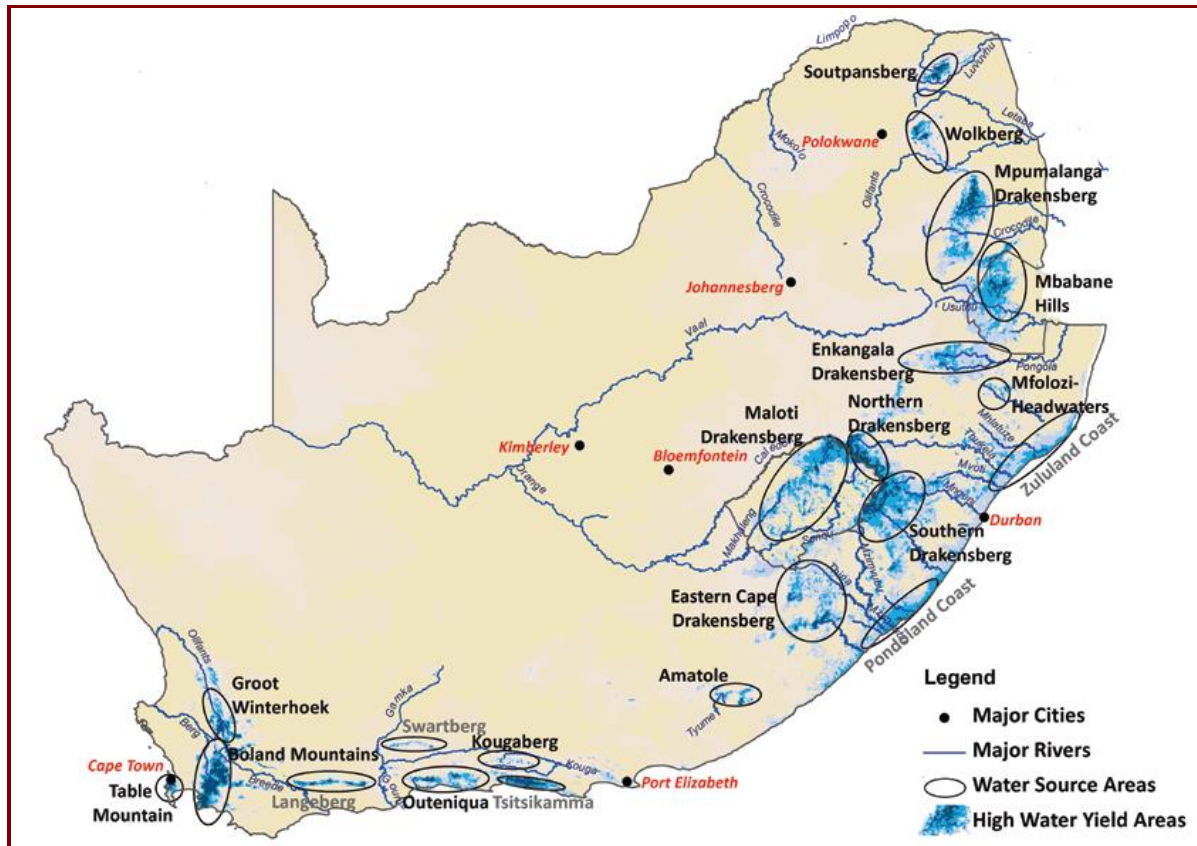


Figure 14: South Africa Water Source Areas

[Source: Nel, et al, 2013]

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

#### 9.4.11.1 Implications

- The site is NOT situated within a designated Strategic Water Source Area and the specific activity (powerline) is unlikely to have an impact on any downstream water resources, as it is unlikely to result in downstream pollution or sedimentation or alter water flows.

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#### 9.4.12 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or 'FEPAs'. Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

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



# Kareebosch 132 kV Powerline Layout - Aquatic Map

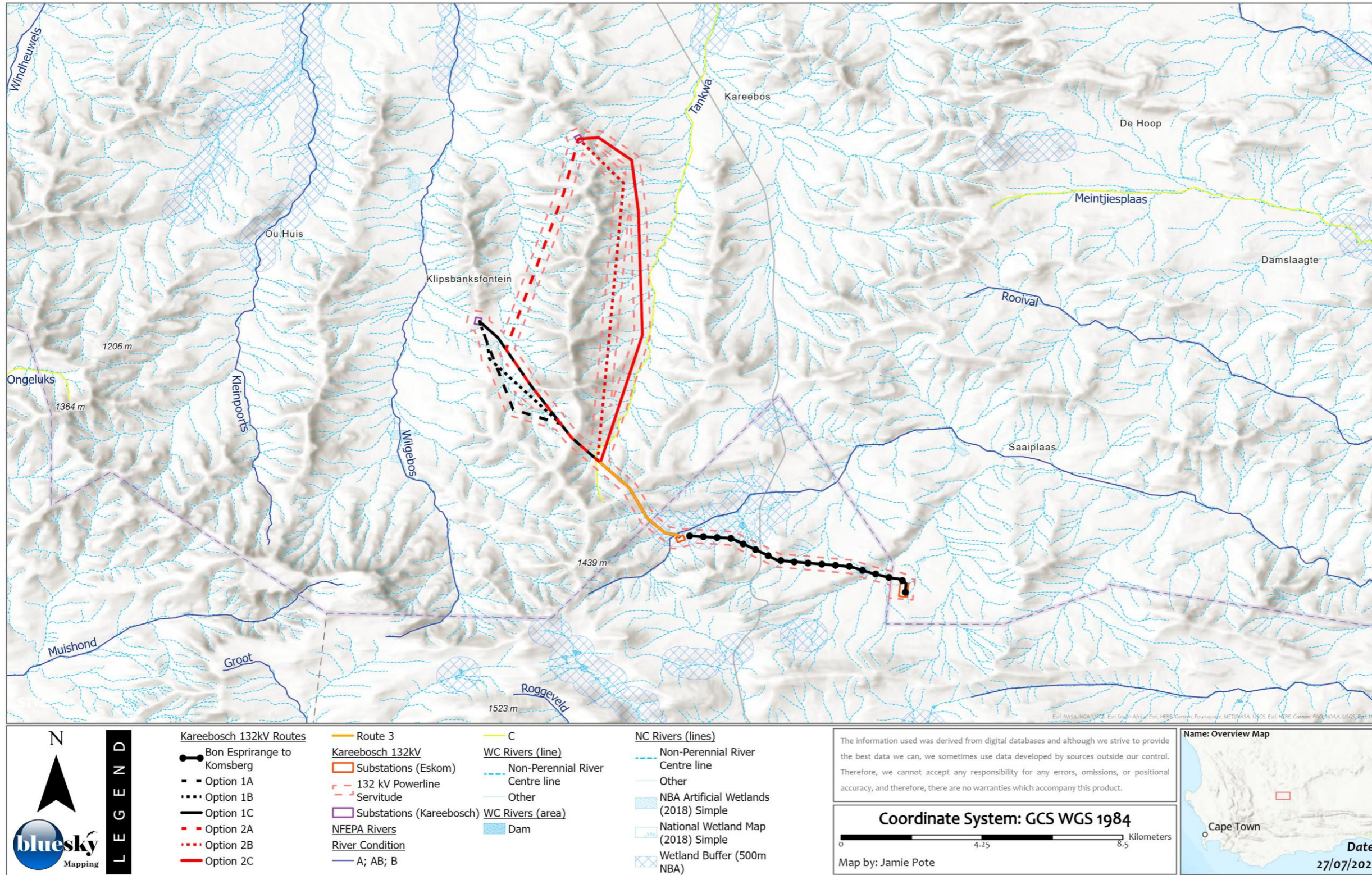


Figure 15: Rivers and Wetlands.

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

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

The powerline route options traverse natural aquatic features or aquatic functional zones, concluding the upper reaches of several unnamed non-perennial watercourses, drainage lines and seeps. All rivers in the vicinity are non-perennial and all are designated as NFEPA Class C: Moderately Modified. The route will traverse the upper reaches of the non-perennial Tankwa River and will also cross an unnamed tributary of the Meintjiesplaas/Buffels River in the vicinity of the Bon Espirange substation. The Wilgebos River is situated over 1.5 km to the west of the nearest powerline component.

### **9.4.13 Rivers and Wetlands**

#### **9.4.13.1 Rivers**

The route will traverse the upper reaches of the non-perennial Tankwa River and will also cross an unnamed tributary of the Meintjiesplaas/Buffels River in the vicinity of the Bon Espirange substation. The Wilgebos River is situated over 1.5 km to the west of the nearest powerline component. Due to the arid nature of the region, watercourses are expected to serve as critical ecological corridors (Figure 15).

#### **9.4.13.2 Wetlands**

The National Biodiversity Assessment (NBA, 2018) identifies natural wetlands to the north of the Bon Espirange substation. These are largely modified but should none the less be avoided (Figure 15). Detailed assessment of aquatic features is largely outside of the scope of this terrestrial biodiversity report and will be addressed in a separate aquatic assessment report if necessary.

#### **9.4.13.3 IMPLICATIONS:**

- It is unlikely that the development of the powerline, which will span several non-perennial watercourses, will have any impact of significance to these watercourses and aquatic features.
- No pylon should be placed within 32 m of any watercourse, drainage line, seep, or wetland. Road crossings in these areas must be limited to what is necessary and existing crossings and tracks should be used as far as possible.

### **9.4.14 Regional Hotspots and Centres of Endemism**

The site is situated to the south of the Bokkeveld-Hantam-Roggeveld Centre of Endemism. The location of the proposed activity in proximity to the centre of Endemism and biodiversity rich areas, suggests that the screening for possible endemic species should be undertaken. Additional screening of endemic species has thus been undertaken and is provided in Section 11 (Plant and Animal Species (Flora and Fauna) Assessment).

#### **9.4.14.1 Implications:**

- Several endemic species could possibly occur within the wider area, which will be assessed further in the species assessment section of this report. Due to the limited and localised footprint associated with a powerline and the extensive extent of the vegetation units, it is likely that these risks will be minimal.

### **9.4.15 Key Biodiversity Areas**

#### **9.4.15.1 Important Bird Areas**

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food,

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

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

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

The closest designated IBA's include Anysberg (41 km to south), Cedarberg - Koue Bokkeveld Complex (66 km to the west) and Swartberg mountains (66 km to the south-east).

#### **9.4.15.2 Implications:**

- The specific activity is not situated within any designated IBA's.
- Avifaunal related risks and impacts, being outside the scope of this terrestrial assessment report, will be assessed as a separate Avifaunal Assessment.

### **9.5 Ecological Processes and Corridors**

#### **9.5.1 Critical Biodiversity Areas**

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

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

#### **9.5.2 Ecosystem Processes and Function and Ecological Support Areas**

In the Succulent Karoo, distinct processes have been associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow.

ESAs include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains CBAs or a terrestrial feature. ESA's are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.

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Land-use guidelines generally recommend the following for ESAs:

- Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.

For areas classified as ESA 1, the following objectives apply:

- These areas are **not required** to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.
- These systems may vary in condition and maintaining function is the main objective, therefore:
- Ecosystems still in natural, near natural state should be maintained.
- Ecosystems that are moderately disturbed/degraded should be restored.

Ecological Support Areas generally include:

- Biodiversity Corridors: Whole landscape-level biodiversity corridor network aimed at retaining connectivity between all geographic areas in the district and nationally. Corridor network identified based on existing corridor networks and following alignment guidelines laid out in the NSBA such as upland-lowland, climatic and latitudinal gradients.
- Wetland Buffer Areas: The buffer zone around wetlands and rivers where land-use activities can impact the ecological functioning and integrity these features. Criteria:
  - 500 m radius buffer around all pans and estuaries
  - 100 m radius buffer around all wetlands and rivers
  - All farm dams.

Limited areas are available for agricultural expansion that are not excluded due to slope and/or soil suitability. It would be feasible to investigate options where ecological functioning and connectivity can still be maintained within the local and broader landscape. This could include mitigation measures that will support maintain ecological function and connectivity.

#### 9.5.2.1 Implications:

- The land use of the immediate area is classed primarily as natural land. The site falls within area designated as CBA, ESA and ONA (Figure 10).
- Several alternative routes are assessed with similar risks to CBAs.
- The proposed powerline will not significantly undermine the ecological functioning of the designated CBA and ESA areas.
- Loss of vegetation and habitat will be limited to substation and pylon footprints, which are generally limited in extent.
- Access roads associated with 132kV powerlines generally consist of two-tracks rather than constructed formal roads, which are used primarily during construction and to some extent thereafter for occasional inspections and maintenance. Vegetation cover tends to regenerate within a season cycle or two once construction is completed.
- Substitutions and overhead powerlines do not pose any significant barriers to terrestrial ecological processes, including gene dispersal, seed germination and foraging activities of terrestrial fauna.
- Mitigation measures will include minimising footprints and identifying and avoiding more sensitive micro-habitats within the broader landscape (including rocky outcrops, weeps, wetlands and/or sub-populations of species of conservation concern).
- The proposed development of substations and overhead powerlines and associated infrastructure is thus unlikely to have any significant impact to terrestrial ecological processes.

#### 9.5.3 Ecosystem Services

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

- Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide<sup>3</sup>, buffers against natural hazards such as fire and floods<sup>(e)</sup>; carbon sequestration (storage), important for reducing the impacts of climate change<sup>(e)</sup>; regulation of water supply<sup>(e)</sup>; grazing for wild animals and livestock<sup>(e)</sup>; natural spaces for recreation & tourism<sup>(e)</sup>; the air we breathe<sup>(e)</sup>; spiritual, ritual and ceremonies; horticultural & wildflower industries<sup>(e)</sup>; natural heritage<sup>(e)</sup> and food, timber, fibre & medicinal plants<sup>(e)</sup>
- Rivers are central to human welfare and economic development. They provide water for agricultural, industrial and domestic uses<sup>(e)</sup>; flood attenuation and regulation<sup>(e)</sup>; food and medicinal plants<sup>(e)</sup>; transport and/or purification of biodegradable wastes; tourism, recreational and cultural use<sup>(e)</sup> & enhanced property values<sup>(e)</sup>.
- Estuaries (not present), together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to subsistence fishing, commercial fisheries (as they provide a refuge for commercial fishes when they are young), wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles), tourism, recreational, cultural use and craft materials and enhanced property values .
- Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:
  - support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g., fire, pollination, seed dispersal), in response to global climate change. (e)
  - are important areas for storing carbon to reduce the impacts of global climate change? (e)
  - are important areas for regulating water supply (e.g., filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments) (e)
  - supply good quality water from mountain catchment areas, surface and groundwater. (e)
  - the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services). (e)
  - are of important scenic value, contributing to tourism and the 'sense of place'. (e)
  - Coastal & marine areas
  - Subsistence & commercial fishing (food)
  - Medicinal & Cosmetic resources e.g., kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
  - Mining (sand and heavy mineral)
  - Recreational value (sport and fishing)
  - Retail value (market-value of housing) (e)
- Net Primary production:(e) This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations' ability to maintain this ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.
- Water production: (e) In more arid areas, many municipalities, towns and farms rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

<sup>3</sup> Within the study area, potential terrestrial ecosystem services are marked <sup>(e)</sup>.

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

Within the site, the most important ecosystem services are the provision of habitat for flora and faunal species (including foraging & nesting) and potentially livestock/game farming as well as energy production. There is minimal change to ecosystem services from pre-development conditions because of surrounding historical rural development and historical agricultural use of the site.

#### 9.5.3.1 Implications:

- The rural communities are generally highly dependent on local ecosystem services for a range of resources. These will however not be significantly affected by the proposed activity.
- The contribution of the site to any ecosystem services of an ecological or biodiversity nature is low to moderate at a regional scale.
- The proposed activity will not significantly affect ecosystem services as described above.

#### 9.5.4 Critical/Important Terrestrial Habitats

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

##### 9.5.4.1 Important Terrestrial Habitats

- Experts Areas: Areas in the terrestrial environments identified by experts as being most critical or important for biodiversity.
- Quartz Patches: Vegetation with quartz or other types of gravel patches, which can be refuges for a wide range of succulent species.
- South-facing Slopes: All areas with steep south-facing mountain slopes larger than 25 Ha in extent. These represent an important climate change refugia for biodiversity.
- Kloofs: All kloofs larger than 50 Ha in extent. These represent a keystone resource for biodiversity (e.g., presence of springs) and important climate change refugia for biodiversity.
- Riverine Rabbit: Modelled Riverine Rabbit habitat based on observed records.
- Rocky Outcrops: Rocky outcrops can provide habitat for geophytic species that often have limited distributions. Several rocky outcrops are present within the powerline servitudes. These will be assessed in more detail in the assessment section of this report.
- Wetland habitat: Wetlands are special habitats as they provide a refuge for birds and other organism, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. Wetlands or Estuaries are protected by various pieces of legislation, such as:
  - The National Water Act (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.

- 
- The NEMA in terms of principle (r) and the listed activities (Section 24).
  - The Conservation of Agricultural Resources Act (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.
  - The Integrated Coastal Management Act (ICMA) 24 of 2008 requires the preparation of Estuary Management Plans by municipalities, unless managed by another Authority e.g., SANParks.
  - Being an arid area, water resources would be considered to be important habitat and will be assessed accordingly in the assessment section of this report.
  - Priority Estuaries: No Estuaries are affected by the proposed activity.
  - Forest: All forest is protected by the National Forests Act.
  - Fynbos: Fynbos vegetation is known for its high localised biodiversity.
  - Colonies or Populations of Threatened or Protected Species: Includes colonies, populations and sub-populations of threatened fauna or flora species.

#### 9.5.4.2

#### 9.5.4.3 Implications:

- Important terrestrial habitats within the site include south facing slopes, rocky outcrops, some wetland and seep habitat and some localised sub-populations of threatened or protected species. These habitats have assessed, and appropriate mitigation measures recommended in the habitat and impact assessment sections of this report.

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## 10 Biodiversity Risk Identification and Assessment

### 10.1 Baseline Biodiversity Description

#### 10.1.1 Site Locality

The Karreebosch Wind Farm and the associated infrastructure is located on a site ~40 km north of Matjiesfontein and ~40 km south of Sutherland. The powerline falls 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 (Figure 16). The proposed powerline route is comprised of several alternatives (1 A, B & C and 2 A, B & C), as indicated in Figure 16 to Figure 18).

#### 10.1.2 Topography and Drainage

The site falls within a mountainous landscape drained by an extensive network of drainage lines and seeps into broad lowland river valleys (Figure 19).

#### 10.1.3 Climate

The area has an arid to semi-arid climate with MAP 180–410 mm with two slight rainfall optima, one being in March and another spread from May to August but showing a slight high in autumn-winter. Mean daily maximum and minimum temperatures are around 29.9 °C and 0.9 °C for January and July, respectively. Frost incidence is 20–50 days per year.



# Kareebosch 132 kV Powerline Layout - Aerial Map

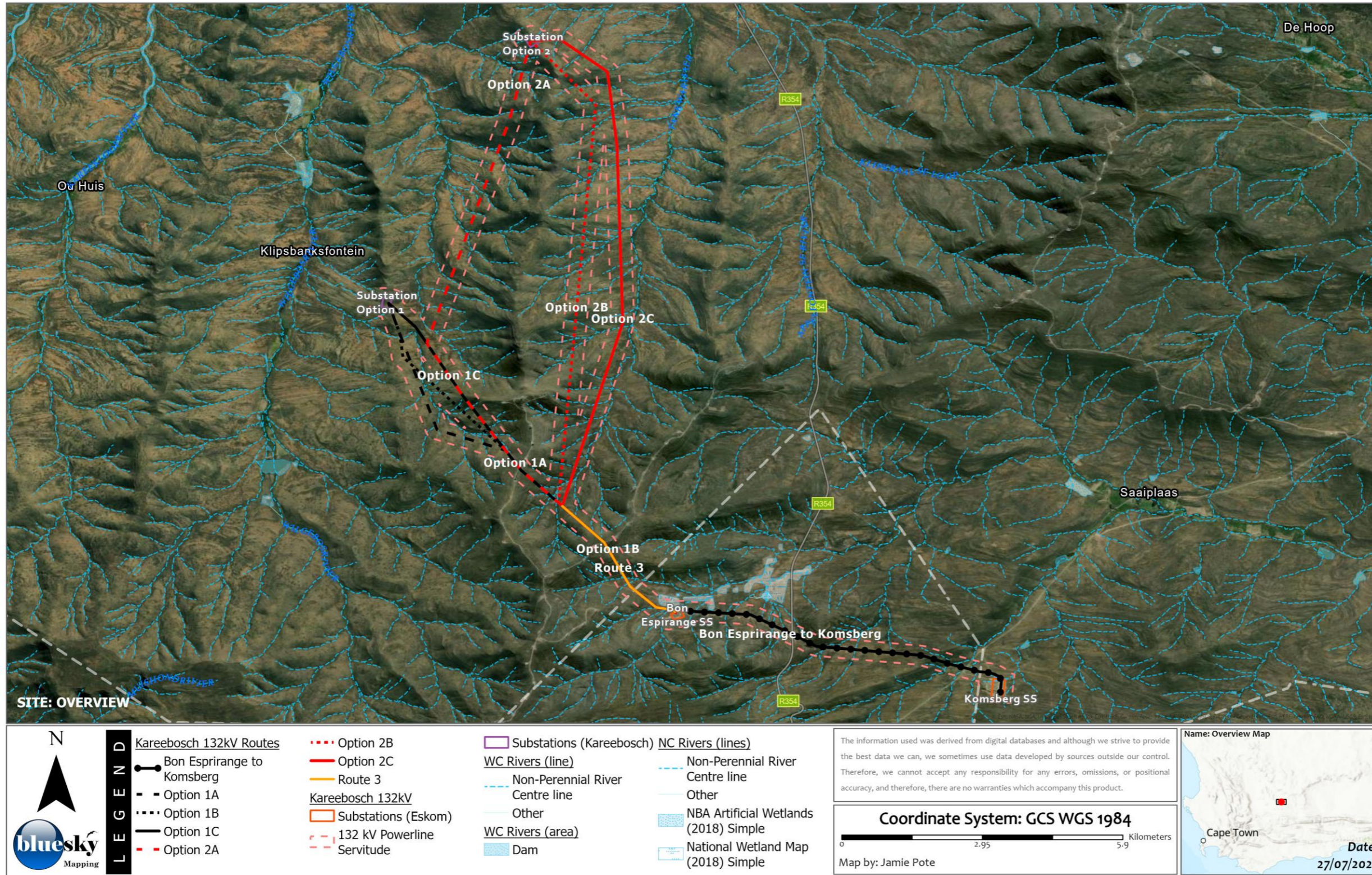


Figure 16: Aerial photo of proposed route options.

# Kareebosch 132 kV Powerline Layout - Aerial Map

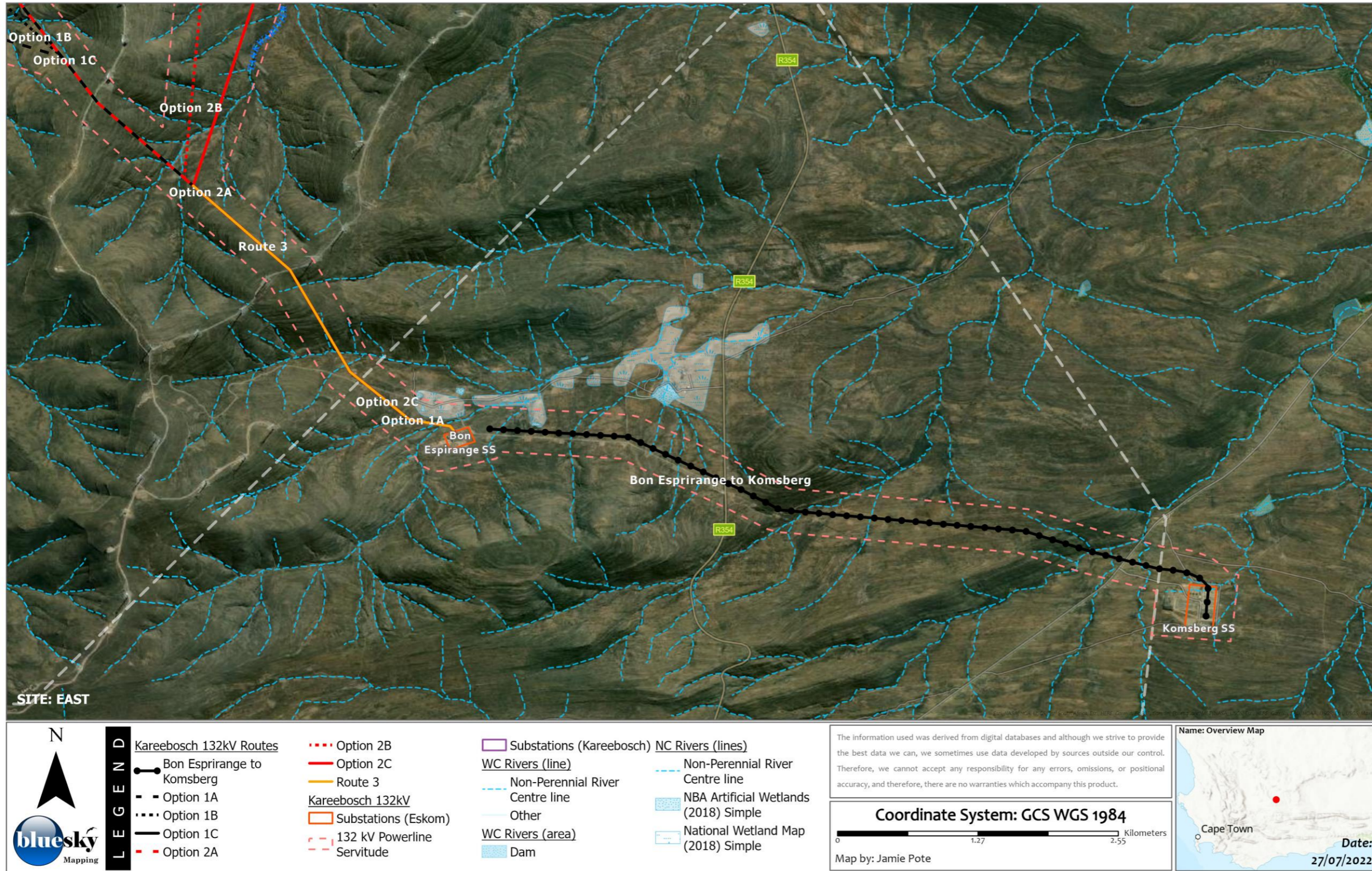


Figure 17: Aerial photo of proposed route options (East).

# Kareebosch 132 kV Powerline Layout - Aerial Map

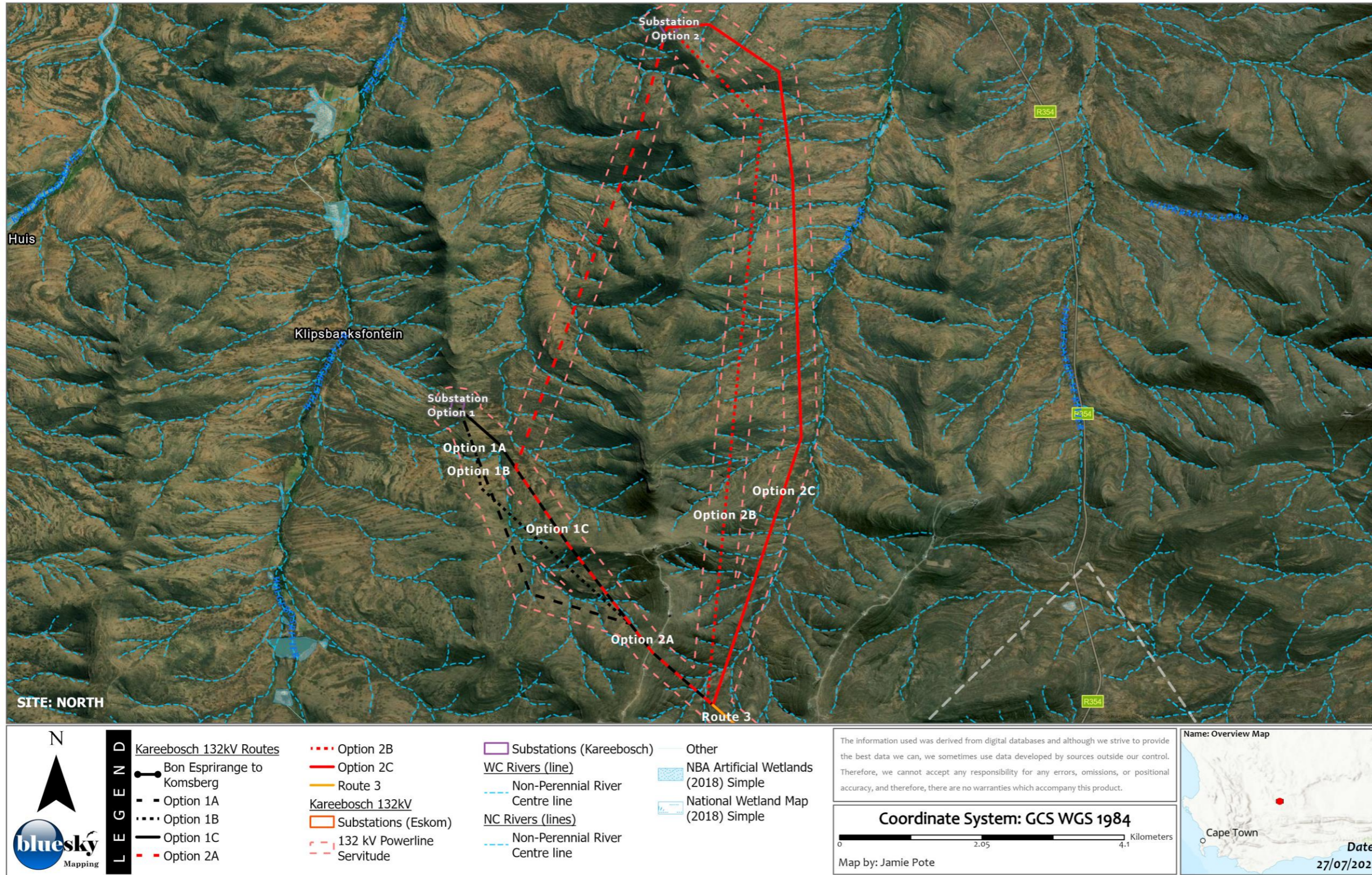


Figure 18: Aerial photo of proposed route options (North).

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## 10.1.4 Terrestrial Landscape Features (Habitat)

### 10.1.4.1 Overview

It is notable across the vegetation types that a suite of species tends to be represented across most of the area (Figure 19), 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.

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 *Merxmüllera 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.





Figure 19: Overview of typical landscape with mountains and broad 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:

- 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 Tankwa Karoo rather than Koedoesberge-Moordenaars Karoo. Furthermore, there is a transition towards Tankwa Escarpment Shrubland towards the north and Tankwa Karoo to the west, with elements of both these units being represented within the peripheral boundaries of the project area, even though they do not overlap with the mapped vegetation as per the National Vegetation Map (2018).
- 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.
- 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).
- 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*.
- 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 at the site that may be disrupted by the development. Fire scars in the broader area

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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.

- In terms of unique and sensitive habitats at the site, a few different potentially sensitive environments are identified:
  - 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.
  - 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.
  - Sensitive Species 142 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 Ha was noted to be present in the broader area with many unaffected but some within or near project component footprints. The specific 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.
  - 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*.
  - 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.

#### 10.1.4.2

#### 10.1.4.3 Mapped Vegetation and Sensitive Areas

Typically, the National Vegetation Map (Mucina & Rutherford, 2018) differentiates vegetation units at quite a coarse scale, and often several distinct communities can be differentiated. Within the proposed powerline servitude, several such communities can be differentiated. For the most part, this may not serve a purpose, however in some cases, smaller, more specialised habitats and communities can be differentiated which may differ from the surrounding vegetation matrix. Such communities and micro-habitats may also serve as faunal habitat for a suite of more specialised faunal species not common to the surrounding landscape. The flora and fauna species that are present in these areas may be different from the surrounding vegetation matrix, giving it a higher overall sensitivity. Where applicable, such Sensitive Areas have been identified (Figure 24 to Figure 26).

Mapping of these communities has been undertaken, based on site confirmation and most recent available aerial photos. Mapping of smaller features is not exhaustive and may differentiate smaller features under 1 Ha that may be scattered within the broader mozaic of vegetation communities. Such areas will none the less be described and their sensitivity highlighted. Smaller sensitive areas would need to be confirmed during the final site walkdown, to micro-site the grid connection footprints.

Figure 20 to Figure 23 above provide an overview of the landscape in which the proposed powerline is situated.



*Figure 20: West of Substation*



*Figure 21: Western alternatives (A, B & C)*



*Figure 22: Northern alternatives along Tankwa River (2 B & C)*



*Figure 23: Western alternatives (1 C)*



# Kareebosch 132 kV Powerline Layout - Sensitivity Overview

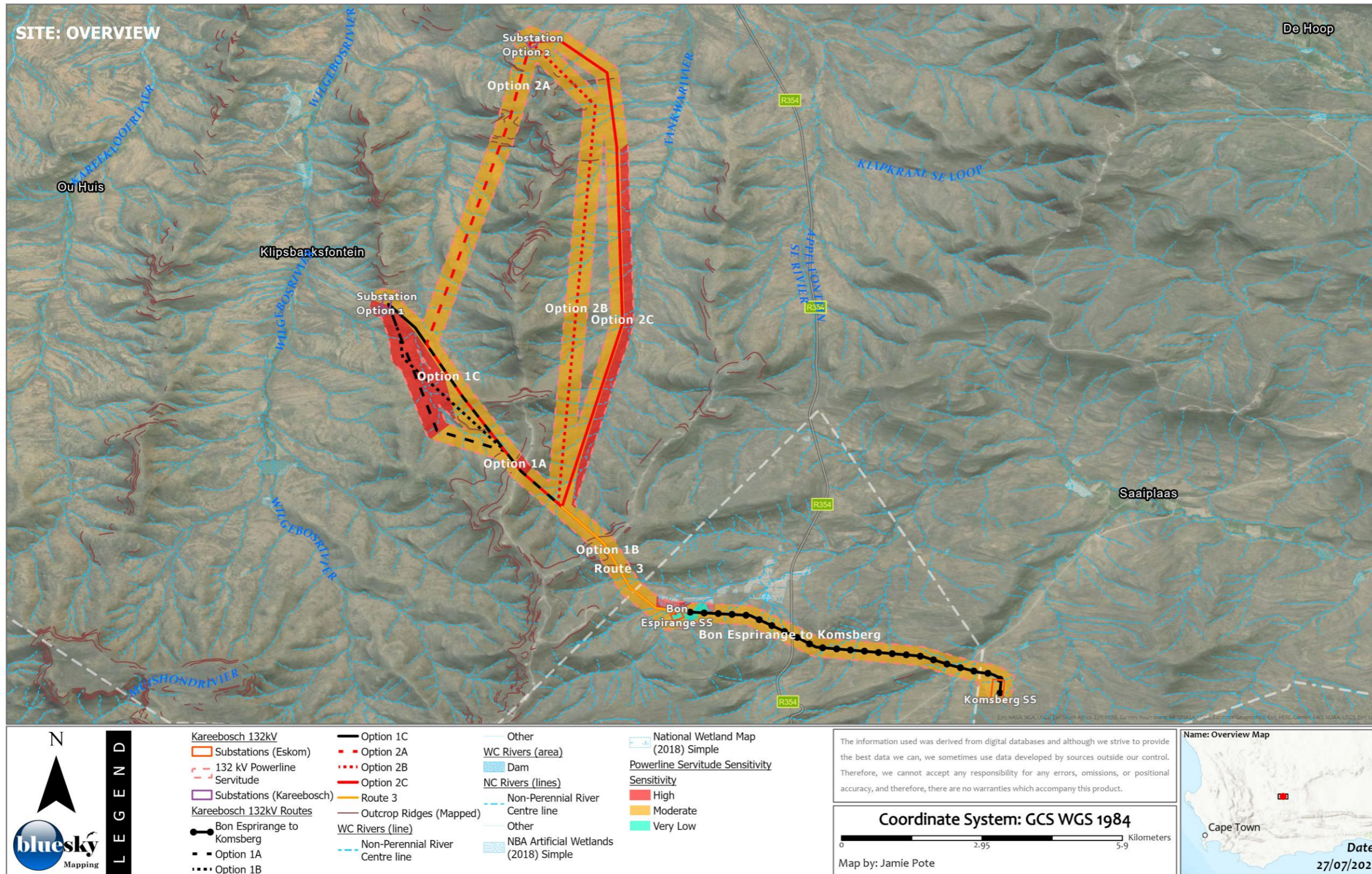


Figure 24: Mapped Vegetation and Sensitive Areas.

# Kareebosch 132 kV Powerline

## Layout - Sensitivity Overview

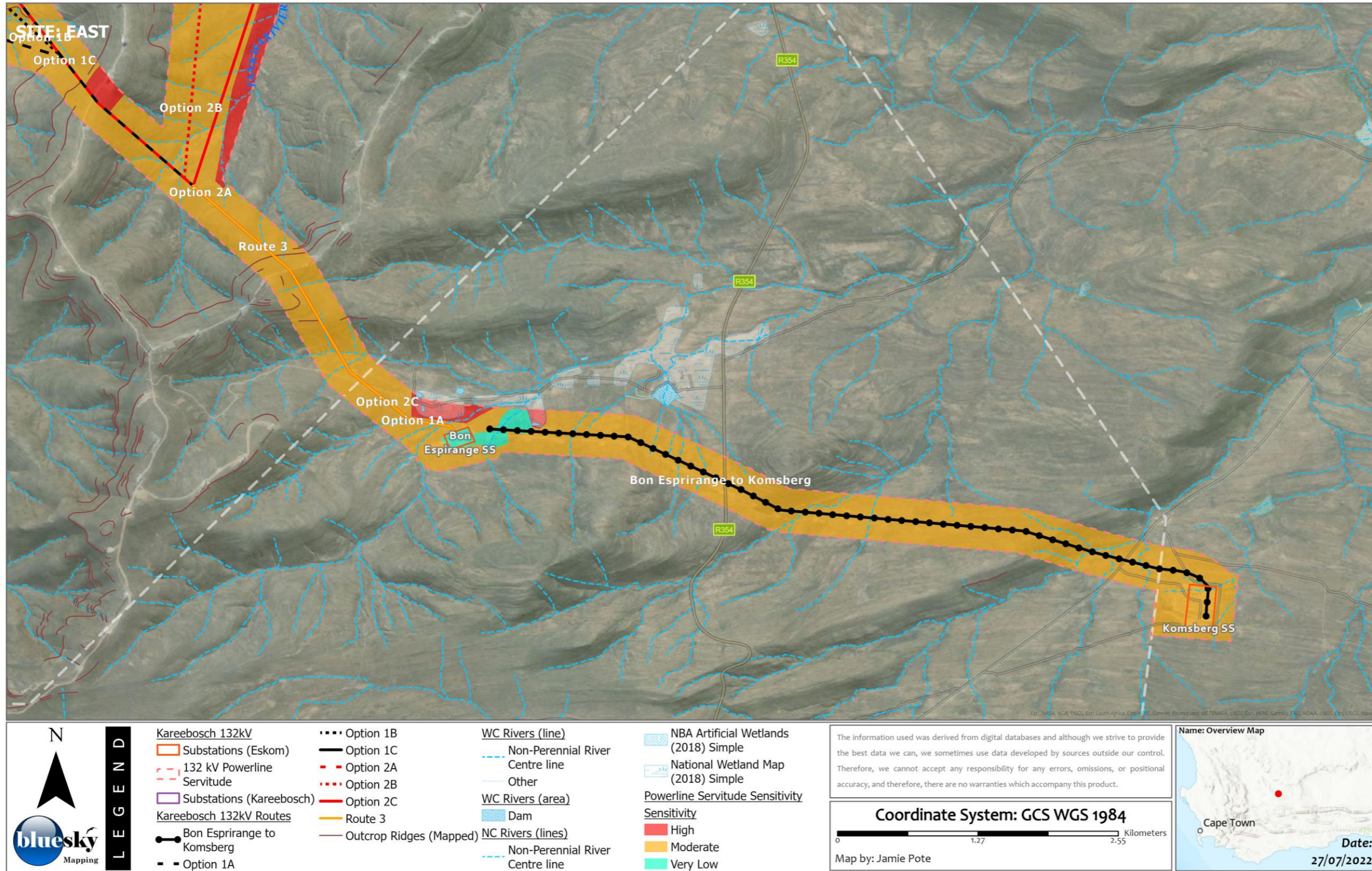


Figure 25: Mapped Vegetation and sensitive areas (East).

# Kareebosch 132 kV Powerline Layout - Sensitivity Overview

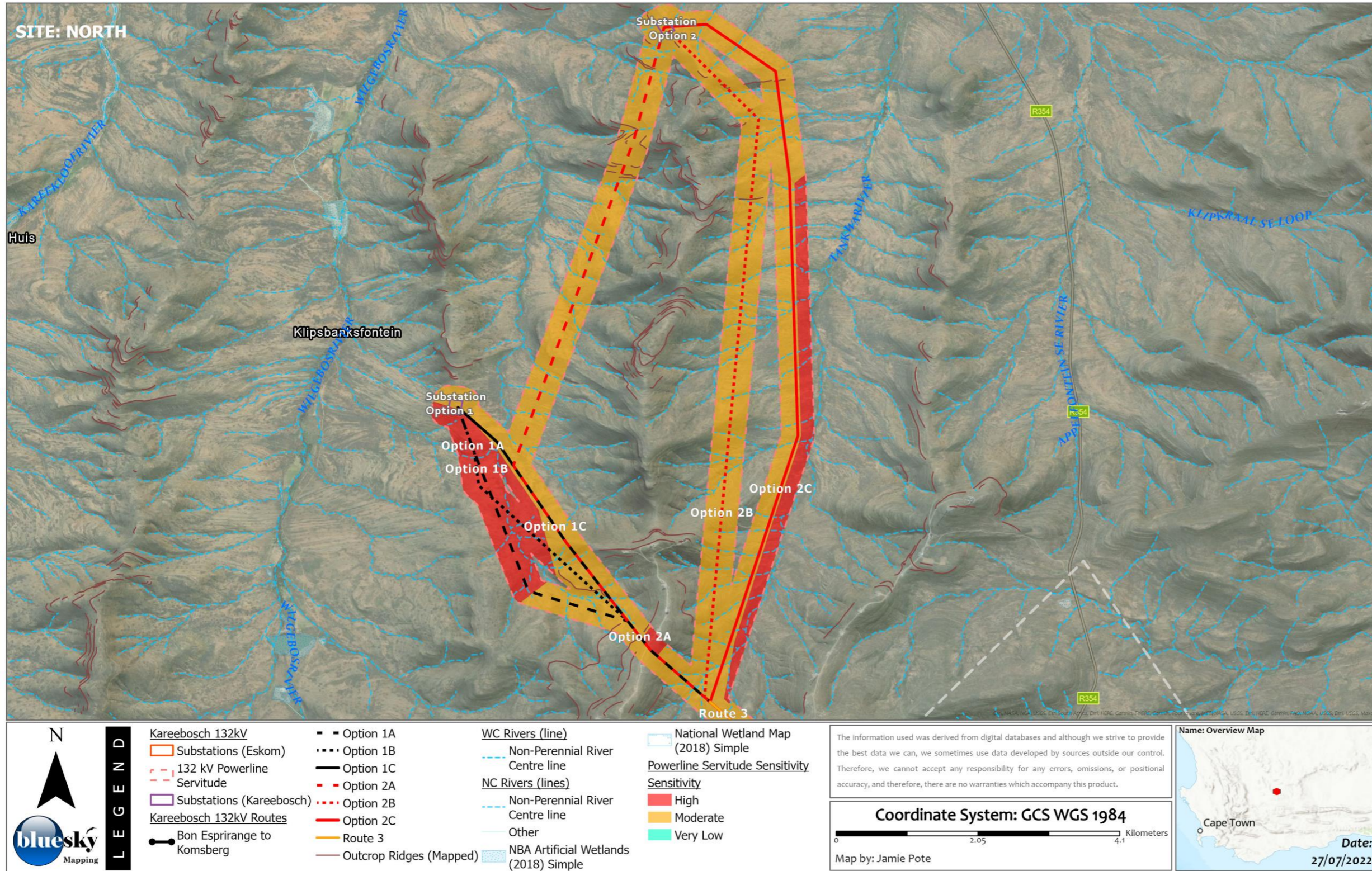


Figure 26: Mapped Vegetation and sensitive areas (North),

## 10.2 Present Ecological State

Table 9 provides a comprehensive description and assessment of biodiversity and ecological indicators for the site.

Table 9: Summary of Key Biodiversity and Ecological Indicators

ASPECT	DESCRIPTION
<b>LANDSCAPE AND COMMUNITY DESCRIPTION</b>	
Aspect, Slope, Topography	Mountainous with wide lowland valleys.
Substrate	Shallow rocky soils on mountains and deeper alluvial soils in valleys
Vegetation units	Central Mountain Shale Renosterveld & Koedoesberge-Moordenaars Karoo
Total Ground Cover (%)	> 60%
Tree Height (m) – Median	Trees are generally absent
Tree Cover (%) Aerial	N/A
Shrub Cover (%)	~ 50%
Herbaceous Cover (%)	
Grass Cover (%)	< 1% (estimated)
Bare soil/rock (%) and disturbed	10 - 40%
<b>TERRESTRIAL LANDSCAPE FEATURES</b>	
Forest	No Forest is present.
Thicket	No Thicket is present.
Grassland	No Grassland present
Fynbos	True Fynbos elements are generally not present, although Renosterveld is considered to have fynbos elements.
Riparian	Riparian vegetation is limited, due to arid nature of the area.
Wetland	Natural wetland habitat is present including extensive seep areas. Wetlands mostly transformed or degraded for water storage.
Estuaries	No estuaries are present.
Dunes/Coastal	Inland dune habitat is absent.
Rocky Outcrop Habitat	Rocky outcrops are present and common on slopes.
Fauna Nesting Sites	One Verreaux's eagles nest is present. Refer to avifaunal assessment.
Fauna Feeding Grounds	Faunal species were noted to be prevalent.
Ecotones	No Ecotones are present
Ecological Corridors	Ecological corridors are considered to be associated with watercourses and valleys, in particular due to the arid nature of the area. The mountain ridges would also serve as corridors for species adapted to the elevated environment.
Evolutionary Processes	None of significance within terrestrial environment.
Transformed (housing)	Several farm dwellings are present in the vicinity.
Transformed (other)	Transformation is low, consisting of a few isolated patches including dwellings and other disturbed areas associated with agriculture (grazing).
Degraded (modified)	Secondary vegetation is similar to intact vegetation in composition.
Secondary vegetation	
<b>DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION</b>	
Human disturbances	Human disturbance due to agricultural development is locally low on site and generally confined to the lowland valleys.
Habitat fragmentation	Fragmentation is low locally.
Invasive Alien Plants	Invasive Alien species are not common.
Other degradation	Minimal, some roads and infrastructure and WEF's being constructed in vicinity.
Remaining intact habitat:	Most of the site can be considered to be intact (natural) to semi-intact (near natural).

ASPECT	DESCRIPTION
Grazing (livestock)	Surrounding area is used extensively historically for livestock grazing, predominantly sheep and goats.
Hunting	Present in the area.
Conservation (passive)	General area does contribute to passive conservation, comprising an extensive area of natural vegetation.
Recreational (sport)	Tourism (flowers) is considered to be an important economic use of the broader area.
Other	None
<b>PATTERNS OF BIODIVERSITY</b>	
Flora	Flora diversity is moderate to high.
Fauna	Fauna diversity is moderate.
Species of Conservation Concern	Several species are potentially found in the region, vegetation unit and broader landscape. Refer to species assessment section.
<b>ECOLOGICAL PROCESSES</b>	
Gene dispersal barriers	Roads, agricultural lands, fences, low in surrounding areas.
Gene dispersal corridors	Watercourses and rivers are important corridors in the arid landscape.
Aeolian (dune) processes	Inland dunes are absent.
Climatic gradients	Present, due to the mountains landscape, climatic gradients are present affecting both temperature and precipitation (rain and mist)
Rivers and Drainage Lines (Riparian Vegetation)	Valleys drained by several non- perennial watercourse to the north and south-east.
Refuges (outcrops/islands)	Rocky outcrops and pavements and other refuges are common within the site but limited to mid to upper slopes of mountains.
Fire	Fire is considered to be an important component of the vegetation represented, however does not appear to be a common occurrence.
Ecotones/Tension zones	None
Erosion	Erosion is generally low within the site, being relatively rocky on slopes and having low rainfall, however the sandy alluvial soils do show evidence of occasional erosion where heavily disturbed.
<b>ECOLOGICAL SERVICES</b>	
Carbon storage	Vegetation is considered a low to medium carbon accumulator.
Provisioning Services	<u>Livestock grazing</u> : Livestock grazing (predominantly sheep) is undertaken in the region but at low stocking rates. <u>Timber (Building materials)</u> : None. <u>Fuelwood</u> : None. <u>Food</u> : None known <u>Fibre</u> : None known <u>Medicinal plants</u> : Several species are known from the surrounding area have medicinal properties and are most likely harvested informally.
Other (ornamentals)	Several succulent and geophytic species are present that are known to be or are potentially ornamentals.
<b>CONSERVATION IMPORTANCE</b>	
Current Distribution (extent)	Vegetation units have a widespread historical regional distribution covering an extensive area. More than 60% is considered to be intact, all having a low regional conservation status (Least Concern).
Red Listed Species and other Species of Conservation Concern	Several species are potentially found in the region, vegetation unit and broader landscape. Refer to Section 11 Plant and Animal Species (Flora and Fauna) Assessment
Habitat for SCC	Several Species of Conservation Concern are known from the general area, as well as the vegetation unit that is present. Several species were confirmed to be present in the broader are having an elevated conservation status. It is however evident that further investigations are likely required for these species is order to adequately assess their conservation status. The site is likely to provide habitat viable potential for any of the mostly mobile faunal species as well as several flora species.
Relative Conservation importance	The site has a low overall significance and is mostly not identified as priority conservation area in terms of the respective bioregional plans.
<b>OTHER SENSITIVITIES</b>	

ASPECT	DESCRIPTION
Conservation importance	Low
Topography	Mountainous with wide lowland valleys.
Wetlands	Natural wetland habitat is present including extensive seep areas. Wetlands mostly transformed or degraded for water storage.
Rehabilitation potential	Rehabilitation potential is moderate, however significant transformation does result in biophysical changes that generally preclude the rehabilitation of sites to pre-existing state. The vegetation is likely adapted to high disturbance levels due to arid conditions and areas outside of rocky outcrops will most likely rehabilitate effectively with minimal input. It is noted that many species produce large amounts of seed, which would spread during windy conditions.
Community structure	Community structure is relatively simple, with vegetation being primarily comprised of shrub, herb, succulent and geophytic elements, with a limited grassy component.

### 10.3 Critical Habitat<sup>4</sup>

The following Critical Habitat features have been identified within the site:

- Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
  - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
  - No Endangered or Critically Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or are likely to directly be affected (other than temporary displacement during construction).
- Criterion 2: Habitat for Endemic or restricted-range species
  - Several range restricted flora species are potentially present in the surrounding area and vegetation types. Refer to Section 11 Plant and Animal Species (Flora and Fauna) Assessment for specific species assessments. Numerous endemic species are present, due to the specific arid vegetation units; however, these generally have a widespread regional distribution and would not be considered to be at risk by the highly localised activity.
  - Several range-restricted faunal species are known from the surrounding area which provide suitable habitat. These species are generally mobile and even though they were not observed during the site visit, the intact vegetation is suitable as a transient visitor.
- Criterion 3: Habitat for Migratory or congregatory species
  - No such terrestrial habitat will be directly or indirectly affected.
- Criterion 4: Habitat for Highly threatened and/or unique ecosystems
  - Vegetation units have a low conservation status and are currently not considered to be under threat.
- Criterion 5: Habitat for Key evolutionary processes
  - No such terrestrial habitat will be directly or indirectly affected.

## 10.4 Terrestrial Biodiversity and Sensitivity Assessment

### 10.4.1 Vegetation Sensitivity

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators (summarised in Table 9) was undertaken and includes the following key criteria:

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

<sup>4</sup> This report is not a Critical Habitat Assessment as defined by the IFC Performance Standards

### 10.4.2 Intactness

Three basic classes are differentiated as follows:

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

Intactness for the site is generally **High** (*but without high conservation status*).

### 10.4.3 Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.
- **Moderate:** individual clumps of invasives present but cover less than 25% of original area.
- **High:** dense, stands of invasives present, or cover 25 - 80% of area with notable loss of ecological functioning. Rehabilitation will most likely require specialised techniques over an extended period (5 – 10 years).
- **Very High:** dense, impenetrable stands of invasives present stands of invasive present, or cover > 80%, with significant loss of ecological functioning and associated biophysical changes that are likely to thwart rehabilitation without assisted techniques, over 10 years or unlikely to rehabilitate to natural state.

Alien invasion for the site is generally **Low**.

### 10.4.4 Degradation

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

INTACTNESS	INVASION LOW	MODERATE	HIGH	VERY HIGH
High	Pristine	Near Pristine	Degraded	-
Moderate	Near Pristine	Degraded	Severely Degraded	Severely Degraded
Low	Degraded	Severely Degraded	Transformed	Transformed
Very Low	Highly Degraded	Transformed	Transformed	Transformed

Degradation for the site is Low to **Moderate (Natural/Intact to Degraded)**

### 10.4.5 Overall Sensitivity score

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix<sup>5</sup> which combines degradation and overall conservation status of the vegetation units of the site.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Transformed	Very Low	Low	Low	Low
Severely degraded	Low	Low	Moderate	Moderate-High
Degraded	Low	Moderate	Moderate - High	Very High

<sup>5</sup> Based on the Terrestrial Biodiversity Assessment protocol.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Ecologically Near Pristine or near Pristine (intact/semi-intact)	Moderate	Moderate - High	High	Critical (No-Go area)

Refer to Figure 30 & Figure 31 for overall sensitivity map and Table 10 for summary of the sensitivity of the respective vegetation units and habitats. In general, both vegetation units (Central Mountain Shale Renosterveld on mountains and Koedoesberge-Moordenaars Karoo on the lowlands) have a low sensitivity. However, where communities or habitats are identified that differ from the normal vegetation matrix, or have other sensitivities, including low resilience to disturbance, a concentration of species of conservation concern and/or protected species, the status has been raised to moderate or high, as the specific communities are deemed to be more sensitive than the surrounding vegetation. These communities generally have localised distributions, and it should be feasible to minimise impacts by careful placement of pylons and associated infrastructure (such as the access roads) to span or avoid such areas, or to minimise the footprints, as far as is technically possible.

Table 10: Sensitivity Summary for the site.

SPECIES	INTACTNESS	SITE ECOLOGICAL IMPORTANCE			STATUS	OVERALL SENSITIVITY*
		ALIEN INVASION	DEGRADATION			
Central Mountain Shale Renosterveld	Moderate	Low	Near Pristine/Degraded		LC	Moderate/Low
Koedoesberge-Moordenaars Karoo	Moderate	Low	Near Pristine/Degraded		LC	Moderate/Low
Rocky outcrops	High	Low	Pristine		LC	High*
Sensitive Species sub-populations	High	Low	Pristine		LC	High*
Alluvial Vegetation (faunal habitat)	Moderate	Low	Pristine		LC	High*
Transformed Areas	Very Low	Low	Transformed		LC	Very Low

\* Vegetation communities and niches that have a higher sensitivity than typical surrounding vegetation.

- Areas scoring an overall Very Low or Low Terrestrial Biodiversity Sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. VERY LOW Terrestrial Biodiversity Sensitivity areas are limited to the transformed areas such as cultivated lands or having secondary vegetation. No LOW Terrestrial Biodiversity Sensitivity areas are differentiated.
- Areas scoring an overall Moderate Terrestrial Biodiversity Sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate Sensitivity areas include the intact Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo, which are more resilient than more specialised habitat, but are none the less having a moderate to high species diversity as well as sporadic species of conservation concern.
- Areas scoring an overall High Terrestrial Biodiversity Sensitivity include those areas deemed to have an elevated sensitivity, including areas deemed to be sensitive areas or habitat such as rocky outcrops and or areas having sub-populations of species of conservation concern that are considered to be vulnerable. High Sensitivity terrestrial areas on site includes Rocky outcrops, riparian areas and various sensitive areas as demarcated in Figure 24 to Figure 26. These areas tend to offer more specialised niche habitats and often have a slightly different species composition to the surrounding Renosterveld or Karoid matrix. Pylons and access roads should avoid these areas where possible, and if not, then the footprint within must be kept to the smallest lowest technically possible.
- Areas scoring an overall VERY HIGH Terrestrial Biodiversity Sensitivity (No-Go Areas) include natural/intact areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat (refer to 9.4.15 Key Biodiversity



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Areas) for any faunal species that is endangered or critically endangered. No Very High sensitivity terrestrial areas have been identified.

**GENERAL COMMENT:** The vegetation type and overall site is considered to have a Low Sensitivity, due to the status of the vegetation type. Taking into consideration niche habitats, several localised areas are considered to have an elevated sensitivity and should be avoided, or footprints minimised as far as is technically possible.

### 10.5 No-Go Areas

Specific No-Go areas that have been identified (Figure 24 to Figure 26) include:

- Wetland areas in vicinity of Bon Espirange substation.
- Rocky Garden on mountain slightly to the north of route for alternatives 1 A, B & C; within 100 meters of the proposed OHP;
- Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of alternative 2C.

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## 11 Plant and Animal Species (Flora and Fauna) Assessment

### 11.1 Overview

Biodiversity is the living component of the natural environment –and underpins both ecosystem processes and the provision of ecosystem services. Human wellbeing is intimately linked to these services especially where livestock production forms the basis of local culture and economies, and local water sources provide the bulk of domestic water needs.

Biodiversity is the basis for evolution and adaptation to changing environments and can be seen as '*life insurance for life itself*'. If we allow that biodiversity, and the capacity of ecosystems to deliver services, to deteriorate, people's wellbeing will suffer sooner or later. Biodiversity depends on its '*pattern*' and on '*process*'. To conserve biodiversity, it is important to represent the full variety of patterns of living organisms, and to ensure their persistence by maintaining the space necessary for ecological processes to continue functioning.

### 11.2 Regional characteristics

The Namaqualand and Tankwa region contains about 3500 plant species in 135 families and 724 genera, with about 25% of this flora endemic to the region. It is also home to an exceptionally high level of insect and reptile endemism, with new species still being discovered. This remarkable diversity is not distributed evenly throughout the region but is concentrated in many local centres of endemism.

However, this pattern is likely to change, as the effects of global climate change lead scientists to the conclusion that the entire Succulent Karoo will most likely experience increased temperatures. It is projected that a 2°C increase in temperature in the area will lead to a 10% reduction in rainfall – a significant loss in an area that is already severely water restricted. This decrease in rainfall is projected to result in a 35% decrease in livestock carrying capacity over the coming 200 years. These projections point to the need for the development of alternative economic opportunities in the area, in order to successfully cope with the changes that are already underway.

### 11.3 Flora

Several endemic and range restricted species are known from the surrounding area. None listed as per the National Screening Tool were confirmed to be present, although it is possible that some individuals of these species could occur, since several similar species were noted to be present as isolated individuals and/or small scattered populations. Note, there is a residual very-low possibility that these species could be present, and cannot be discounted without extensive seasonal sampling, which is generally outside the scope of such an assessment.

### 11.4 Fauna

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:

#### 11.4.1 Mammals

At least 50 mammal species potentially occur at the site (Skinner and Chimimba, 2005). 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 diversity is moderate 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 paeba* and Common Duiker *Sylvicapra*

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*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 pylons.

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 of this species occur between Sutherland and Fraserburg to the northeast as well as around Touwsrivier 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.

#### 11.4.2 Avifauna and Bats

Avifauna and Bats are assessed in separate specialist assessments.

#### 11.4.3 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 placement of pylons avoids 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 and therefore mitigation measures are proposed in the EMP.

#### 11.4.4 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

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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.

#### 11.4.5 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 with no mounds 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 Fideiinae) 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 undisturbed, as they were found to be uncommon across the broader project area of influence.

Two colonies of ground bees have been identified in the project area, however neither are within the OHP proposed OHP routes.

#### 11.5 Species of Conservation Concern

Several endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, but cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for site development, as well as the level of degradation, the risk of a species suffering any significant population loss is low. There is always a residual risk to species for any activity.

##### 11.5.1 Red Listed, Endemic and Protected Flora

Listed species (Table 11) were flagged from various database sources as occurring in the region and having an elevated conservation status. All were cross-checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. The site falls within the general distribution range of many endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable, Near Threatened or Rare. Some of these species are also only from a single or a few populations. As per Table 11, **no** Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area.

Based on observations made during the site visit, many of the listed species are typically geophytic or succulent species and tend to be present as broadly scattered individuals or occur in small, localised clusters. The more specialised habitats within the broader Renosterveld and Karroid mosaic habitat have

been identified and indicated as being of higher sensitivity, including rocky outcrops, which are generally localised. These habitats are generally less resilient to disturbance compared to the vegetation communities present in the widespread sandy habitat and being localised, can be more easily avoided during placement of pylons, by spanning the affected areas, or minimising the number of pylons and access roads and tracks within such areas.

Due to the prevalence of many species belonging to various broadly protected groups, such as the Aizoaceae, Crassulaceae, Iridaceae, Asphodelaceae and Amarylidaceae, protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) being present, permits will be required as well as a pre-commencement flora search and rescue. Where necessary plant search and rescue should be undertaken within the defined footprint areas.

Potential and confirmed protected species are listed in Section 19 Appendix 1 – Flora and Fauna Species of Conservation Concern and include:

Numerous species protected in terms of the Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2 and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) were recorded. These species generally have a more widespread distribution. Permits will be required in terms of the respective Acts for their relocation and/or destruction before commencement.

Sensitive Species as per the National Environmental Screening Tool having an elevated conservation status were found to occur, although most species were not found.

No trees protected in terms of the National Forests Act were recorded.

Several endemic species were recorded and are listed, however all of these are either confirmed to have a wider distribution range and are not deemed to be at risk or are sparse and highly unlikely that any infrastructure will pose any risk, and/or can be easily avoided during final micro siting and pylon/access road placement.

It is possible that other of the designated sensitive species are present in the surrounding area, however none were recorded within the proposed powerline route.

Table 11: Flora Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS <sup>6</sup>	COMMENT/PRESENCE
<i>Antimima androsaeca</i>	Aizoaceae	CR Rare, WC, NC	<b>Not recorded. Present in vicinity.</b> A range-restricted species (EOO 10 km <sup>2</sup> ), known from one site where it is not threatened. Sutherland, Roggeveld Escarpment.
<i>Asparagus mollis</i>	Asparagaceae	VU, NEST (M)	<b>Not recorded.</b>
<i>Eriosephalus grandiflorus</i>	Asteraceae	Rare, NEST (M)	<b>Not recorded.</b> Present in area
<i>Indigofera hantamensis</i>	Fabaceae	Rare	<b>Few individuals recorded, near but not directly under proposed powerline corridors, uncommon.</b> A rare species, known from only three subpopulations scattered over a large area. Not threatened. Roggeveld to Calvinia.
<i>Lotononis venosa</i>	Fabaceae	EN, NEST (M)	<b>Not recorded.</b> An endemic species to the Klein Roggeveld escarpment (extent of occurrence 84 km <sup>2</sup> , and area of occupancy 16 km <sup>2</sup> ). It is

<sup>6</sup> NEST – National Environmental Screening Tool (Very High, High, Medium, Low); NC - Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2; WC – Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000); ToPS – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (LC), Near Threatened (NT), Critically Endangered (CR), Endangered (EN), Vulnerable (VU); CITIES - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	FAMILY	STATUS <sup>6</sup>	COMMENT/PRESENCE
			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>Pauridia breviscapa</i>	Hypoxidaceae	Rare, WC, NC, NEST (M)	Not recorded.
<i>Romulea eburnea</i>	Iridaceae	VU, WC, NC	<b>Not recorded. Present in vicinity.</b> 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	<b>Not recorded. Present in vicinity.</b> 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 syringodeoflora</i>	Iridaceae	NT, WC, NC	<b>Not recorded. Present in vicinity.</b> A range restricted Roggeveld endemic (EOO 474 km <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>Sensitive Species 1107</i>	Asphodelaceae	Rare, WC, NC, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 1138</i>	Aizoaceae	Rare, WC, NC, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 142</i>	Amaryllidaceae	VU, WC, NC, NEST (M)	<b>Present.</b> 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>Sensitive Species 338</i>	Amaryllidaceae	Rare, WC, NC, NEST (M)	Not recorded
<i>Sensitive Species 346</i>	Geraniaceae	Rare, NC, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 620</i>	Crassulaceae	Rare, NC, NEST (M)	<b>Not recorded.</b> Karoo Endemic, A range-restricted habitat specialist endemic to the Ceres Karoo and Roggeveld. Site overlaps with possible range, may be present in

SCIENTIFIC NAME	FAMILY	STATUS <sup>6</sup>	COMMENT/PRESENCE
			shaded crevices on south facing slopes.
<i>Sensitive Species 711</i>	Amaryllidaceae	Rare, WC, NC, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 722</i>	Crassulaceae	Rare, NC, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 886</i>	Asteraceae	Rare, NEST (M)	<b>Not recorded</b>
<i>Sensitive Species 936</i>	Asphodelaceae	Rare, WC, NC, NEST (M)	<b>Not recorded</b>
<i>Zaluzianskya mirabilis</i>	Scrophulariaceae	Rare, NEST (M)	<b>Not recorded.</b>

A residual risk will be present, although all reasonable attempts have been made to locate any such species and a pre-construction walkdown to undertake micro-siting of pylons as well as a flora search and rescue will significantly reduce this risk.

### 11.5.2 Species of Conservation Concern occurring in the region

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on **30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that *'the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications'*.

Numerous endemic and range restricted species are known from the general surrounding area and there is a high likelihood that they could be present, and cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for a small development footprint within a larger site, the risk of a species suffering any significant loss is low. There is however always a residual risk to species for any activity, which may not be recorded during site assessment. All reasonable measures are implemented to find such species, however it is not feasible to check every square meter of such a site. Based on the number of site assessments undertaken over the years, there is sufficient confidence in the data that informed this assessment.

### 11.5.3 National Environmental Screening Tool Listed Flora (Plant) Species

Sensitive Species confirmed to be present within the proposed powerline servitude include *Indigofera hantamensis* (a few individuals near alternative 1 B & C; Figure 27) and Sensitive Species 142 (scattered sub-populations including extensive sub-population in vicinity of alternatives 1 A & B; Figure 28).

Both are readily identifiable (Sensitive species 142 in its growth season June through November) and are easily relocatable.

An additional species, *Antimima androsacea* was found to be common a few kilometres south of the powerline route, but was not observed in vicinity of the powerline.



*Figure 27: Indigofera hantamensis*



*Figure 28: Sensitive Species 142*



# Kareebosch 132 kV Powerline Layout - Species Distribution Map

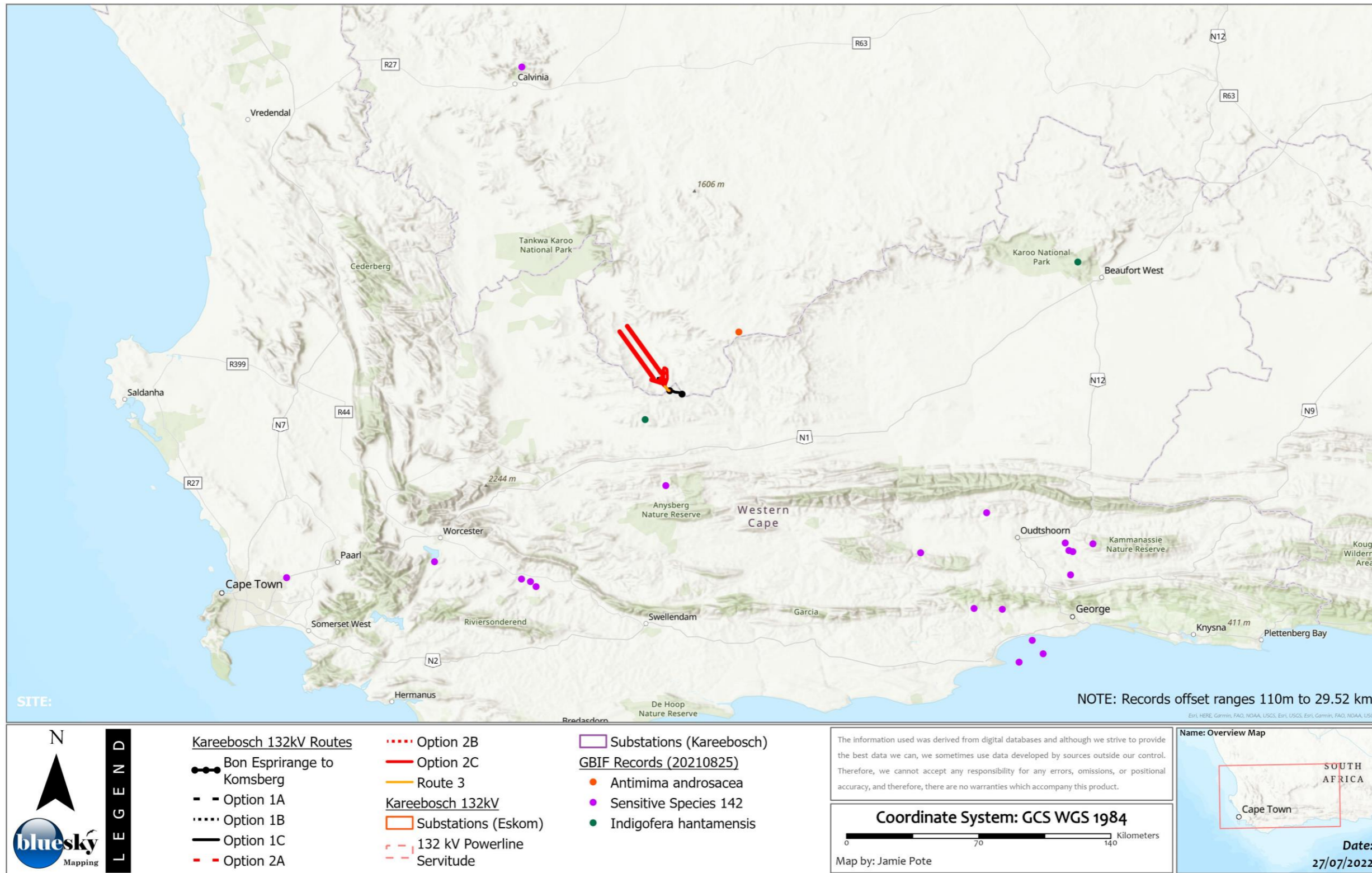


Figure 29: Distribution records of Sensitive Species.

## SENSITIVE SPECIES 142

National Environmental Screening Tool (NEST) confirmed species include Sensitive Species 142 (Table 12). Sensitive Species 142 is widespread within the Western, Northern and Eastern Cape, known to occur from just north-east of Cape Town inland to the Roggeveld and eastwards to George and inland to east of Oudtshoorn. It is known to occur in at least 18 sub-populations, and all are supposedly having less than 50 individuals (refer to Figure 29 for distribution map of known records).

Table 12: Sensitive Species 142 (National Assessment, 2012)

Taxonomy		
Scientific Name	Sensitive Species 142	
Family	-	
National Status		
Status and Criteria	<b>Vulnerable A2c; C2a(i)</b>	
Assessment Date	2007/09/21	
Assessor(s)	D.A. Snijman & D. Raimondo	
Justification	This long-lived bulb occurs as widely scattered subpopulations in lowland areas that are subject to continued habitat loss to agriculture (30% of habitat has been lost over the past 70 years). Herbarium specimens record about 18 subpopulations, and we estimate that a 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.	
Distribution		
Endemism	South African endemic	
Provincial distribution	Eastern Cape, Northern Cape, Western Cape	
Range	Nieuwoudtville to Baviaanskloof	
Estimated Geographic Area of Occurrence (SEAG, 2020 <sup>7</sup> )	10.46 km <sup>2</sup>	
Total Site Area	Indeterminate but possibly exceeds estimated geographic area for the species.	
Approximate suitable habitat	Indeterminate but possibly exceeds estimated geographic area for the species.	
Habitat and Ecology		
Major system	Terrestrial	
Major habitats	Western Little Karoo, Roggeveld Karoo, Breede Shale Renosterveld, Montagu Shale Renosterveld, Matjiesfontein Shale Renosterveld, Central Mountain Shale Renosterveld, Humansdorp Shale Renosterveld, Langkloof Shale Renosterveld, Uniondale Shale Renosterveld, Eastern Ruens Shale Renosterveld, Oudtshoorn Karroid Thicket	
Description	Heavy clay soils	
Threats		
The plants are collected for medicinal purposes (there has been an observed loss due to harvesting in Worcester). This species has lost habitat throughout much of the south-western Cape due to crop cultivation.		
Population		
Although widespread, this species is rare and occurs as small, scattered subpopulations		
Population trend	Decreasing	
Assessment History		
Taxon assessed	Status and Criteria	Citation/Red List version
	VU A2c; C2a(i)	Raimondo et al. (2009)
	Extinct	Victor (2002)
	Endangered	Hilton-Taylor (1996)
Bibliography		
<ul style="list-style-type: none"> <li>▪ Goldblatt, P. and Manning, J.C. 2000. Cape Plants: A conspectus of the Cape Flora of South Africa. Strelitzia 9. National Botanical Institute, Cape Town.</li> <li>▪ Hilton-Taylor, C. 1996. Red data list of southern African plants. Strelitzia 4. South African National Botanical Institute, Pretoria.</li> <li>▪ Müller-Doblies, D. and Müller-Doblies, U. 1994. De Liliifloris notulae 5. Some new taxa and combinations in the Amaryllidaceae tribe Amaryllidaceae from arid Southern Africa. Feddes Repertorium 105:331-363.</li> </ul>		

<sup>7</sup> SEAG: South African National Biodiversity Institute (SANBI). 2021. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute & Birdlife South Africa for DEFF, Pretoria. Version 1.2020.

- Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.
- Victor, J.E. 2002. South Africa. In: J.S. Golding (ed), Southern African plant Red Data Lists. Southern African Botanical Diversity Network Report 14 (pp. 93-120), SABONET, Pretoria.
- Vlok, J. and Schutte-Vlok, A.L. 2010. Plants of the Klein Karoo. Umdaus Press, Hatfield

The threat to the species is from illegal harvesting rather than overgrazing, land degradation or development, hence the proposed activity is unlikely to have any impact on the conservation status of the species. Furthermore, the species will be highly conducive to successful pre-construction relocation.

With particular reference to the large population of *Sensitive Species 142* situated within the alignment of OHP Options 1A and 1C, and inasmuch that *Sensitive Species 142* is a subterranean geophyte:

- The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.
- Vegetation and any *Sensitive Species 142* should not be removed/relocated to create the 4x4 track but rather left *in situ* (i.e., create the track by simply driving repeatedly over the same route). If any *Sensitive Species 142* clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
  - Improved survival of *Sensitive Species 142* (and other geophytic plants) by leaving them *in situ* rather than relocating them;
  - Retention of topsoil and the seed bank *in situ* improves rehabilitation/regeneration of vegetation; and
  - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
- Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of *Sensitive Species 142* and any other protected species.
- All protected species within any pylon footprint must be rescued and relocated.

### **INDIGOFERA HANTAMENSIS**

National Environmental Screening Tool (NEST) confirmed species include *Indigophora hantamensis* (Table 13). *Indigophora hantamensis* is known from a very limited area approximately south-west of the site, possibly extending north-eastwards to Beaufort West (or possibly two distinct sub-populations) in the Northern Cape. It is known to occur in 3 sub-populations, scattered over a large area (refer to Figure 29 for distribution map of known records). A single clump of two individuals was recorded in the vicinity of alternative 1 A, B & C during an extensive site visit which sampled an extensive area in the vicinity of the site.

Table 13: *Indigofera hantamensis* (National Assessment, 2012)

Taxonomy	
Scientific Name	<i>Indigofera hantamensis</i> Diels
Family	Fabaceae
National Status	
Status and Criteria	<b>Rare</b>
Assessment Date	2006/10/14
Assessor(s)	D. Raimondo
Justification	A rare species, known from only three subpopulations scattered over a large area. Not threatened.
Distribution	
Endemism	South African endemic
Provincial distribution	Northern Cape
Range	Roggeveld to Calvinia

Estimated Geographic Area of Occurrence (SEAG, 2020 <sup>8</sup> )	<p>- No recent data</p> <p>For plants listed as having no recent data, any confirmed population represents the only recent known population for the taxon and must be included as highly significant. For plants listed as being under-sampled, the proportion of the population may still be calculated and represented in the report but specialists must flag that it is likely an overestimate as there is too little recent data to accurately calculate the total area of occurrence for the species. In such cases the specialist must represent the significance of the population through comparing field findings with the information included in the Red List assessment for the taxon.</p>	
Total Site Area	Less than 1 m <sup>2</sup> confirmed in vicinity of proposed powerline	
Approximate suitable habitat	Unknown	
<b>Habitat and Ecology</b>		
Major system	Fynbos	
Major habitats	Fynbos (Renosterveld)	
Description	Scree slopes	
<b>Threats</b>		
None		
<b>Population</b>		
Stable trend		
Population trend		
<b>Assessment History</b>		
<b>Taxon assessed</b>	<b>Status and Criteria</b>	<b>Citation/Red List version</b>
Indigofera hantamensis Diels	Rare	Raimondo et al. (2009)
Indigofera hantamensis Diels	Insufficiently Known	Hilton-Taylor (1996)
<b>Bibliography</b>		
<ul style="list-style-type: none"> <li>▪ Hilton-Taylor, C. 1996. Red data list of southern African plants. Strelitzia 4. South African National Botanical Institute, Pretoria.</li> <li>▪ Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.</li> <li>▪ Snijman, D.A. 2013. Plants of the Greater Cape Floristic Region 2: The extra Cape flora. Strelitzia 30. South African National Biodiversity Institute, Pretoria.</li> </ul>		
<b>Citation</b>		
Raimondo, D. 2006. Indigofera hantamensis Diels. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2021/10/07		

It is highly unlikely that the proposed activity will pose any significant threat to any individuals or the species.

Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.

#### 11.5.4 Red Listed and Protected Fauna

The site falls within the general distribution range of a few faunal species as indicated in Table 14 below. Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact to faunal species of conservation concern.

No Endangered or Critically fauna species were confirmed to be present, but several are known to be present in proximity to the site. Three red-listed SCC are known from the wider area. The proposed activity is unlikely to significantly affect these species and a pre-commencement fauna search and rescue will allow any less mobile reptiles to be relocated.

The larger mammal and bird species are unlikely to be significantly affected as they are generally mobile, and the site is surrounded by large areas of intact areas that would provide suitable alternative habitat.

<sup>8</sup> SEAG: South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute & Birdlife South Africa for DEFF, Pretoria. Version 1.2020.

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A faunal search and rescue is recommended prior to site clearance activities, to include reptiles such as snakes and tortoises which can be relocated into adjacent unaffected intact vegetation or nearby areas of similar intact habitat at least 2 km from any construction activities.

Table 14: Fauna Species of Conservation Concern

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>9</sup>	COMMENT/PRESENCE
<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>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>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>			
<b>ORTHOPTERA (GRASSHOPPERS)</b>			
None of Concern			
<b>LEPIDOPTERA (BUTTERFLIES)</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. Not recorded.
<b>HYMENOPTERA (BEES)</b>			
<i>Unidentified aggregating, ground-nesting Bee</i>		Unknown	Present in low lying alluvial areas, forming large, aggregated colonies covering area up to ± 100 m <sup>2</sup> . Although status is unknown, such colonies are rare within the site and deemed to be important ecologically as pollinators and relocation is not feasible due to dispersed nests.
<b>SCORPIONS AND SPIDERS</b>			
<i>Baboon Spiders</i>	Baboon Spiders	ToPS, NC	Various species likely present

<sup>9</sup> **NEST** – National Environmental Screening Tool (Very High, High, Medium, Low); **NC** - Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2; **WC** – Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000); **ToPS** – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (**LC**), Near Threatened (**NT**), Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**); **CITIES** - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	COMMON NAME	STATUS <sup>9</sup>	COMMENT/PRESENCE
<i>Scorpions</i>	Scorpions	ToPS, NC	Various species likely present

#### 11.5.4.1 National Environmental Screening Tool Listed Fauna (Animal) Species

No NEST listed animal species were confirmed to be present on the site or are likely to be present, other than perhaps as an occasional transient visitor. Avifaunal species are assessed in a separate specialist assessment and are thus not considered further in this report. Retention of the intact vegetation will preserve any suitable habitat and a faunal search and rescue before commencement will minimise risk.

The only non-avifaunal listed species is *Bunolagus monticularis* (Riverine Rabbit), which is known to occur in a very specific habitat, being within extensive alluvial floodplains. No suitable habitat is present or likely to be affected by the proposed powerline and associated infrastructure.

#### 11.5.5 Alien Invasive Species

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

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

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

Alien invasive and other weed species are generally not prevalent within the site. A list of species is included in

**Table 15.** Several ruderal weed species are likely to proliferate in disturbed areas, although this will be limited by the arid nature of the area. A weed management programme, as part of the construction contract including an after-care period will be required.

*Table 15: Alien (exotic) invasive and other weed species and status.*

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS <sup>10</sup>	PRESENCE
<i>Prosopis spp.</i>	Prosopis/Mesquite	Fabaceae	NEMBA 1	Sparse in broader area.

### 11.5.5.1 Eradication protocol

The act required the removal of these species, being the responsibility of the landowner, as described in Table 16 and below.

*Table 16: Legislation regarding invasive alien species.*

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

#### 6. Control measures

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

(2) *Such control measures may relate to –*

(1) *the control of weeds and invader plants.*

(3) *A control measure may –*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

<sup>10</sup> CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016). Refer to Section 9.3 & Table 16 for detailed procedures and requirements.



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

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

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

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

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

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

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

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

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

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

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

### CHAPTER 9: COMPLIANCE AND ENFORCEMENT

#### 35. Offences and penalties

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

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

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

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

(c) to both such fine and imprisonment.

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

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP, and a detailed action plan compiled and implemented by the ECO. All removed trees must either be removed from site or disposed of at a registered waste disposal facility. Alternatively, the plant material can be mulched using a woodchipper on site. And seed-bearing material is to be disposed of at a registered landfill.

### **11.5.6 Permitting Requirements**

The following flora and fauna permits are likely to be required:

- NEM:BA Threatened or Protected Species (ToPS) species listed in terms of the ToPS regulations and including red-listed species.
- Northern Cape Nature Conservation Act (Act no. 9 of 2009) - several species
- The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000

## 11.6 Terrestrial Plant and Animal Species Sensitivity Assessment

### 11.6.1 Site Ecological Importance Criteria

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

$$SEI = BI + RR \text{ where } BI = CI + FI$$

SEI	INTERPRETATION IN RELATION TO PROPOSED DEVELOPMENT ACTIVITIES
Very high (Critical)	Avoidance mitigation – <u>no destructive development activities should be considered</u> . Offset mitigation <u>not acceptable/not possible</u> (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – <u>changes to project infrastructure design to limit the amount of habitat impacted</u> , limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – <u>development activities of medium impact acceptable</u> followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – <u>development activities of medium to high impact acceptable</u> followed by appropriate restoration activities.
Very Low	Minimisation mitigation – <u>development activities of medium to high impact acceptable</u> and restoration activities may not be required.

### 11.6.2 Conservation importance

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as *'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'*

CI	FULFILLING CRITERIA
Very high (Critical)	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km <sup>2</sup> . Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km <sup>2</sup> . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.

CI	FULFILLING CRITERIA
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

### 11.6.3 Functional Integrity

**Functional integrity (FI)** of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is '*A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*'

FI	FULFILLING CRITERIA
Very high	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance (e.g., ploughing).
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

### 11.6.4 Biodiversity Importance

FUNCTIONAL INTEGRITY	CONSERVATION IMPORTANCE				
	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Very High	Very High	Very High	High	Medium	Low
High	Very Moderate - High y High	High	Medium	Medium	Low
Medium	High	Medium	Medium	Low	Very Low
Low	Medium	Medium	Low	Low	Very Low
Very Low	Medium	Low	Very Low	Very Low	Very Low

### 11.6.5 Receptor resilience

**Receptor resilience (RR)** is defined here as ‘The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.’

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

RECEPTOR RESILIENCE	BIODIVERSITY IMPORTANCE				
	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Very High	Very High	Very High	High	Medium	Low
High	Very High	Very High	High	Medium	Very Low
Medium	Very High	High	Medium	Low	Very Low
Low	High	Medium	Low	Very Low	Very Low
Very Low	Medium	Low	Very Low	Very Low	Very Low

### 11.6.6 Site Ecological Importance

Based on the intactness, conservation status and presence of Sensitive Species, the relative species-based sensitivity varies across the site, with transformed areas having a Very Low sensitivity, intact and semi-intact areas having a Moderate Sensitivity, and specialised localised habitats having a High Sensitivity (Table 17). The overall Terrestrial Biodiversity Sensitivity map aligns with the species of conservation concern map.

*Table 17: Overall Species Ecological Importance.*

SPECIES/HABITAT	INTACTNESS	SITE ECOLOGICAL IMPORTANCE			OVERALL SENSITIVITY*
		ALIEN INVASION	DEGRADATION	STATUS	
Central Mountain Shale Renosterveld	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Koedoesberge-Moordenaars Karoo	Moderate	Low	Near Pristine/ Degraded	LC	Moderate/ Low
Rocky outcrops	High	Low	Pristine	LC	High*
Sensitive Species sub-populations	High	Low	Pristine	LC	High*
Alluvial Vegetation (faunal habitat)	Moderate	Low	Pristine	LC	High*
Transformed Areas	Very Low	Low	Transformed	LC	Very Low

**GENERAL COMMENT:** The site is considered to have an overall Moderate Sensitivity due to the low (Least Concern) conservation status of the vegetation units represented. The general intactness and diversity of species of conservation concern (including numerous Crassulaceae and Aizoaceae) does elevate the overall sensitivity to be above low for near-natural vegetation. Specific Sensitive Areas (Figure 20 to Figure 23) having an elevated sensitivity, are present and are reflected in the overall sensitivity maps (Figure 30 & Figure 31).

# Kareebosch 132 kV Powerline Layout - Sensitivity Overview

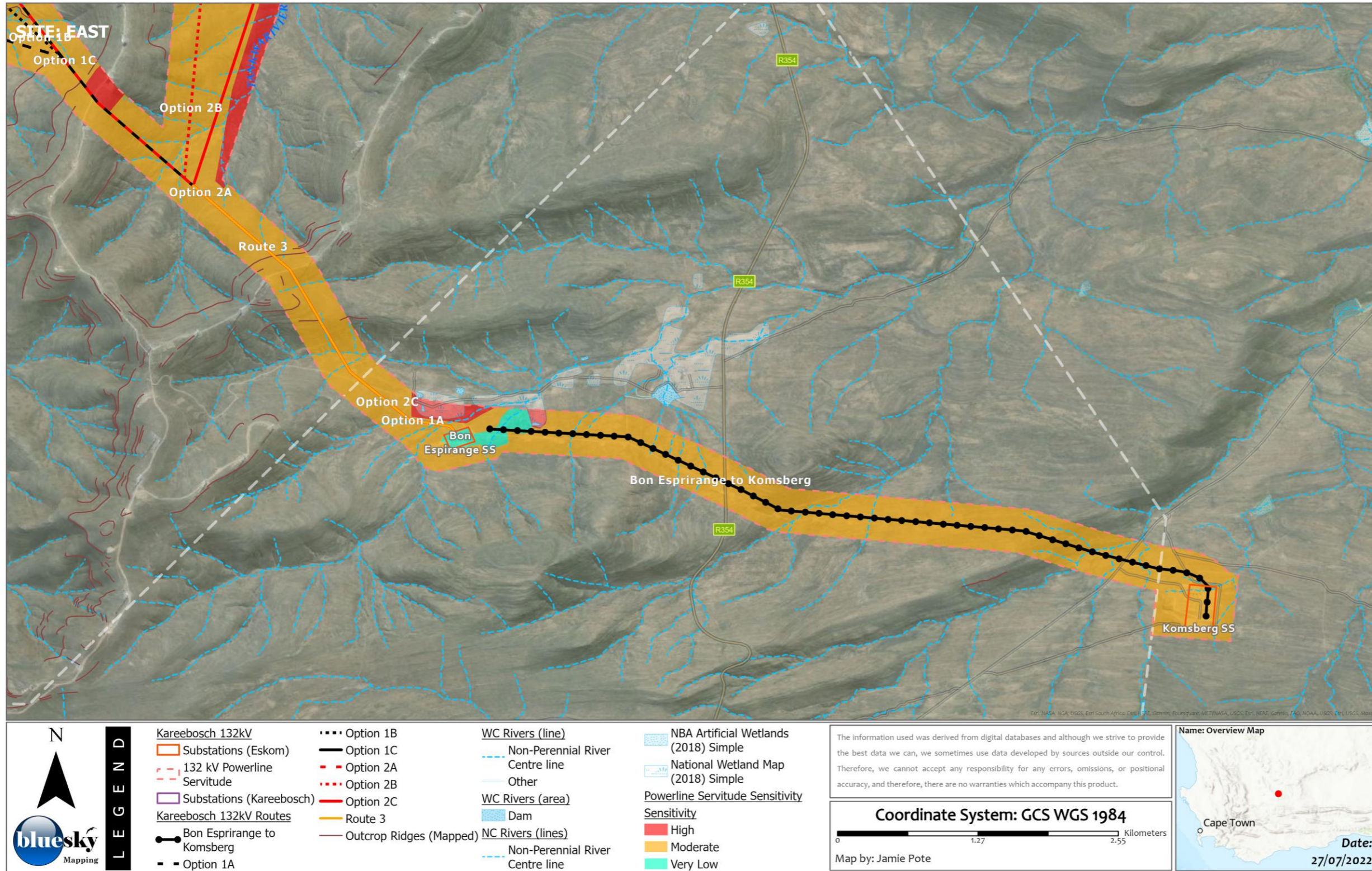


Figure 30 Overall Species Sensitivity (East; Options).

# Kareebosch 132 kV Powerline Layout - Sensitivity Overview

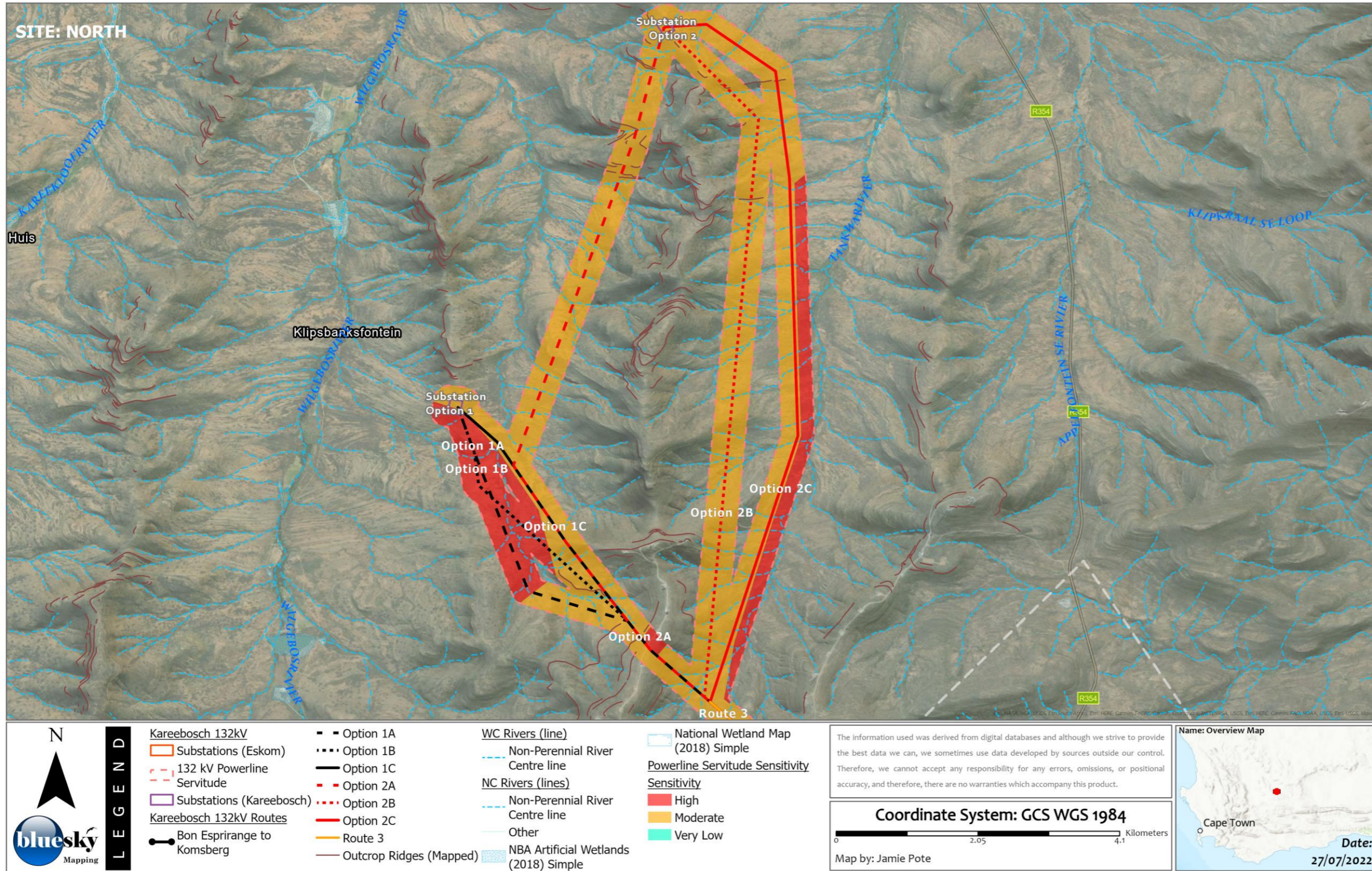


Figure 31 Overall Species Sensitivity (North).

## 12 Terrestrial Biodiversity and Species Risk and Impact Assessment

### 12.1 Potential Terrestrial Biodiversity Impacts (Direct)

The primary direct impacts to terrestrial biodiversity are summarised in Table 18.

Table 18: Potential Impacts to Terrestrial Biodiversity

IMPACT	Nature of Impact
Vegetation	<u>Permanent or temporary loss of indigenous vegetation</u> cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	<u>Loss of flora Species of Conservation Concern</u> during pre-construction site clearing activities. Several special of concern are known from surrounding areas, which could be destroyed during site preparation.
Alien Invasive Species	<u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	<u>Susceptibility of some areas to erosion</u> because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	<u>Disturbances or disruptions to ecological processes:</u> Activity may result in disturbances to ecological processes.
Aquatic and Riparian habitat & processes	<u>Disturbances to Aquatic and Riparian habitat &amp; processes</u> associated with terrestrial vegetation associated with aquatic features.
Faunal Habitat	<u>Loss of Faunal Habitat:</u> Activity will result in the loss of habitat for faunal species.
Faunal Processes	<u>Impacts to faunal processes</u> because of the activity
Faunal Species	<u>Loss of faunal SCC</u> due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

### 12.2 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant additional ancillary linear infrastructure, such as additional roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected.

### 12.3 Potential Terrestrial Biodiversity Impacts (Cumulative)

Development of the entire site will result in some cumulative impacts; however, the vegetation unit, habitat and species are generally widespread.

### 12.4 Assessment Of Impacts and Mitigation

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

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct<sup>11</sup>, indirect<sup>12</sup>, secondary<sup>13</sup> as well as cumulative<sup>14</sup> impacts.

<sup>11</sup> Impacts that arise directly from activities that form an integral part of the Project.

<sup>12</sup> Impacts that arise indirectly from activities not explicitly forming part of the Project.

<sup>13</sup> Secondary or induced impacts caused by a change in the Project environment.

<sup>14</sup> Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.



A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria<sup>15</sup> presented in Table 19 below.

Table 19: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
<b>Impact Magnitude (M)</b> The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
<b>Impact Extent (E)</b> The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
<b>Impact Reversibility (R)</b> The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
<b>Impact Duration (D)</b> The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
<b>Probability of Occurrence (P)</b> The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
<b>Significance (S)</b> is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
<b>Total Score</b>	4 to 15	16 to 30	31 to 60	61 to 80	81 to 100
<b>Environmental Significance Rating (Negative (-))</b>	Very low	Low	Moderate	High	Very High
<b>Environmental Significance Rating (Positive (+))</b>	Very low	Low	Moderate	High	Very High

## 12.5 Impact Mitigation

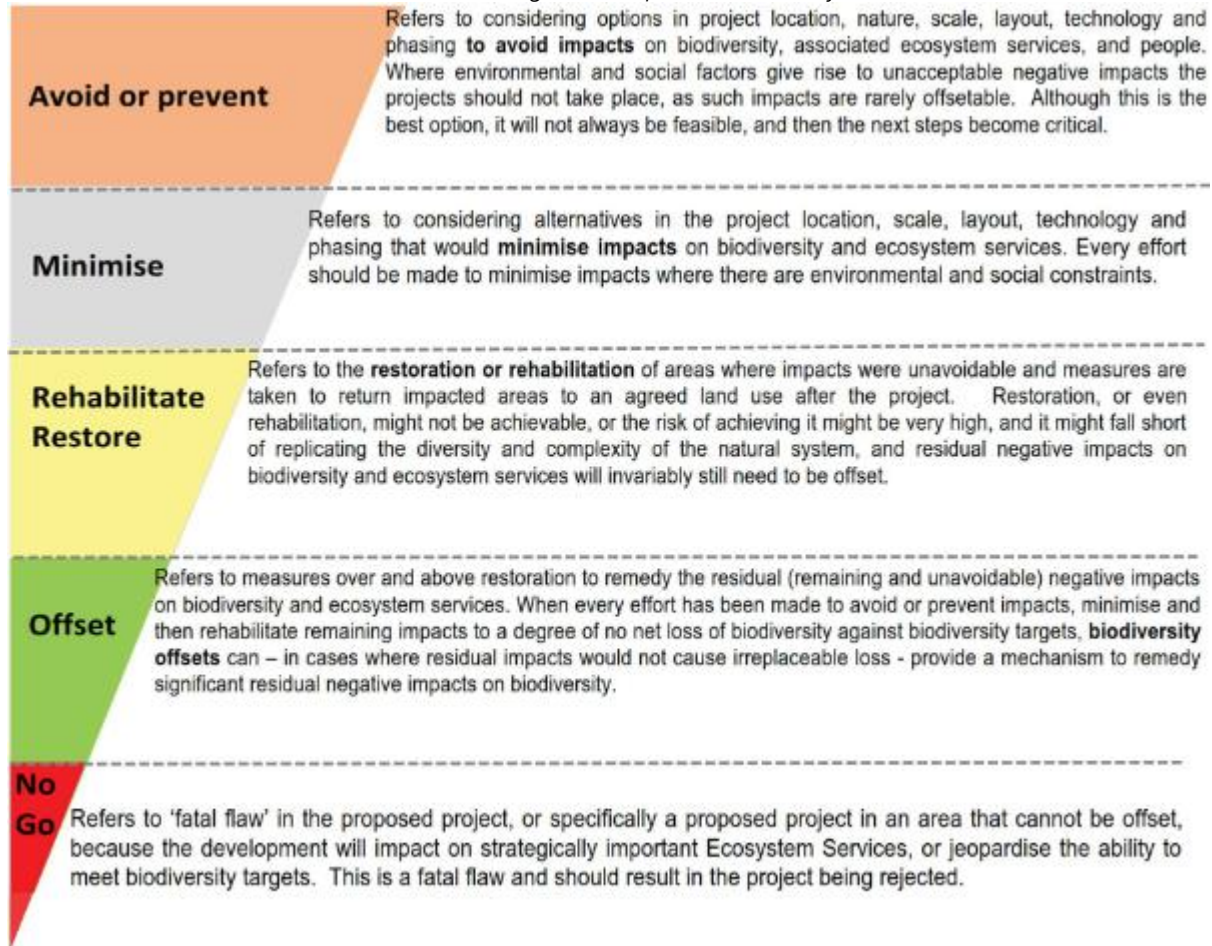
The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures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

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by

<sup>15</sup> The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan. The mitigation sequence/hierarchy is shown in Table 20 below.

Table 20: Mitigation Sequence/Hierarchy



Furthermore, the following must be considered:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for both the construction, operation and decommissioning phases of the project, where relevant.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.
- Management actions: Where negative impacts are identified, specialists must specify practical mitigation objectives (i.e., ways of avoiding or reducing negative impacts). Where no mitigation is feasible, this should be stated, and the reasons given. Where positive impacts are identified, management actions to enhance the benefit must also be recommended.

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## 12.6 Assessment of Terrestrial Biodiversity Impacts

Construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not effectively managed. Table 18 describes impacts that may potentially occur in the site (as per DFFE guidelines) as well indicating the relevant EMP section. The predicted significance of these during the construction phase are summarised in Table 21 and during the operational phase are summarised in Table 22. Refer to Sections 5.6.1 & 5.6.2 for methodology.

Development of the entire site will result in **Construction impacts** of Moderate- Significance to Vegetation, Flora, Fauna and Ecological Processes which can be mostly mitigated to Low Significance through careful siting of footprints, conducting search and rescue prior to site clearance activities and the implementation of mitigation measures.

Development of the entire site will result in anticipated mostly **Operational impacts** of Medium-Low Significance to Vegetation, Flora, Fauna and Ecological Processes which can be mitigated to Low Significance through careful siting of footprints and implementation of mitigation measures.

With particular reference to the large population of *Sensitive Species 142* situated within the alignment of OHP Options 1A and 1C, and inasmuch that *Sensitive Species 142* is a subterranean geophyte:

- The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.
- Vegetation and any *Sensitive Species 142* should not be removed/relocated to create the 4x4 track but rather left *in situ* (i.e., create the track by simply driving repeatedly over the same route). If any *Sensitive Species 142* clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
  - Improved survival of *Sensitive Species 142* (and other geophytic plants) by leaving them *in situ* rather than relocating them;
  - Retention of topsoil and the seed bank *in situ* improves rehabilitation/regeneration of vegetation; and
  - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
- Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of *Sensitive Species 142* and any other protected species.
- All protected species within any pylon footprint must be rescued and relocated.

Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.

Placement of the OHP on the Bon Espirange – Komsberg route on either the north or southern side of the existing 132kV OHP has the same minimal impact to biodiversity and terrestrial ecology. Accordingly, the OHP here can be established on either north or south of the existing 132kV OHP as may be required from an engineering perspective. The existing service track should be used along this route where permissible under land rights.

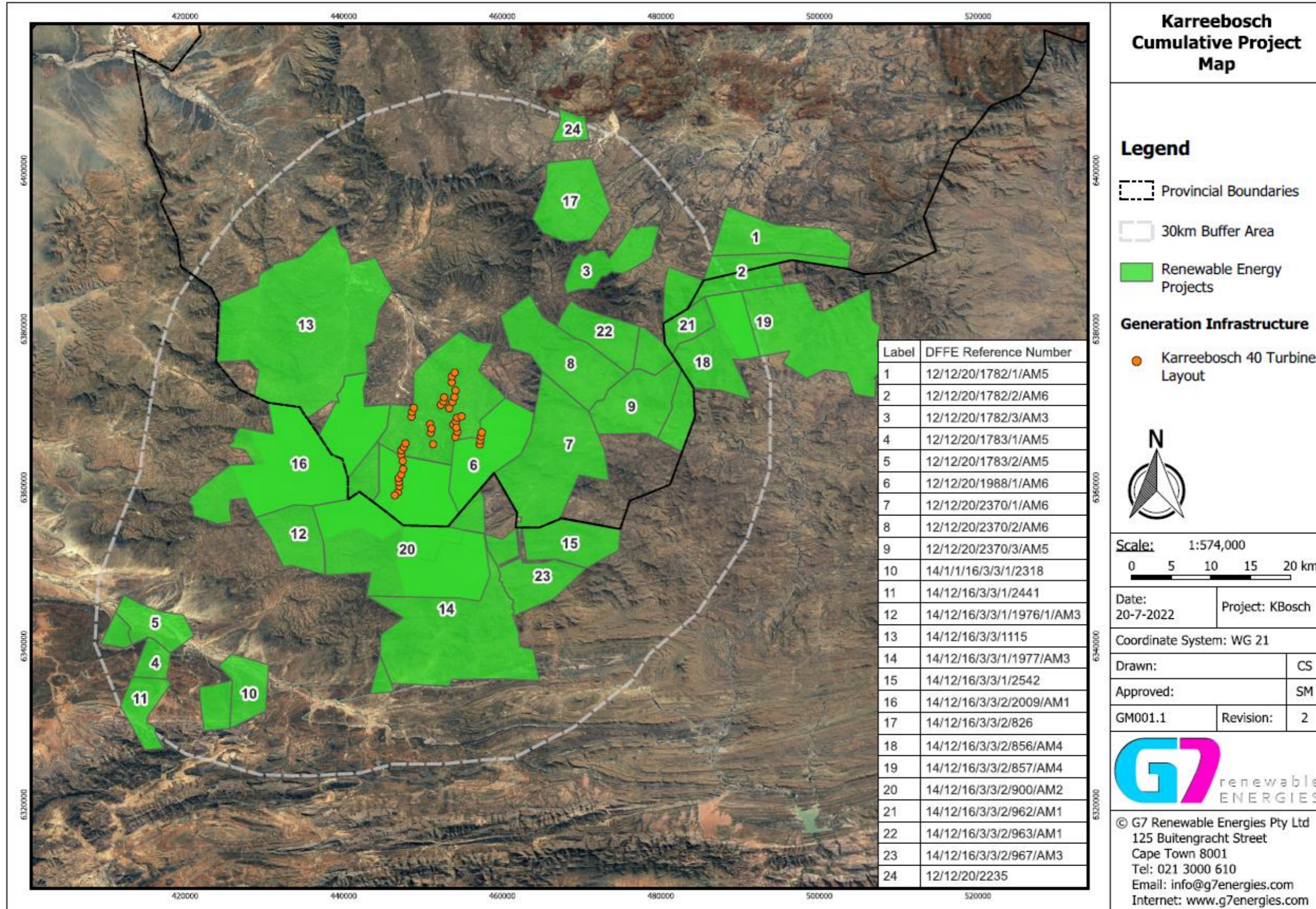


Figure 32: Proposed/Existing Wind Energy Projects on the Komsberg REDZ

### 12.6.1 NO GO OPTION

The No Go option is considered a neutral impact scenario as the current ecological state is retained:

- No negative impact from infrastructure and development
- No broader positive impact from the provision of renewable energy.

### 12.6.2 CONSTRUCTION

IMPACT NUMBER	ASPECT	DESCRIPTION	STAGE	CHARACTER	EASE OF MITIGATION	PRE-MITIGATION							RATING	POST-MITIGATION						
						(M+	E+	R+	D)X	P=	S	(M+		E+	R+	D)X	P=	S	RATING	
Impact 1:	Vegetation	Permanent or temporary loss of indigenous vegetation cover	Construction	Negative	Moderate	3	2	3	4	5	60	N3	1	2	3	4	5	50	N3	
Significance						N3 - Moderate								N3 - Moderate						
Impact 2:	Flora Species	Loss of flora Species of Conservation Concern	Construction	Negative	Moderate	2	1	3	1	5	35	N3	1	1	3	1	5	30	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 3:	Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion	Construction	Negative	Moderate	3	1	3	2	4	36	N3	1	1	3	2	4	28	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 4:	Erosion	Susceptibility of some areas to erosion +	Construction	Negative	Moderate	3	2	3	3	3	33	N3	1	2	3	3	3	27	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 5:	Ecological Processes	Disturbances or disruptions to ecological processes	Construction	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 6:	Aquatic Processes	Disturbances to Aquatic and Riparian habitat & processes	Construction	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 7:	Faunal Habitat	Loss of Faunal Habitat	Construction	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 8:	Faunal Processes	Impacts to faunal processes	Construction	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate								N2 - Low						
Impact 9:	Faunal Species	Loss of faunal SCC	Construction	Negative	Moderate	2	1	3	1	3	21	N2	1	1	3	1	3	18	N2	
Significance						N2 - Low								N2 - Low						

Table 21 : Construction Phase Impact Assessment.

12.6.3 OPERATIONAL

IMPACT NUMBER	RECEPTOR	DESCRIPTION	STAGE	CHARACTER	EASE OF MITIGATION	PRE-MITIGATION						RATING	POST-MITIGATION						RATING
						(M+	E+	R+	D)X	P=	S		(M+	E+	R+	D)X	P=	S	
Impact 1:	Vegetation	Permanent or temporary loss of indigenous vegetation cover	Operational	Negative	Moderate	3	2	3	4	5	60	N3	1	2	3	4	5	50	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 2:	Flora Species	Loss of flora Species of Conservation Concern	Operational	Negative	Moderate	1	1	3	1	5	30	N2	1	1	3	1	5	30	N2
Significance						N2 - Low							N2 - Low						
Impact 3:	Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 4:	Erosion	Susceptibility of some areas to erosion +	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 5:	Ecological Processes	Disturbances or disruptions to ecological processes	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 6:	Aquatic Processes	Disturbances to Aquatic and Riparian habitat & processes	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 7:	Faunal Habitat	Loss of Faunal Habitat	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 8:	Faunal Processes	Impacts to faunal processes	Operational	Negative	Moderate	1	1	3	2	4	28	N2	1	1	3	2	4	28	N2
Significance						N2 - Low							N2 - Low						
Impact 9:	Faunal Species	Loss of faunal SCC	Operational	Negative	Moderate	1	1	3	1	4	24	N2	1	1	3	1	4	24	N2
Significance						N2 - Low							N2 - Low						

Table 22 : Operational Phase Impact Assessment.

12.6.4 DECOMMISSIONING

IMPACT NUMBER	ASPECT	DESCRIPTION	STAGE	CHARACTER	EASE OF MITIGATION	PRE-MITIGATION						POST-MITIGATION							
						(M+	E+	R+	D)X	P=	S	RATING	(M+	E+	R+	D)X	P=	S	RATING
Impact 1:	Vegetation	Permanent or temporary loss of indigenous vegetation cover	Decommissioning	Negative	Moderate	3	2	3	4	5	60	N3	1	2	3	4	5	50	N3
Significance						N3 - Moderate						N3 - Moderate							
Impact 2:	Flora Species	Loss of flora Species of Conservation Concern	Decommissioning	Negative	Moderate	2	1	3	1	5	35	N3	1	1	3	1	5	30	N2
Significance						N3 - Moderate						N2 - Low							
Impact 3:	Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion	Decommissioning	Negative	Moderate	3	1	3	2	4	36	N3	1	1	3	2	4	28	N2
Significance						N3 - Moderate						N2 - Low							
Impact 4:	Erosion	Susceptibility of some areas to erosion +	Decommissioning	Negative	Moderate	3	2	3	3	3	33	N3	1	2	3	3	3	27	N2
Significance						N3 - Moderate						N2 - Low							
Impact 5:	Ecological Processes	Disturbances or disruptions to ecological processes	Decommissioning	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2
Significance						N3 - Moderate						N2 - Low							
Impact 6:	Aquatic Processes	Disturbances to Aquatic and Riparian habitat & processes	Decommissioning	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2
Significance						N3 - Moderate						N2 - Low							
Impact 7:	Faunal Habitat	Loss of Faunal Habitat	Decommissioning	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2
Significance						N3 - Moderate						N2 - Low							
Impact 8:	Faunal Processes	Impacts to faunal processes	Decommissioning	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2
Significance						N3 - Moderate						N2 - Low							
Impact 9:	Faunal Species	Loss of faunal SCC	Decommissioning	Negative	Moderate	2	1	3	1	3	21	N2	1	1	3	1	3	18	N2
Significance						N2 - Low						N2 - Low							

Table 23 : Decommissioning Phase Impact Assessment.

12.6.5 CUMULATIVE

IMPACT NUMBER	ASPECT	DESCRIPTION	STAGE	CHARACTER	EASE OF MITIGATION	PRE-MITIGATION							RATING	POST-MITIGATION						
						(M+	E+	R+	D)X	P=	S	(M+		E+	R+	D)X	P=	S	RATING	
Impact 1:	Vegetation	Permanent or temporary loss of indigenous vegetation cover	Cumulative	Negative	Moderate	3	2	3	4	5	60	N3	1	2	3	4	5	50	N3	
Significance						N3 - Moderate							N3 - Moderate							
Impact 2:	Flora Species	Loss of flora Species of Conservation Concern	Cumulative	Negative	Moderate	2	1	3	1	5	35	N3	1	1	3	1	5	30	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 3:	Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion	Cumulative	Negative	Moderate	3	1	3	2	4	36	N3	1	1	3	2	4	28	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 4:	Erosion	Susceptibility of some areas to erosion +	Cumulative	Negative	Moderate	3	2	3	3	3	33	N3	1	2	3	3	3	27	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 5:	Ecological Processes	Disturbances or disruptions to ecological processes	Cumulative	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 6:	Aquatic Processes	Disturbances to Aquatic and Riparian habitat & processes	Cumulative	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 7:	Faunal Habitat	Loss of Faunal Habitat	Cumulative	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 8:	Faunal Processes	Impacts to faunal processes	Cumulative	Negative	Moderate	3	2	3	4	4	48	N3	1	2	3	1	4	28	N2	
Significance						N3 - Moderate							N2 - Low							
Impact 9:	Faunal Species	Loss of faunal SCC	Cumulative	Negative	Moderate	2	1	3	1	3	21	N2	1	1	3	1	3	18	N2	
Significance						N2 - Low							N2 - Low							

Table 24 : Cumulative Impact Assessment.



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## 12.7 Terrestrial Biodiversity Impact Reversibility

In general, most direct impacts will have a moderate to high reversibility in the typical Renosterveld and Karoid habitat, as well as within the transformed or degraded areas. While it may be possible to re-instate a natural vegetation after disturbance to some extent, it is unlikely that the niche habitats such as rocky outcrops can be re-instated or rehabilitated as effectively.

## 12.8 Impacts and Risks to Irreplaceable Biodiversity Resources

The Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo vegetation is widespread, with some niche habitats and sensitive species communities being less common. These areas have been highlighted and sensitivity increased accordingly. The area provides habitat for a wide range of faunal species, although it is unlikely that the proposed development would provide any direct or indirect impact of significance to species of conservation concern. Faunal species may undergo some localised temporary displacement during construction, but are likely to either move to adjacent areas, or in the medium term are likely to return after construction.

The type of powerline (132 kV) will most likely be constructed using monopole and/or lattice pylons, which have a very small and localised impacts. The access road will also most likely not require the heavy vehicles that would be required for construction of a larger powerline; hence access road requirements will be minimal and most likely consist of a two-track type road, which is typical for powerlines.

The development of the site will result in the loss of intact vegetation having a low conservation status as well as habitat for numerous protected and possibly also red listed flora species. This impact will be limited to isolated pylon footprints, access roads (a two-track type road) and the preferred substation site, approximately 3ha extent.

Risks to Irreplaceable Biodiversity Resources are thus considered to be low.

## 12.9 Findings, Outcomes and Recommendations

In summary, the site is located between Sutherland and Matjiesfontein, within the Northern and Western Cape provinces, surrounded by an extensive mountainous area that comprises generally large commercial farms that have been used historically primarily for grazing with limited crops and pastures. More recently the area is being developed for Wind Energy Facilities, in conjunction with ongoing commercial (grazing) farming activities. Within the site, levels of transformation and alien infestation are generally low. Vegetation is primarily Koedoesberge-Moordenaars Karoo in the lowlands and Central Mountain Shale Renosterveld in the mountains, with several communities being differentiated, having slight differences in biophysical conditions (underlying substrate, soils and aspects) and flora composition. The vegetation units are widespread and have a low overall conservation status.

Several species of conservation concern are found in the broader area and could be present most likely as scattered individuals or small clumps or sub-populations. Several range-restricted species of conservation concern are also known to occur in the surrounding area and the vegetation types, with some found in proximity to the powerline at the time of the site assessment. The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool and is addressed in the respective species assessment section above.

The proposed powerline will result in the limited transformation and loss of some natural habitat, limited to the footprints for pylons and substations and access roads along the preferred route. This loss will be highly localised but will result in a cumulative loss of the vegetation type and species. This cumulative loss is negligible.

Numerous flora and fauna species protected in terms of the Northern Cape Nature Conservation Act (Act 9 of 2009) and Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000) are present or likely to be present and will require the appropriate permits before commencement. Flora and fauna search and rescue is recommended before commencement. It may be most feasible to undertake the

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search and rescue, in particular of fauna, in a phased manner prior to site clearance activities. This will increase the likelihood of finding and relocating various species.

Due to the small size of the overall footprint, risks to faunal species are likely to be low. It is likely that the mammal species identified to be of conservation concern would likely be transient visitors. A search and rescue should be conducted before commencement to relocate any small mammals into a nearby area of similar suitable habitat. Several reptile species are present but are also likely transient. A search and rescue must be conducted before commencement to relocate any reptiles into a nearby area of similar suitable habitat. Amphibians are likely less common, being an arid area, with limited or no perennial wetlands noted. Bird species listed as being of conservation concern are potentially present as transient visitors (i.e., flying over, nesting or foraging) and thus the proposed activity is unlikely to pose any significant risk. Passerine birds were however noted to be an important ecological component of the habitat. Bird species may be temporarily displaced during construction, because of the development but will adapt accordingly and similar suitable habitat is present in the surrounding landscape. The avifaunal assessment will provide more detailed assessment of birds.

The route does cross mountainous areas, with more sensitive outcrop areas. The powerline route should span outcrops as far as possible.

Several more sensitive areas, generally confined to small areas, within the broader homogenous landscape were noted and have been mapped and designated a higher sensitivity. This is due to the prevalence of various protected species that are not common to the surrounding Renosterveld/Karoid mozaic. These habitats are also somewhat less resilient to disturbance, and it is recommended that these patches be avoided as far as is technically possible.

## 12.10 Summary of Findings

Very Low sensitivity areas include transformed areas such as cultivated areas.

Low sensitivity areas include most of the route within natural Shale Renosterveld and Moordenaars Karoo.

No Moderate Sensitivity areas were identified.

High sensitivity areas were identified including:

- Sub-population of Sensitive Species 142 and scattered but localised individuals of *Indigophora hantamensis* in the vicinity of a portion of alternatives 1A and 1B and slightly to the west of alternative 1C & 2A.

No Very High sensitivity areas were identified.

Specific No-Go areas that have been identified (Figure 24 to Figure 26) include:

- Wetland areas in vicinity of Bon Espirange substation.
- Rocky Garden on mountain slightly to the north of route for alternatives 1A; within 100 meters of the proposed OHP;
- Buffer along Tankwa River including aggregating, ground-nesting bee population on western side of alternative 2C.

Cumulative impacts because of the development of the site, are regarded as being low due to the widespread nature of the vegetation unit and the low impact of the proposed activity which is unlikely to pose significant risk to potential localised populations of species of conservation concern.

## 12.11 Recommendations

The habitats that are designated as having an elevated sensitivity should be avoided as far as is technically possible.

A flora and fauna search and rescue should be undertaken prior to site clearance activities.

With particular reference to the large population of *Sensitive Species 142* situated within the alignment of OHP Options 1A and 1C, and inasmuch that *Sensitive Species 142* is a subterranean geophyte:

- The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.

- 
- Vegetation and any *Sensitive Species 142* should not be removed/relocated to create the 4x4 track but rather left *in situ* (i.e., create the track by simply driving repeatedly over the same route). If any *Sensitive Species 142* clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
    - Improved survival of *Sensitive Species 142* (and other geophytic plants) by leaving them *in situ* rather than relocating them;
    - Retention of topsoil and the seed bank *in situ* improves rehabilitation/regeneration of vegetation; and
    - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
  - Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of *Sensitive Species 142* and any other protected species.
  - All protected species within any pylon footprint must be rescued and relocated.

Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.

## 13 Management Programs

Table 25 lists specific mitigation measures that must be implemented and adhered to. These must be conditions of authorisation.

Table 25: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	Blanket clearing of vegetation must be limited to a limited to 4x4 access tracks (were need) and substations footprints. No clearing outside of footprint to take place. Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place.
Flora Species	A flora search and rescue is likely to be required within pylon and substation footprints as per: Northern Cape Nature Conservation Act (Act no. 9 of 2009) Western Cape Nature Conservation Laws Amendment Act (Act No 3 of 2000): NEMBA Threatened or Protected Species (TOPS).
Alien Invasive Species	A suitable weed management strategy to be implemented in construction and operation phases.
Erosion	Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover vegetation planted once construction is completed. Topsoil must be stripped and stockpiled separately and replaced on completion. If natural vegetation re-establishment does not occur, a suitable grass must be applied.
Ecological Processes	Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.
Aquatic and Riparian processes	Pylon placement should span any aquatic and riparian features, rivers, non-perennial watercourses and any wetlands/pans.
Faunal Habitat	Blanket clearing of vegetation must be limited to the footprint. It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
Faunal Processes	It is recommended that a faunal search and rescue be conducted before construction commences (i.e. clearing of vegetation), although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances.
Faunal Species	No animals are to be harmed or killed during the course of operations. Workers are NOT allowed to snare any faunal species.

### 13.1 Site Preparation and Vegetation Clearing Plan

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

Necessary permits must be obtained for all species listed in:

- NEM:BA Threatened or Protected Species (ToPS) species listed in terms of the ToPS regulations and including red-listed species.
- Northern Cape Nature Conservation Act (Act no. 9 of 2009)
- The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000)

Areas to be cleared of vegetation will be clearly demarcated before clearing commences.

Flora search and rescue is to be conducted before vegetation clearing takes place.

Plants to be rescued should include both Species of Conservation Concern requiring removal for relocation as well as species that would be suitable for use in rehabilitation and that are amenable to transplanting.

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Areas should only be stripped of vegetation as and when required and in particular once Species of Conservation Concern have been relocated for that area.  
Search and Rescue is best undertaken during early Spring period.  
Should site construction occur in a phased manner, then clearing activities should take place also in a phased manner, ahead of construction work.

The following fauna relocation plan is recommended for inclusion in the EMPr and Fauna removal permit applications:

Necessary permits must be obtained for all species listed in:

- NEM:BA Threatened or Protected Species (ToPS) species listed in terms of the ToPS regulations and including red-listed species.
- Northern Cape Nature Conservation Act (Act no. 9 of 2009)
- The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000)

### 13.2 Relocation of Species of Conservation Concern

The following general approach is recommended for translocation of species of conservation concern including Sensitive Species 142 where is affected by the activity:

- Season dependant, collect seed from any large mature and seed-bearing specimens that fall within the disturbance footprint before commencement (most likely during late autumn/early winter). This seed should be stored in cool dry conditions and sown in the following spring after rain and end of cold spells. The collected seed can include plant material to which the seed is attached.
- Locate and dig out any small individuals and/or seedlings, ensuring that disturbance to the root ball is minimal and plant in bags using locally sourced soil or replant directly into adjacent area. Any bagged plants must be stored in cool partially sunny conditions and kept watered, but not over watered for the duration of the construction period or until replanted.
- Any seed that was collected as per point 1, can then be sown and lightly raked to ensure some coverage with ground. It was noted from the site investigation that occasional seedlings or juveniles are present.
- Similarly, the bagged plants, should any have survived, can be replanted as well.
- Season and rainfall dependant, some after care watering of the translocated plants may be required.

With particular reference to the large population of *Sensitive Species 142* situated within the alignment of OHP Options 1A and 1C, and inasmuch that *Sensitive Species 142* is a subterranean geophyte:

- The 4x4 tracks supporting the OHPs across the project must be developed to follow a 'path of least resistance' and without the use of bulldozers or other earth moving equipment, as much as practically possible.
- Vegetation and any *Sensitive Species 142* should not be removed/relocated to create the 4x4 track but rather left *in situ* (i.e., create the track by simply driving repeatedly over the same route). If any *Sensitive Species 142* clumps are within the 4x4 track route it would be recommended to divert slightly to avoid if possible. This will achieve the following:
  - Improved survival of *Sensitive Species 142* (and other geophytic plants) by leaving them *in situ* rather than relocating them;
  - Retention of topsoil and the seed bank *in situ* improves rehabilitation/regeneration of vegetation; and
  - Keeping a natural/endemic vegetative embedded into the soil decreases local erosion and topsoil loss from high wind.
- Where bulldozers or other earth moving equipment are used, then permits must be obtained for prior rescue and relocation of *Sensitive Species 142* and any other protected species.
- All protected species within any pylon footprint must be rescued and relocated.

Plants to be relocated should be dug out with as little damage to roots as possible and replanted in the adjacent landscape. A hand-spade should not be used but rather a small hand-pick (e.g., geologists pick) to minimise root damage. It is recommended that a small amount of water is provided to the disturbed roots after replanting, if undertaken outside of a rainy period.

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### 13.3 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable grasses and local indigenous seed mix, if deemed to be required, however, vegetation is likely to re-establish without input.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Final rehabilitation must comply with the requirements mentioned in the Rehabilitation Plan.

### 13.4 Open Space Management/Conservation Plan

None are applicable for this project.

### 13.5 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of services for maintenance/replacement of defective components and leak repair. All measures of this report, including the EMPr should be adhered for any maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report and EMPr.

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## 14 Stakeholder Engagement

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

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

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

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## 15 Organizational Capacity and Competency

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

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



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## 16 Emergency Preparedness and Response

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

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

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## 17 Monitoring and Review

Key monitoring activities should include the following:

- Pre-construction
  - Ensure flora permits are in place timeously (PNCO only) – allow at least 1 or 2 months before commencement.
  - Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
- Bush clearing
  - Ensure working plant has no oil or hydraulic leaks.
  - Check delineated footprints area not exceeded.
- Construction
  - Regular checks on trenches for trapped animals and possible drowning risks
  - Regular checks of fences for snares
- Rehabilitation
  - Check quality of topsoil and weed free.
  - Check for weed regrowth and manage timeously (before seed is set)
- Operational monitoring
  - Weed management on ongoing basis, as required.
  - Erosion to be addressed on ongoing basis, most likely along access tracks.

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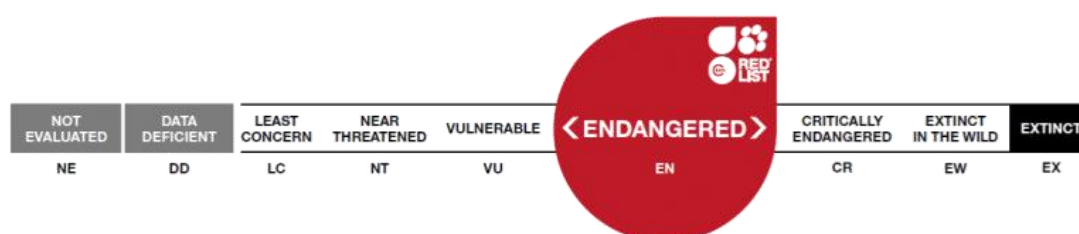
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## 19 Appendix 1 – Flora and Fauna Species of Conservation Concern

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 assessment (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).

Scientific Name	Family	Status <sup>16</sup>	Comment
<b>Plants</b>			
<i>Acmadenia argillophila</i>	Rutaceae	NT	Not recorded, found to the south in the Swartberg.
<i>Adromischus maculatus</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Adromischus mammillaris</i>	Crassulaceae	EN, NC	Not recorded, known locations in Calitzdorp area
<i>Adromischus phillipsiae</i>	Crassulaceae	Rare, NC, NEST (M)	Not recorded. Roggeveld Mountains to Kamiesberg. Sheltered rock crevices in loam soil.
<i>Agathosma acocksii</i>	Rutaceae	VU, NC	Not recorded. Witberg to the south, outside of project area in Fynbos.
<i>Albuca concordiana</i>	Hyacinthaceae	LC, NC, WC	Present on site or vicinity
<i>Aloe comptonii</i>	Asphodelaceae	LC, NC, WC	Present on site or vicinity
<i>Aloe longistyla</i>	Asphodelaceae	LC, NC, WC	Not recorded, Widespread species
<i>Aloidendron dichotomum</i>	Asphodelaceae	VU, NC, WC	Not recorded
<i>Amphithalea spinosa</i>	Fabaceae	VU	Not recorded. NEST projected, known locations to the south in the Hex River Valley/ Witteberg area
<i>Amphithalea villosa</i>	Fabaceae	NT	Not recorded
<i>Anisodonteia procumbens</i>	Malvaceae	Rare	Not recorded.
<i>Antimima androsacea</i>	Aizoaceae	CR, Rare, WC, NC	A range-restricted species (EOO 10 km <sup>2</sup> ), known from one site where it is not threatened. Sutherland, Roggeveld Escarpment. In vicinity but not recorded at proposed powerline.

<sup>16</sup> 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.

Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Antimima emarcescens</i>	Aizoaceae	VU, WC, NC	Not recorded.
<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 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.
<i>Aspalathus intricata</i> subsp. <i>intricata</i>	Fabaceae	Rare, NC	Not recorded.
<i>Aspalathus intricata</i> subsp. <i>oxyclada</i>	Fabaceae	Rare, NC	Not recorded.
<i>Asparagus mollis</i>	Asparagaceae	VU, NEST (M)	Not recorded.
<i>Astroloba corrugata</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Astroloba herrei</i>	Asphodelaceae	VU, WC, NC	Not recorded, known locations to the south in the Swartberg mountains around Matjiesfontein & Prince Albert
<i>Astroloba robusta</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Babiana cuneata</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Babiana sambucina</i>	Iridaceae	EN, WC, NC	Not recorded
<i>Boophone disticha</i>	Amaryllidaceae	LC, WC, NC	Present on site or vicinity
<i>Braunsia apiculata</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Braunsia stayneri</i>	Aizoaceae	Rare, WC, NC	Not recorded.
<i>Brunsvigia comptonii</i>	Amaryllidaceae	LC, WC, NC	Present on site. Widespread and not in danger of extinction. Common and widespread in project area.
Sensitive Species 142	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 or vicinity



Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Bulbine abyssinica</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Bulbine succulenta</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Bulbinella cauda-felis</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Calamophyllum teretiusculum</i>	Aizoaceae	DDT, WC, NC	Not recorded. Karoo Endemic, taxonomically problematic.
<i>Calobota elongata</i>	Fabaceae	VU	Not recorded
<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 or vicinity
<i>Cineraria lobata</i> subsp. <i>lasiocaulis</i>	Asteraceae	Rare	Not recorded.
<i>Cleretum booyensii</i>	Aizoaceae	Rare, WC, NC	Not recorded.
<i>Cliffortia arborea</i>	Rosaceae	VU	Not recorded.
<i>Conophytum minimum</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Conophytum truncatum</i>	Aizoaceae	NE, WC, NC	Not recorded
<i>Cotyledon cuneata</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Cotyledon orbiculata</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Cotyledon tomentosa</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula altropurpurea</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula clavata</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula columnaris</i>	Crassulaceae	LC, WC, NC	Present on site or vicinity
<i>Crassula congesta</i> subsp. <i>laticephala</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula cotyledonis</i>	Crassulaceae	LC, NC	Present on site or vicinity
<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
<i>Crassula muscosa</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula orbicularis</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula pageae</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula roggveldii</i>	Crassulaceae	Rare, NC	Not recorded
<i>Crassula rupestris</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula tecta</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula tetragona</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula tomentosa</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Crassula umbella</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Cromidon hamulosum</i>	Scrophulariaceae	DD	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<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.
<i>Diascia macrophylla</i>	Scrophulariaceae	LC, WC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<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.

Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Drosanthemum framesii</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Drosanthemum hispidum</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Drosanthemum worcesterense</i>	Aizoaceae	EN, WC, NC	Not recorded.
<i>Duvalia caespitosa</i>	Apocynaceae	LC, NC	Present on site or vicinity
<i>Duvalia parviflora</i>	Apocynaceae	VU, NC	Not recorded, known locations in the south around Ladismith & Oudtshoorn
<i>Erica glandulipila</i>	Ericaceae	Rare, WC, NC	Not recorded.
<i>Eriosephalus grandiflorus</i>	Asteraceae	Rare, NEST (M)	Not recorded. Present in area
<i>Eriosephalus microphyllus</i> var. <i>carnosus</i>	Asteraceae	EN	Not recorded.
<i>Euphorbia loricata</i>	Euphorbiaceae	LC, NC	Present on site or vicinity
<i>Euphorbia mauritanica</i>	Euphorbiaceae	LC, NC	Present on site or vicinity
<i>Euphorbia multiceps</i>	Euphorbiaceae	LC, NC	Present on site or vicinity
<i>Euphorbia multifolia</i>	Euphorbiaceae	LC, NC	Present on site or vicinity
<i>Euryops namaquensis</i>	Asteraceae	VU	Not recorded. Outside of range (Namaqualand/ Knersvlakte) quartz patches.
<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.
<i>Gibbaeum gibbosum</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Gibbaeum pubescens</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Gladiolus venustus</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Globulariopsis wittebergensis</i>	Scrophulariaceae	Rare	Not recorded.
<i>Gnidia cyanea</i>	Thymelaeaceae	Rare	Not recorded.
<i>Gonialoe variegata</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<i>Haemanthus coccineus</i>	Amaryllidaceae	LC, WC, NC	Present on site or vicinity
<i>Haworthia arachnoidea</i>	Asphodelaceae	LC, WC, NC	Present on site or vicinity
<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 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.
<i>Helictotrichon barbatum</i>	Poaceae	VU	Not recorded.

Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Helictotrichon namaquense</i>	Poaceae	VU	Not recorded.
<i>Helictotrichon roggeveldense</i>	Poaceae	EN	Not recorded.
<i>Heliophila elata</i>	Brassicaceae	VU	Not recorded.
<i>Hereroa crassa</i>	Aizoaceae	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Hermannia pillansii</i>	Malvaceae	CR Rare	Not recorded.
<i>Hesperantha flava</i>	Iridaceae	Rare, WC, NC	Not recorded. Present in area
<i>Hesperantha glabrescens</i>	Iridaceae	Rare, WC, NC	Not recorded.
<i>Holothrix aspera</i>	Orchidaceae	LC, WC, NC	Present on site or vicinity
<i>Holothrix secunda</i>	Orchidaceae	LC, WC, NC	Present on site or vicinity
<i>Holothrix villosa</i>	Orchidaceae	LC, WC, NC	Present on site or vicinity
<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. Few individuals recorded, uncommon.
<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.
<i>Ixia rivulicola</i>	Iridaceae	VU, WC, NC	Not recorded.
<i>Jamesbrittenia thunbergii</i>	Scrophulariaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Lachenalia aurioiae</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia comptonii</i>	Hyacinthaceae	LC, WC, NC	Not recorded. Karoo Endemic, Tankwa Karoo to the Roggeveld Escarpment south-west of Sutherland and Matjiesfontein.
<i>Lachenalia ensifolia</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia isopetala</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia juncifolia</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia martinae</i>	Hyacinthaceae	VU, WC, NC	Not recorded
<i>Lachenalia obscura</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia violacea</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Lachenalia whitehillensis</i>	Hyacinthaceae	NT, WC, NC	Not recorded
<i>Lachenalia zebrina</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<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 or vicinity
<i>Leobordea globulosa</i>	Fabaceae	VU	Not recorded.

Scientific Name	Family	Status <sup>16</sup>	Comment
<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.
<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, NEST (M)	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. Not recorded.
<i>Malephora lutea</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Massonia depressa</i>	Hyacinthaceae	LC, WC, NC	Present on site or vicinity
<i>Mesembryanthemum nodiflorum</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Monsonia crassicaulis</i>	Geraniaceae	LC, NC	Present on site or vicinity
<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 or vicinity
<i>Moraea cuspidata</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Moraea miniata</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Moraea polyanthos</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Moraea polystachya</i>	Iridaceae	LC, WC, NC	Present on site or vicinity
<i>Muraltia karroica</i>	Polygalaceae	VU	Not recorded, found to the south in the Swartberg.
<i>Nemesia anisocarpa</i>	Scrophulariaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.
<i>Nenax velutina</i>	Rubiaceae	Rare	Not recorded.
<i>Octopoma nanum</i>	Aizoaceae	VU, WC, NC	Not recorded
<i>Oftia glabra</i>	Scrophulariaceae	Rare	Not recorded.
<i>Ornithogalum juncifolium</i>	Hyacinthaceae	LC, WC, NC	Not recorded
<i>Oxalis convexula</i>	Oxalidaceae	LC, NC	Present on site or vicinity
<i>Oxalis dregei</i>	Oxalidaceae	LC, NC	Present on site or vicinity
<i>Oxalis marlothii</i>	Oxalidaceae	EN, NC	Not recorded. Present in area
<i>Oxalis melanosticta</i>	Oxalidaceae	LC, NC	Present on site or vicinity
<i>Oxalis pes-caprae</i>	Oxalidaceae	LC, NC	Present on site or vicinity
<i>Pauridia breviscapa</i>	Hypoxidaceae	Rare, WC, NC, NEST (M)	Not recorded.
<i>Pectinaria articulata</i>	Apocynaceae	LC, NC	Present on site or vicinity
<i>Pectinaria longipes subsp. longipes</i>	Apocynaceae	LC, NC	Not recorded. Roggeveld-Hantam endemic, Known from general area. Widespread.

Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Peersia frithii</i>	Aizoaceae	VU, WC, NC	Not recorded. Present in area
<i>Pelargonium magenteum</i>	Geraniaceae	LC, NC	Present on site or vicinity
<i>Pelargonium alternans</i>	Geraniaceae	LC, NC	Present on site or vicinity
<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.
<i>Phylica comptonii</i>	Rhamnaceae	Rare, NC	Not recorded.
<i>Phylica retorta</i>	Rhamnaceae	Rare, NC	Not recorded.
<i>Phyllobolus amabilis</i>	Aizoaceae	Rare, WC, NC	Not recorded
<i>Piarranthus comptus</i>	Apocynaceae	LC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Piarranthus geminatus</i>	Apocynaceae	LC, NC	Present on site or vicinity
<i>Pleiospilos nelii</i>	Aizoaceae	LC, WC, NC	Not recorded. Outside of range.
<i>Polhillia involucrata</i>	Fabaceae	EN, NC	Not recorded.
<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.
<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 aridus</i>	Restionaceae	VU	Not recorded.
<i>Restio esterhuyseniae</i>	Restionaceae	Rare, WC, NC	Not recorded.
<i>Restio karoicus</i>	Restionaceae	LC, WC, NC	Not recorded.
<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.
<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.
<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

Scientific Name	Family	Status <sup>16</sup>	Comment
			overgrazing. Stony shale flats and slopes, Roggeveld Plateau.
<i>Romulea tortuosa</i>	<i>Iridaceae</i>	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>	<i>Aizoaceae</i>	Rare, WC, NC	Not recorded.
<i>Ruschia altigena</i>	<i>Aizoaceae</i>	Rare, WC, NC	Not recorded.
<i>Ruschia cradockensis</i>	<i>Aizoaceae</i>	LC, WC, NC	Present on site or vicinity
<i>Ruschia crassa</i>	<i>Aizoaceae</i>	LC, WC, NC	Present on site or vicinity
<i>Ruschia karrooica</i>	<i>Aizoaceae</i>	LC, WC, NC	Not recorded. Karoo Endemic, widespread.
<i>Ruschia perfoliata</i>	<i>Aizoaceae</i>	LC, WC, NC	Not recorded. Great Karoo endemic, Known from general area. Widespread.
<i>Sarcocaulon crassicaule</i> )			
<i>Secale strictum</i> subsp. <i>africanum</i>	Poaceae	CR EN	Not recorded. NEST projected. Roggeveld-Hantam endemic, Found on riverbanks.
<i>Selago albomontana</i>	Scrophulariaceae	Rare	Not recorded.
<i>Sensitive Species 1107</i>	Asphodelaceae	Rare, WC, NC, NEST (M)	Not recorded
<i>Sensitive Species 1138</i>	Aizoaceae	Rare, WC, NC, NEST (M)	Not recorded
<i>Sensitive Species 142</i>	Amaryllidaceae	VU, WC, NC, NEST (M)	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>Sensitive Species 338</i>	Amaryllidaceae	Rare, WC, NC, NEST (M)	Not recorded
<i>Sensitive Species 346</i>	Geraniaceae	Rare, NC, NEST (M)	Not recorded
<i>Sensitive Species 620</i>	Crassulaceae	Rare, NC, NEST (M)	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>Sensitive Species 711</i>	Amaryllidaceae	Rare, WC, NC, NEST (M)	Not recorded
<i>Sensitive Species 722</i>	Crassulaceae	Rare, NC, NEST (M)	Not recorded
<i>Sensitive Species 886</i>	Asteraceae	Rare, NEST (M)	Not recorded
<i>Sensitive Species 936</i>	Asphodelaceae	Rare, WC, NC, NEST (M)	Not recorded

Scientific Name	Family	Status <sup>16</sup>	Comment
<i>Sericocoma pungens</i>	Amaranthaceae	LC, WC, NC	Not recorded, Widespread species
<i>Stapelia rufa</i>	Apocynaceae	LC, NC	Present on site or vicinity
<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>Tankwana 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>Trichodiadema marlothii</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Trichodiadema mirabile</i>	Aizoaceae	LC, WC, NC	Present on site or vicinity
<i>Tridentea gemmiflora</i>	Apocynaceae	LC, NC	Present on site or vicinity
<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.
<i>Tylecodon faucium</i>	Crassulaceae	Rare, NC	Not recorded. Karoo Endemic, A range-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 or vicinity
<i>Tylecodon reticulatus</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Tylecodon wallichii</i>	Crassulaceae	LC, NC	Present on site or vicinity
<i>Wurmbea capensis</i>	Colchicaceae	VU	Not recorded. Outside of range (Swartland area).
<i>Zaluzianskyia mirabilis</i>	Scrophulariaceae	Rare, NEST (M)	Not recorded.
<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 a be 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

Scientific Name	Family	Status <sup>16</sup>	Comment
			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 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.



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## 20 Appendix 2: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in Table 18 will be managed / controlled as set out under mitigating measures (Table 25) and as detailed in this section for the more significant impacts during the construction phase.

### 20.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation should be temporarily stored during operations and to be used later to stabilise slopes.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.
- No open fires are permitted on site.
- Rehabilitation of vegetation of the site must be done as described in the Rehabilitation Plans.

### 20.2 Flora Search and Rescue

The following flora relocation plan is recommended:

- Respective permits to be obtained from the relevant competent authorities.
- When the final tower positions are known, where necessary plant search and rescue should be undertaken within the defined footprint areas.
- Flora search and rescue is to be conducted prior to vegetation clearing takes place.
- These species are to be replanted as soon as practically possible in a suitable area of similar vegetation, where future development is unlikely to occur, or within a nearby protected area.

### 20.3 Fauna Search and Rescue

Inasmuch that almost all fauna will voluntarily vacate areas of construction/high activity, the following is recommended for inclusion in the EMP:

Necessary permits must be obtained for all species listed in:

- NEM:BA Threatened or Protected Species (ToPS) species listed in terms of the ToPS regulations and including red-listed species.
- Northern Cape Nature Conservation Act (Act no. 9 of 2009) - several species
- The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000
- Any tortoise found in a construction footprint area should be moved to an area of safety greater than 100 metres away.
- Removal of snakes must be undertaken by a competent snake handler.
- Once caught, each snake must be individually transported in suitable container.
- The transport containers must be kept cool to decrease stress for the reptiles.
- The reptiles will be relocated as soon as possible after they have been caught.

### 20.4 Alien and Invasive Plan Management Plan

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

- 
- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
  - A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
  - Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
  - The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
  - All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site.

## 20.5 Fires

- No open fires are permitted on site.
- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.

## 20.6 Top Soil Aspects

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded.

## 20.7 Dust

- If required, water spray vehicles will be used to control wind cause by strong winds during activities on the works. Similar water-free methods may also be implemented.

## 20.8 Stormwater and Erosion Control

- Stormwater Management Plans must be developed for the site.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.

## 20.9 Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity.

## 20.10 Excavations

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

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

- 
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the area.

### 20.11 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually for two years.

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

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## 21 Appendix 3: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

### SCOPE

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation* (GN 320, 20 March 2020)) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation<sup>17</sup>.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute<sup>18</sup>.

### 21.1 SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

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

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- 1) a desk top analysis, using satellite imagery,
- 2) a preliminary on-site inspection; and
- 3) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

- 1) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
- 2) contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and

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<sup>17</sup> The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

<sup>18</sup> The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on the screening tool).

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

## 21.2 TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
1	<b><u>General Information</u></b>	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being " <i>very high sensitivity</i> " for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Specialist Assessment</u> .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being ' <i>low sensitivity</i> ' for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Compliance Statement</u> .	✓
1.3	However, where the information gathered from the site sensitivity verification <u>differs</u> from the designation of ' <i>very high</i> ' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a ' <i>low</i> ' sensitivity, then a <u>Terrestrial Biodiversity Compliance Statement</u> must be submitted.	✓
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a ' <i>low</i> ' terrestrial biodiversity sensitivity on the screening tool, a <u>Terrestrial Biodiversity Specialist Assessment</u> must be conducted.	✓
1.5	If any part of the proposed development footprint falls within an area of ' <i>very high</i> ' sensitivity, the assessment and reporting requirements prescribed for the ' <i>very high</i> ' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, <u>can be returned to the current state within two years of the completion of the construction phase</u> , in which case a <u>compliance statement applies</u> . Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.	✓
	<b>VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features</b>	
2	<b><u>Terrestrial Biodiversity Specialist Assessment</u></b>	
2.1	The assessment must be prepared by a <u>specialist registered with the South African Council for Natural Scientific Professionals (SACNASP)</u> with expertise in the field of terrestrial biodiversity.	✓
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	✓
2.3.1	a <u>description of the ecological drivers or processes</u> of the system and how the proposed development will impact these;	✓
2.3.2	<u>ecological functioning and ecological processes</u> (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	✓
2.3.3	the <u>ecological corridors</u> that the proposed development would impede including migration and movement of flora and fauna;	✓
2.3.4	the description of any <u>significant terrestrial landscape features</u> ( <i>including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments</i> );	✓
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	✓

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
(a)	<u>main vegetation types</u> ;	✓
(b)	<u>threatened ecosystems</u> , including listed ecosystems as well as locally important habitat types identified;	✓
(c)	<u>ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats</u> ; and	✓
(d)	<u>species, distribution, important habitats</u> (e.g., feeding grounds, nesting sites, etc.) and <u>movement patterns</u> identified;	✓
2.3.6	the assessment <u>must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity</u> as identified by the screening tool and verified through the site sensitivity verification; and	✓
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
2.3.7.1	<b>terrestrial critical biodiversity areas</b> (CBAs), including:	✓
(a)	the <u>reasons why an area has been identified as a CBA</u> ;	✓
(b)	an indication of <u>whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state</u> or in achieving the goal of rehabilitation;	✓
(c)	the <u>impact on species composition and structure of vegetation</u> with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);	✓
(d)	the <u>impact on ecosystem threat status</u> ;	✓
(e)	the <u>impact on explicit subtypes in the vegetation</u> ;	✓
(f)	the <u>impact on overall species and ecosystem diversity</u> of the site; and	✓
(g)	the <u>impact on any changes to threat status of populations of species of conservation concern</u> in the CBA;	✓
2.3.7.2	<b>terrestrial ecological support areas</b> (ESAs), including:	✓
(a)	the <u>impact on the ecological processes</u> that operate within or across the site;	✓
(b)	the <u>extent the proposed development will impact on the functionality</u> of the ESA; and	✓
(c)	<u>loss of ecological connectivity</u> (on site, and in relation to the broader landscape) due to the <u>degradation and severing of ecological corridors or introducing barriers that impede migration   and movement of flora and fauna</u> ;	✓
2.3.7.3	<b>protected areas</b> as defined by the National Environmental Management: Protected Areas Act, 2004 including	✓
(a)	an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	✓
2.3.7.4	<b>priority areas for protected area expansion</b> , including-	✓
(a)	the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network;	✓
2.3.7.5	<b>Strategic Water Source Areas (SWSAs)</b> including:	✓
(a)	the <u>impact(s) on the terrestrial habitat of SWSA</u> ; and	✓
(b)	the impacts of the proposed development <u>on the SWSA water quality and quantity</u> (e.g., describing potential increased runoff leading to increased sediment load in water courses),	✓
2.3.7.6	<b>FEPA sub catchments</b> , including-	✓
(a)	the <u>impacts of the proposed development on habitat condition and species</u> in the FEPA sub catchment;	✓
2.3.7.7	<b>indigenous forests</b> , including:	✓
(a)	impact on the <u>ecological integrity of the forest</u> and	✓
(b)	<u>percentage of natural or near natural indigenous forest area lost</u> and a <u>statement on the implications in relation to the remaining areas</u> .	✓

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
2.4	The findings of the assessment must be written up in a <b><u>Terrestrial Biodiversity Specialist Assessment Report</u></b>	✓
<b>3</b>	<b><u>Terrestrial Biodiversity Specialist Assessment Report</u></b>	
3.1	The <b>Terrestrial Biodiversity Specialist Assessment Report</b> must contain, as a minimum, the following information:	✓
3.1.1	<u>contact details of the specialist</u> , their SACNASP registration number, their field of expertise and a curriculum vitae;	✓
3.1.2	a <u>signed statement of independence</u> by the specialist;	✓
3.1.3	a <u>statement on the duration, date and season of the site inspection</u> and the relevance of the season to the outcome of the assessment,	✓
3.1.4	<u>description of the methodology used</u> to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	✓
3.1.5	a <u>description of the assumptions made</u> and any uncertainties or gaps in knowledge or data as well as a statement of the <u>timing and intensity of site inspection</u> observations;	✓
3.1.6	a <u>location of the areas not suitable for development</u> , which are to be avoided during construction and operation (where relevant);	✓
3.1.7	<u>additional environmental impacts</u> expected from the proposed development;	✓
3.1.8	any <u>direct, indirect and cumulative impacts</u> of the proposed development;	✓
3.1.9	the <u>degree to which impacts, and risks can be mitigated</u> ;	✓
3.1.10	the degree to which the <u>impacts and risks can be reversed</u> ;	✓
3.1.11	the degree to which the <u>impacts and risks can cause loss of irreplaceable resources</u> ;	✓
3.1.12	proposed <u>impact management actions</u> and <u>impact management outcomes</u> proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),	✓
3.1.13	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as <u>having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate</u> ,	✓
3.1.14	a substantiated statement based on the findings of the specialist assessment, <u>regarding the acceptability, or not, of the proposed development</u> if it should receive approval a not; and	✓
3.1.15	<u>any conditions to which this statement is subjected</u> .	✓
3.2	The findings of the <u>Terrestrial Biodiversity Specialist Assessment</u> must be incorporated into the <u>Basic Assessment Report</u> or the <u>Environmental Impact Assessment Report</u> , including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	✓
3.3	A <u>signed copy of the assessment</u> must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
	<b>LOW SENSITIVITY RATING – for terrestrial biodiversity features</b>	
<b>4</b>	<b><u>Terrestrial Biodiversity Compliance Statement</u></b>	✓
4.1	The compliance statement <u>must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences</u> .	✓
4.2	The compliance statement must:	✓
4.2.1	<u>be applicable to the preferred site</u> and proposed development footprint;	✓
4.2.2	<u>confirm that the site is of 'low' sensitivity</u> for terrestrial biodiversity; and	✓
4.2.3	indicate <u>whether or not the proposed development will have any impact on the biodiversity feature</u> .	✓
4.3	The <u>compliance statement</u> must contain, as a minimum, the following information:	✓

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
4.3.1	the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	✓
4.3.2	a <u>signed statement of independence</u> by the specialist;	✓
4.3.3	a <u>statement on the duration, date and season</u> of the site inspection and the relevance of the season to the outcome of the assessment;	✓
4.3.4	a <u>baseline profile description</u> of biodiversity and ecosystems of the site;	✓
4.3.5	the <u>methodology used to verify the sensitivities</u> of the terrestrial biodiversity features on the site, including equipment and modelling used, where relevant;	✓
4.3.6	in the case of a linear activity, <u>confirmation from the terrestrial biodiversity specialist</u> that, in their opinion, based on the mitigation and remedial measures propped, <u>the land can be returned to the current state within two years of completion of the construction phase</u> ;	✓
4.3.7	where required, <u>proposed impact management outcomes or any monitoring requirements</u> for inclusion in the EMPr;	✓
4.3.8	a <u>description of the assumptions made and any uncertainties or gaps in knowledge</u> or data; and	✓
4.3.9	any <u>conditions to which this statement is subjected</u> .	✓
4.4	A <u>signed copy of the compliance statement</u> must be appended to the <u>Basic Assessment Report</u> or Environmental Impact Assessment Report.	✓

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

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
<b>1</b>	<b><u>General Information</u></b>	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “ <i>very high</i> ” or “ <i>high</i> ” sensitivity for <u>terrestrial animal species</u> must submit a <b>Terrestrial Animal Species Specialist Assessment Report</b> .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “ <i>medium sensitivity</i> ” for <u>terrestrial animal species</u> must submit <b>either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement</b> , depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “ <i>low</i> ” sensitivity for <u>terrestrial animal species</u> must submit a <b>Terrestrial Animal Species Compliance Statement</b> .	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “ <i>very high</i> ” or “ <i>high</i> ”, for terrestrial animal species sensitivity and it is found to be of a “ <i>low</i> ” sensitivity, then a <b>Terrestrial Animal Species Compliance Statement</b> must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “ <i>low</i> ” terrestrial animal species sensitivity and it is found to be of a “ <i>very high</i> ” or “ <i>high</i> ” terrestrial animal species sensitivity, a <b>Terrestrial Animal Species Specialist Assessment</b> must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “ <i>very high</i> ” or “ <i>high</i> ” sensitivity, the assessment and reporting requirements prescribed for the “ <i>very high</i> ” or “ <i>high</i> ” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	✓
1.7	The <b>Terrestrial Animal Species Specialist Assessment</b> and the <b>Terrestrial Animal Species Compliance Statement</b> must be undertaken within the <i>study area</i> .	✓
1.8	Where the nature of the activity <b>is not</b> expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓



TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
1.9	Where the nature of the activity <b>is</b> expected to have an impact on SCC beyond the boundary of the preferred site, the <i>project areas of influence</i> (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> <sup>19</sup> , and the study area must include the PAOI, as determined.	✓
	<b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species</b>	
2	<b><u>Terrestrial Animal Species Specialist Assessment</u></b>	✓
	<b><u>VERY HIGH SENSITIVITY RATING</u></b> 4) Critical habitat for range-restricted species <sup>20</sup> of conservation concern, that have a global range of less than 10 km <sup>2</sup> . 5) SCC listed on the IUCN Red List of Threatened Species <sup>21</sup> or on South Africa's National Red List website <sup>22</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare. 6) Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. 7) The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. These areas are irreplaceable for SCC.  <b><u>HIGH SENSITIVITY RATING</u></b> 8) Confirmed habitat for SCC. 9) SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. These areas are unsuitable for development due to a very likely impact on SCC.	✓
2.1	The assessment must be undertaken by a <u>specialist registered with the South African Council for Natural Scientific Professionals (SACNASP)</u> with a field of practical experience relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	✓
2.2	The assessment must be undertaken in accordance with the <i>Species Environmental Assessment Guideline</i> <sup>23</sup> ; and must:	✓
2.2.1	<u>identify the SCC which were found, observed or are likely to occur</u> within the study area;	✓
2.2.2	<u>provide evidence</u> (photographs or sound recordings) of <u>each SCC found</u> or observed within the study area, which <b>must be disseminated by the specialist to a recognized online database facility</b> <sup>24</sup> , immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓
2.2.3	<u>identify the distribution, location, viability</u> <sup>25</sup> and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.2.4	<u>identify the nature and the extent of the potential impact of the proposed development on the population</u> of the SCC located within the study area;	✓
2.2.5	determine the <u>importance of the conservation of the population of the SCC</u> identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	✓
2.2.6	determine the <u>potential impact of the proposed development on the habitat</u> of the SCC located within the study area;	✓
2.2.7	include a <u>review of relevant literature on the population size of the SCC, the conservation interventions</u> as well as any <u>national or provincial species management plans for the SCC</u> . This review must provide information on the need to conserve the SCC and <u>indicate whether the development is compliant with the applicable species management plans</u> and if not, include a motivation for the deviation;	✓
2.2.8	<u>identify any dynamic ecological processes occurring within the broader landscape</u> that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓

<sup>19</sup> Available at <https://bgis.sanbi.org/>

<sup>20</sup> Species with a geographically restricted area of distribution.

<sup>21</sup> <https://www.iucnredlist.org/>

<sup>22</sup> This category includes the categories Extremely Rare, Critically Rare and Rare

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

<sup>24</sup> The preferred platform is iNaturalist.org but any other national or international virtual museum.

<sup>25</sup> the ability to survive and reproduce in the long term.

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
2.2.9	identify any <u>potential impact of ecological connectivity in relation to the broader landscape</u> , resulting in impacts on the identified SCC and its long-term viability;	✓
2.2.10	determine <u>buffer distances</u> as per the <i>Species Environmental Assessment Guidelines</i> used for the population of each SCC;	✓
2.2.11	discuss the <u>presence or likelihood of additional SCC</u> including threatened species not identified by the screening tool, <i>Data Deficient</i> or <i>Near Threatened Species</i> , as well as any undescribed species <sup>26</sup> ; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and	✓
2.2.12	identify any <u>alternative development footprints</u> within the preferred site which would be of “ <i>low</i> ” or “ <i>medium</i> ” sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.3	The findings of the assessment must be written up in a <b>Terrestrial Animal Species Specialist Assessment Report</b> .	✓
3	<b>Terrestrial Animal Species Specialist Assessment Report</b>	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	<u>contact details and relevant experience</u> as well as the <u>SACNASP registration number</u> of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed <u>statement of independence</u> by the specialist;	✓
3.1.3	a statement on the <u>duration, date and season of the site inspection</u> and the relevance of the season to the outcome of the assessment;	✓
3.1.4	a description of the <u>methodology used to undertake the site sensitivity verification, impact assessment and site inspection</u> , including equipment and modelling used where relevant;	✓
3.1.5	a description of the <u>mean density of observations/number of sample sites per unit area</u> <sup>27</sup> and the site inspection observations;	✓
3.1.6	a description of the <u>assumptions made and any uncertainties or gaps</u> in knowledge or data;	✓
3.1.7	<u>details of all SCC found or suspected to occur on site</u> , ensuring sensitive species are appropriately reported <sup>28</sup> ;	✓
3.1.8	the <u>online database name, hyperlink and record accession numbers</u> for disseminated evidence of SCC found within the study area;	✓
3.1.9	the <u>location of areas not suitable for development</u> and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the <u>cumulative impacts</u> ;	✓
3.1.11	<u>impact management actions and impact management outcomes</u> proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a <u>reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development</u> and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	✓
3.1.13	a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “ <i>low</i> ” or “ <i>medium</i> ” terrestrial animal species sensitivity and were not considered appropriate.	✓
3.2	A <u>signed copy of the assessment</u> must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
4	<b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>	
	<b>MEDIUM SENSITIVITY RATING – for terrestrial animal species:</b> <u>Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species</u> <sup>29</sup> . SCC <u>listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website</u> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents <u>suspected habitat for SCC</u> based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓

26 Undescribed species are to be assessed as “High Sensitivity”.

27 Species Environmental Assessment Guideline

28 The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

29 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the <i>Species Environmental Assessment Guidelines</i> .	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as “medium” sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a <b>Terrestrial Animal Species Specialist Assessment</b> must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a <b>Terrestrial Animal Species Compliance Statement</b> must be submitted.	✓
5	<b>LOW SENSITIVITY RATING – for terrestrial animal species</b>	
	<b>Terrestrial Animal Species Compliance Statement</b>	✓
	10) Areas where no natural habitat remains.	
	11) Natural areas where there is no suspected occurrence of SCC.	
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of “low” sensitivity for terrestrial animal species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement <sup>30</sup> must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	the mean density of observations/ number of samples sites per unit area <sup>15</sup> .	✓
5.3.6	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.7	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the <b>Terrestrial Animal Species Compliance Statement</b> must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

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

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

<sup>30</sup> An example of what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
	<b>Terrestrial Plant Species Compliance Statement</b> , depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “ <i>low</i> ” sensitivity for <u>terrestrial plant species</u> must submit a <b>Terrestrial Plant Species Compliance Statement</b> .	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “ <i>very high</i> ” or “ <i>high</i> ”, for terrestrial plant species sensitivity and it is found to be of a “ <i>low</i> ” sensitivity, then a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “ <i>low</i> ” terrestrial plant species sensitivity and it is found to be of a “ <i>very high</i> ” or “ <i>high</i> ” terrestrial plant species sensitivity, a <b>Terrestrial Plant Species Specialist Assessment</b> must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “ <i>very high</i> ” or “ <i>high</i> ” sensitivity, the assessment and reporting requirements prescribed for the “ <i>very high</i> ” or “ <i>high</i> ” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	✓
1.7	The <b>Terrestrial Plant Species Specialist Assessment</b> and the <b>Terrestrial Plant Species Compliance Statement</b> must be undertaken within the <i>study area</i> .	✓
1.8	Where the nature of the activity <b>is not</b> expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity <b>is</b> expected to have an impact on SCC beyond the boundary of the preferred site, the <i>project areas of influence</i> (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> <sup>31</sup> , and the study area must include the PAOI, as determined.	✓
	<b>VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species</b>	
<b>2</b>	<b>Terrestrial Plant Species Specialist Assessment</b>	✓
	<u>VERY HIGH SENSITIVITY RATING</u> 12) Critical habitat for range-restricted species <sup>32</sup> of conservation concern, that have a global range of less than 10 km <sup>2</sup> . 13) SCC listed on the IUCN Red List of Threatened Species <sup>33</sup> or on South Africa’s National Red List website <sup>34</sup> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare. 14) Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. 15) The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. These areas are irreplaceable for SCC.  <u>HIGH SENSITIVITY RATING</u> 16) Confirmed habitat for SCC. 17) SCC, listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. These areas are unsuitable for development due to a very likely impact on SCC.	✓
2.1	The assessment must be undertaken by a <u>specialist registered with the South African Council for Natural Scientific Professionals (SACNASP)</u> with a field of practical experience relevant to the taxonomic group (“ <i>taxa</i> ”) for which the assessment is being undertaken.	✓
2.2	The assessment must be undertaken within the study area.	✓

<sup>31</sup> Available at <https://bgis.sanbi.org/>

<sup>32</sup> Species with a geographically restricted area of distribution.

<sup>33</sup> <https://www.iucnredlist.org/>

<sup>34</sup> This category includes the categories Extremely Rare, Critically Rare and Rare

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
2.3	The assessment must be undertaken in accordance with the <i>Species Environmental Assessment Guideline</i> <sup>35</sup> ; and must:	✓
2.3.1	<u>Identify the SCC which were found, observed or are likely to occur</u> within the study area;	✓
2.3.2	<u>provide evidence</u> (photographs) of <u>each SCC found or observed</u> within the study area, which <b>must be disseminated by the specialist to a recognized online database facility</b> <sup>36</sup> , immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	✓
2.3.3	identify the <u>distribution, location, viability</u> <sup>37</sup> and provide a detailed description of population size of the SCC, identified within the study area;	✓
2.3.4	identify the <u>nature and the extent of the potential impact of the proposed development on the population</u> of the SCC located within the study area;	✓
2.3.5	determine the <u>importance of the conservation of the population of the SCC</u> identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	✓
2.3.6	determine the <u>potential impact of the proposed development on the habitat</u> of the SCC located within the study area;	✓
2.3.7	include a <u>review of relevant literature on the population size of the SCC, the conservation interventions</u> as well as any <u>national or provincial species management plans for the SCC</u> . This review must provide information on the need to conserve the SCC and <u>indicate whether the development is compliant with the applicable species management plans</u> and if not, include a motivation for the deviation;	✓
2.3.8	identify <u>any dynamic ecological processes occurring within the broader landscape</u> that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	✓
2.3.9	identify any <u>potential impact of ecological connectivity in relation to the broader landscape</u> , resulting in impacts on the identified SCC and its long-term viability;	✓
2.3.10	determine <u>buffer distances</u> as per the <i>Species Environmental Assessment Guidelines</i> used for the population of each SCC;	✓
2.3.11	discuss the <u>presence or likelihood of additional SCC</u> including threatened species not identified by the screening tool, <i>Data Deficient or Near Threatened Species</i> , as well as any undescribed species <sup>38</sup> ;	✓
2.3.12	identify any <u>alternative development footprints</u> within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.4	The findings of the assessment must be written up in a <b>Terrestrial Plant Species Specialist Assessment Report</b> .	✓
3	<b>Terrestrial Plant Species Specialist Assessment Report</b>	✓
3.1	This report must include as a minimum the following information:	✓
3.1.1	<u>contact details and relevant experience</u> as well as the <u>SACNASP registration number</u> of the specialist preparing the assessment including a curriculum vitae;	✓
3.1.2	a signed <u>statement of independence</u> by the specialist;	✓
3.1.3	a statement on the <u>duration, date and season of the site inspection</u> and the relevance of the season to the outcome of the assessment;	✓
3.1.4	a description of the <u>methodology used to undertake the site sensitivity verification</u> , impact assessment and site inspection, including equipment and modelling used where relevant;	✓
3.1.5	a description of the <u>assumptions made and any uncertainties or gaps</u> in knowledge or data;	✓
3.1.6	a description of the <u>mean density of observations/number of sample sites per unit area</u> <sup>39</sup> and the site inspection observations;	✓
3.1.7	<u>details of all SCC found or suspected to occur on site</u> , ensuring sensitive species <sup>40</sup> are appropriately reported;	✓

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

<sup>36</sup> The preferred platform is iNaturalist.org but any other national or international virtual museum.

<sup>37</sup> the ability to survive and reproduce in the long term.

<sup>38</sup> Undescribed species are to be assessed as "High Sensitivity".

<sup>39</sup> Species Environmental Assessment Guideline

<sup>40</sup> The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
3.1.8	the <u>online database name, hyperlink and record accession numbers</u> for disseminated evidence of SCC found within the study area;	✓
3.1.9	the <u>location of areas not suitable for development</u> and to be avoided during construction where relevant;	✓
3.1.10	a discussion on the <u>cumulative impacts</u> ;	✓
3.1.11	<u>impact management actions and impact management outcomes</u> proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	✓
3.1.12	a <u>reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development</u> and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	✓
3.1.13	a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.	✓
3.2	A <u>signed copy of the assessment</u> must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓
<b>4</b>	<b>MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION</b>	
	<b>MEDIUM SENSITIVITY RATING – for terrestrial plant species:</b> <u>Suspected habitat for SCC</u> based either on there being records for this species collected in the past, prior to 2002, or <u>being a natural area included in a habitat suitability model</u> <sup>41</sup> . SCC <u>listed on the IUCN Red List of Threatened Species or South Africa’s National Red List website</u> as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents <u>suspected habitat for SCC</u> based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be <u>investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups</u> (“taxa”) for which the assessment is being undertaken.	✓
4.3	The assessment must be <u>undertaken within the study area</u> .	✓
4.4	The <u>site inspection</u> to determine the presence or likely presence of SCC must be undertaken in accordance with the <i>Species Environmental Assessment Guidelines</i> .	✓
4.5	The <u>site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as “medium” sensitivity by the screening tool</u> .	✓
4.6	Where SCC <u>are found on site or have been confirmed</u> to be likely present, a <b>Terrestrial Plant Species Specialist Assessment</b> must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where <u>no SCC are found on site during the site inspection</u> or the presence is confirmed to be unlikely, a <b>Terrestrial Plant Species Compliance Statement</b> must be submitted.	✓
<b>5</b>	<b>LOW SENSITIVITY RATING – for terrestrial plant species</b>	
	<b>Terrestrial Plant Species Compliance Statement</b> 18) Areas where no natural habitat remains. 19) Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement <u>must be prepared by a SACNASP registered specialist</u> under one of the two fields of practice (Botanical Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be <u>applicable to the study area</u> ;	✓
5.2.2	<u>confirm that the study area, is of “low” sensitivity</u> for terrestrial plant species; and	✓
5.2.3	indicate <u>whether or not the proposed development will have any impact</u> on SCC.	✓
5.3	The compliance statement <sup>42</sup> must contain, as a minimum, the following information:	✓
5.3.1	<u>contact details and relevant experience as well as the SACNASP registration number</u> of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed <u>statement of independence</u> by the specialist;	✓
5.3.3	a statement on the <u>duration, date and season</u> of the site inspection and the relevance of the season to the outcome of the assessment;	✓

41 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

42 An example of what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline.

TABLE	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT
5.3.4	a description of the <u>methodology</u> used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	where required, <u>proposed impact management actions</u> and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.6	a <u>description of the assumptions made and any uncertainties or gaps</u> in knowledge or data;	✓
5.3.7	the mean <u>density of observations/ number of samples</u> sites per unit area <sup>43</sup> ; and	✓
5.3.8	any <u>conditions</u> to which the compliance statement is subjected.	✓
6	A <u>signed copy</u> of the <b>Terrestrial Plant Species Compliance Statement</b> must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

<sup>43</sup> Refer to the Species Environmental Assessment Guideline.



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- EIB/EBRD Performance Requirements Assurance
- World Bank Environmental & Social Safeguards Assurance

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## 22.1 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 intuitions 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.

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.

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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 N#: 400102/95)**
  - **Professional Environmental Scientist**
  - **Professional Ecologist**
- 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

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