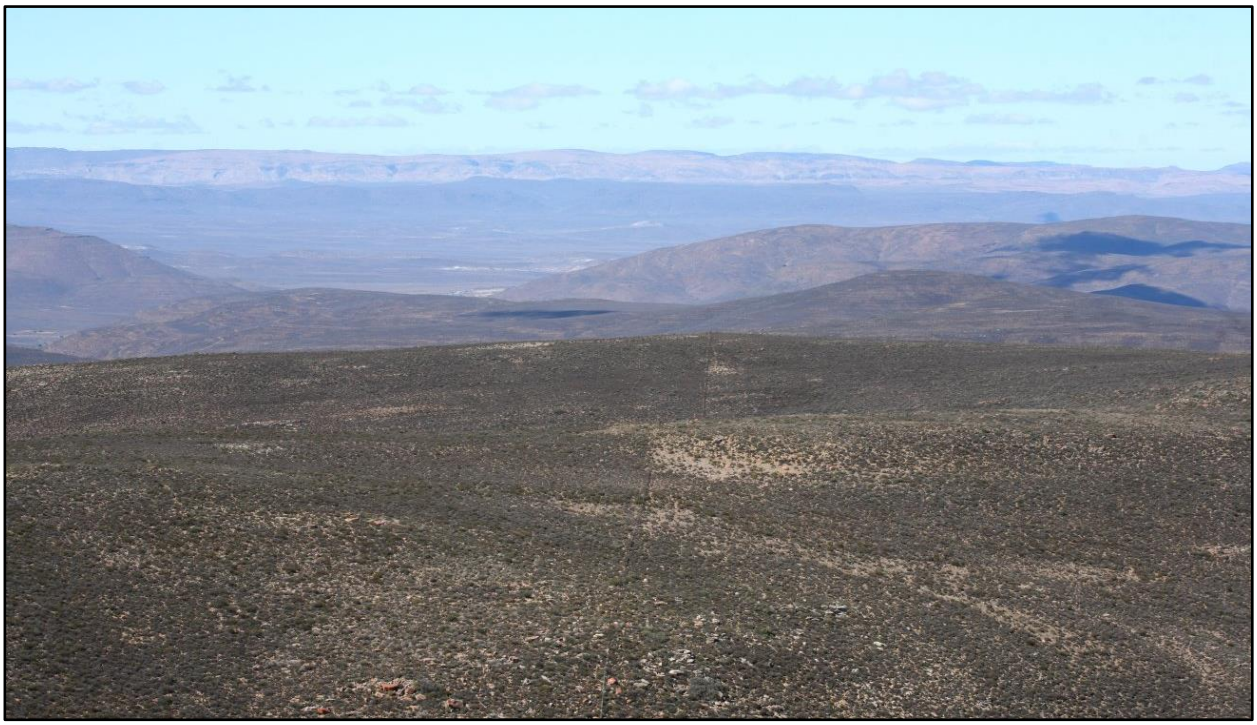
BASIC ASSESSMENT FOR THE PROPOSED 132KV OVERHEAD DISTRIBUTION LINE AND SUBSTATION FOR THE RIETKLOOF WIND ENERGY FACILITY

FAUNA & FLORA SPECIALIST BASIC ASSESSMENT REPORT



PRODUCED FOR EOH COASTAL AND ENVIRONMENTAL SERVICES

ON BEHALF OF RIETKLOOF WIND FARM (PTY) LTD

BY

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1 INTRODUCTION

Rietkloof Wind Farm (Pty) Ltd, a subsidiary of G7 Renewable Energies (Pty) Ltd, is proposing to develop a 140MW wind energy facility (WEF) between Matjiesfontein and Sutherland in the Western Cape Province, South Africa. The Rietkloof wind energy facility will comprise approximately 70 turbines, covering several properties within the Laingsburg Local Municipality, Western Cape.

In order to connect the Rietkloof wind farm to the Eskom grid, several options of 132kV power lines connecting the Rietkloof on-site substation to the national Grid at the Komsberg Main Transmission Substation (either directly to Bon Espirange Substation, directly to Komsberg Substation or via a shared central hub substation to be shared by Brandvalley and Rietkloof WEFs) have been proposed. Following completion of construction and commissioning, this infrastructure will be transferred to Eskom for ownership and operation. EOH Coastal and Environmental Services (EOH CES) have been appointed to carry out the environmental process for the development as required in terms of the EIA regulations. Simon Todd Consulting has been contracted by EOH CES to provide a terrestrial ecological (fauna and flora) impact assessment for the required Basic Assessment (BA) process for the proposed 132kV powerline and onsite substation.

As part of the BA process, this ecological specialist study details the ecological characteristics of the affected area and provides an assessment of the likely ecological impacts associated with the development of the power line and onsite substations. Various alternatives are considered and associated impacts are assessed for the preconstruction, construction, operation, and decommissioning phases of the development. A variety of avoidance and mitigation measures associated with each identified impact are recommended to reduce the likely negative impacts of the development, which should be included in the Environmental Management Programme (EMPr) for the development. The full scope of study is detailed below.

2 STUDY APPROACH

2.1 SCOPE OF STUDY

The scope of the study includes the following activities:

- a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project;
- a description and evaluation of environmental issues and potential impacts (including details of direct, indirect and cumulative impacts) that have been identified;
- a statement regarding the potential significance of the identified issues based on the

evaluation of the issues/impacts;

- an indication of the methodology used in determining the significance of potential environmental impacts;
- an assessment of the significance of direct indirect and cumulative impacts of the development.
- a description and comparative assessment of all alternatives including cumulative impacts;
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr);
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- a description of any assumptions uncertainties and gaps in knowledge, and
- an environmental impact statement which contains:
    - a summary of the key findings of the environmental impact assessment;
    - an assessment of the positive and negative implications of the proposed activity;
    - a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations:

- Disclose any gaps in information or assumptions made.
- Identify recommendations for mitigation measures to minimise impacts.
- Outline additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Programme (EMPr) for faunal or flora related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided which will be separated into the following project phases:

- Preconstruction
- Construction
- Operational Phase
- Rehabilitation Phase

2.2 Assessment Approach & Philosophy

The assessment has been conducted according to the EIA Regulations, published by the Department of Environmental Affairs (2014) as well as within the best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers *et al.* (2005).

This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e. Critical Biodiversity Areas (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas, where applicable.

- Demonstrate how the proponent intends complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA), which, amongst other things, indicates that environmental management should, in order of priority aim to:

    - Avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
    - Avoid degradation of the environment;
    - Avoid jeopardising ecosystem integrity;
    - Pursue the best practicable environmental option by means of integrated environmental management;
    - Protect the environment as the people's common heritage;
    - Control and minimise environmental damage; and
    - Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show (through the BAR process) how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

To adhere to the above principles and best-practice guidelines, the following approach forms the basis for the study approach and assessment philosophy:
The study includes data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing:

- A description of the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following have been identified or described:

Community and ecosystem level

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, fine-scale systematic conservation plans, etc*).

Species level

- Red Data Book species (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Fauna

- Describe and assess the terrestrial fauna present in the area that will be affected by the proposed development.
- Conduct a faunal assessment that can be integrated into the ecological study.
- Describe the existing impacts of current land use as they affect the fauna.
- Clarify species of special concern (SSC) and that are known to be:
    - endemic to the region;
    - that are considered to be of conservational concern;
    - that are in commercial trade (CITES listed species);
    - or, are of cultural significance.
- Provide monitoring requirements as input into the Environmental Management Plan (EMP) for faunal related issues.

Other pattern issues

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following have been identified or described:

- The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
- Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Furthermore, any further studies that may be required during or after the BAR process will be outlined.
- All relevant legislation, permits and standards that would apply to the development will be identified.
- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

2.3 PROJECT DESCRIPTION

The proposed Rietkloof WEF powerline infrastructure will include a number of potential 33/132kV onsite substation location(s), as described below. Part of the footprint of these 33/132kV substation(s) was assessed in the WEF EIA (see Rietkloof WEF EIA Fauna and Flora Specialist Report, April 2016) and will also be assessed in this report’s assessment of the electrical infrastructure. This is because the applicant will remain in control of the low voltage components of the 33/132kV substation (including isolators, control room, cabling, transformers etc.), while the high voltage components of this substation (assessed in this BA) will likely be ceded to Eskom.

The proposed development will include the following basic activities and components:
Various alternatives are being considered to 1) step up the voltage from 33 kV to 132 KV (on-site 33/132 kV sub-stations); 2) to distribute the 132 kV electricity to the national grid (overhead distribution line); and 3) various grid line options.
The electrical distribution infrastructure related to this Basic Assessment process is:

- High voltage components of the 33/132kV onsite substation including transformers, isolators, cabling, light mast and other as required by Eskom. The onsite substation would have a footprint of up to 200m x 200m that would also house site offices, storage areas, ablution facilities and the maintenance building.
- 132kV above-ground distribution line to connect the onsite 33/132kV substation to the grid. The pylons for this line will have an average spacing of 250m to 300m.
- Connection to the national grid. There are three options being considered and the

preferred option will be informed by environmental, technical considerations and Eskom's preference:

- Limited upgrades to the existing 400kV Komsberg substation with several electrical components to be defined by Eskom (e.g. additional feeder bay, transformer bay) on the existing substation property.
- The Bon Espirange satellite 132kV substation. The Bon Espirange satellite substation will be established by Eskom and other IPPs as an alternative to connecting all wind farms west of Komsberg directly to the Eskom Komsberg Substation.
- Construction of a central switching station (up to 200m x 200m) to be shared by both Rietkloof and Brandvalley if both are awarded preferred bidders. If the central hub or switching station option is ultimately selected by Eskom, each project will build their own 33/132kV substation and connect to the central station. From there one 132kV line for both projects will lead to either the Komsberg or Bon Espirange substation.

Each of these distribution line alternatives will be buffered by 100 m (i.e. 200m in total) in order to allow for micro-siting of the service road and pylons.
Although several alternatives are considered, only one of the seven alternative 33/132 kV on-site sub-station and one 132 kV overhead line will be built to connect to the preferred grid connection option.

3 METHODOLOGY

3.1 DATA SOURCING AND REVIEW

Data sources from the literature consulted and used where necessary in the study includes the following:

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Critical Biodiversity Areas for the site and surroundings were extracted from the *Namakwa District Biodiversity Sector Plan* (Desmet & Marsh 2008) as well as the *Biodiversity Assessment of the Central Karoo District Municipality* and the *Winelands District Municipality* (Skowno et al. 2009).
- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) 3320CD, 3320DC, 3320AB, 3320BA was extracted from the SABIF/SIBIS database hosted by SANBI. This is a considerably larger area than the study area, but

this is necessary to ensure a conservative approach as well as counter the fact that the site itself has probably not been well sampled in the past.

- The IUCN conservation status (Figure 1) of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2013).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011). This includes rivers, wetlands and catchments defined under the study.
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).

Fauna:

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and the ADU databases http://vmus.adu.org.za.
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.
- The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria 2015 (See Figure 1) and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed conservation status alone. To address this shortcoming, the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

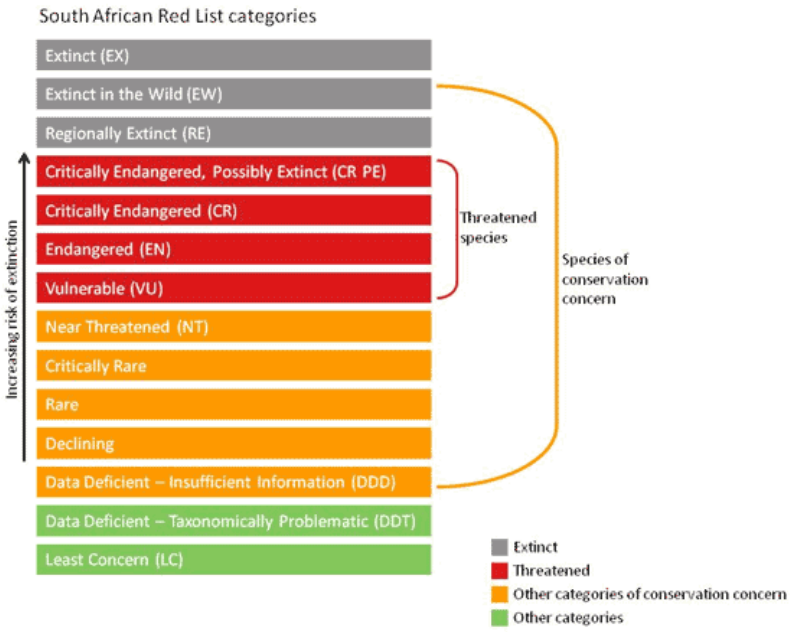


Figure 1. Schematic representation of the South African Red List categories. Taken from http://redlist.sanbi.org/redcat.php

3.2 SITE VISIT

A site visit to the study area was conducted between 19 and 22 February 2016. During the site visit, the different biodiversity features, habitat, and landscape units present at the site were investigated in the field and all plant and animal species observed were recorded. Specific attention was paid to the areas affected by the power lines and features in close proximity to the development footprint that might be impacted by the development. Active searches for reptiles and amphibians were also conducted within habitats likely to harbour or be important for such species. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments such as rocky outcrops or quartz patches were noted in the field if present and recorded on a GPS and mapped onto satellite imagery of the site.

Apart from the current site visit, the area has also been visited in the past at different times of the year for a variety of other assessments. This includes the site in 2010, as well as numerous field surveys of the adjacent authorized Roggeveld and Karreebosch WEFs between 2012 and 2015, as well as several grid connection alternatives from these same facilities to the Komsberg substation. This information is used to inform the current study as appropriate.

3.3 SENSITIVITY MAPPING & ASSESSMENT

An ecological sensitivity map of the site was produced by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases. This includes delineating the different habitat units identified in the

field and assigning sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern.

The purpose of this map is to provide a guide to development at the site and ensure that areas that are intrinsically sensitive or vulnerable to disturbance could be accommodated at the planning stage within the layout as much as possible.

The ecological sensitivity of the different units identified in the mapping procedure for the broad-scale sensitivity map was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is usually undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are generally deemed no-go areas from a developmental perspective and should be avoided. However, in case of linear features such as drainage lines, it may be necessary for access roads and other infrastructure to traverse such features. Excessive disturbance or impact to such areas may be considered to constitute a fatal flaw of the development and as such should be avoided as much as possible.
- In some situations, areas were also classified between the above categories, such as Medium-High, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately between two sensitivity categories.

3.4 LIMITATIONS & ASSUMPTIONS

The site visit took place during the summer dry season, which places some limitations on the study as the site falls within the winter rainfall region and the majority of species of concern are not active in the summer. Although the older site visits and the information gathered from the

adjacent wind energy facilities reduces the uncertainty associated with the current site visit, it is not possible to confirm the presence or absence of many of the listed species known from the area within the development footprint. As a result the sensitivity assessed is based largely on the habitat present and the dominant perennial shrub species observed and the known association with species of concern. Where development has been planned within the areas identified here as high sensitivity, there should be a pre-construction walk-through vegetation survey within these areas to identify any species of concern within the development footprint, so that suitable avoidance and fine-scale adjustment of the final routing and pylon footprints can be made. However, it is important to note that the ecological patterns at the site were clear and well known by the consultant and this provides an adequate basis on which to assess the likely impacts of the development on the ecological features of the site.

The lists of amphibians, reptiles and mammals for the site are based on those observed at the site and on the adjacent sites as well as those likely to occur in the area based on their distribution and habitat preferences. Several site visits have been conducted during various seasons to the area and information on fauna observed in the area is included where relevant. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Figure 2), the vast majority of the power line routes are within the Central Mountain Shale Renosterveld vegetation, while only a small area around the Komsberg substation and in the far south of the study area fall within the Koedoesberge-Moordenaars Karoo vegetation type. In the south, one of the on-site substation options (Option 7) is within the Tanqua Wash Riviere vegetation type.

Central Mountain Shale Renosterveld occurs in the Western and Northern Cape on the southern and southeastern slopes of the Klein Roggeveldberge and Komsberg below the Komsberg section of the Great Escarpment as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area. It is associated with clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones with land types mostly Ib and Fc. Although this vegetation type is classified as Least Threatened, it has a very limited extent of 1236km^2 and is not formally conserved anywhere. Levels of transformation are however low and it is considered to be 99% intact. Although no endemic species are known to occur within this vegetation type, little is known about this Renosterveld type and it has been poorly sampled. Experience from this and other projects in the area indicate that this should be considered to be a relatively sensitive vegetation type with a relatively high abundance of species of conservation

concern and in context of the site should in fact be considered to have a higher sensitivity than those areas of Koedoesberge-Moordenaars Karoo. The Komsberg area is also a recognized centre of plant diversity and endemism and the majority of this diversity is associated with the high elevation areas of Central Mountain Shale Renosterveld (Clark *et al.* 2011).

Within the site, 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 *Merxmeullera stricta* and succulents such as *Tylecodon wallachii* and *Crassula tetragona* subsp. *connivens*. There is a clear change in the vegetation discernable above 1350m, where the cooler and wetter conditions results 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*. Although it was dry at the time of the site visit, indications are that the abundance of geophytes and other species of potential concern are significantly higher within this habitat than on the lower-lying areas.

Although the Tanqua Wash Riviere vegetation type has been mapped only along the Groot River in the far south of the site, it is also associated with the other major drainage lines of the study area. This vegetation unit is associated with the Alluvia of the Tanqua and Doring Rivers and sheet-wash plains of their less important tributaries embedded largely within the Tanqua Karoo vegetation unit. It consists of a mosaic of shrublands with *Salsola* and *Lycium* alternating with *Acacia karoo* gallery thickets. It is classified as Least Threatened and is considered moderately-well conserved as 13% of the target 19% falls within the Tanqua National Park and other nature reserves. It has not been heavily impacted by transformation and more than 95% is still intact. At a broad level, this is considered to be sensitive vegetation type as it is vulnerable to disturbance and being associated with drainage lines is ecologically important for a variety of ecological services and processes. In addition, the Riverine Rabbit *Bunolagus monticularis* which is listed as Critically Endangered is known to occur within this vegetation unit in the broad area and may occur along the southern margin of the site associated with this vegetation unit, but has not been recorded from this area and so this considered unlikely.

The smaller drainage lines in the higher lying parts of the site are considered distinctive from the Tanqua Wash Riviere, which is associated with low-lying areas of the Tanqua and Western Karoo and is usually characterised by broad silty floodplains due to the low slope. Although many of the drainage lines of the site in the higher lying areas are small and not well developed, some of the larger drainage lines have well developed associated wetlands with extensive reed beds and in the lower reaches, where the rivers become more confined, there is usually a well-

developed woody component. Dominant and common species include *Pseudoschoenus inanis, Athanasia minuta subsp. inermis, Felicia filifolia, Lycium cinereum, Euryops imbricatus, Dicerothamnus rhinocerotis, Phragmites australis, Conyza scabrida, Mentha longifolia* subsp. *capensis, Artemisia afra* and trees such as a *Searsia lancea, Salix mucronata* and *Acacia karoo*. Some significant populations of *Brunsvigia josephinae* (VU) were observed in the wetlands at the site in close proximity to the existing access roads and if the development goes ahead then specific attention would need to be paid to avoiding the plants near to powerline infrastructure as well as ensuring their long-term protection from harvesting.

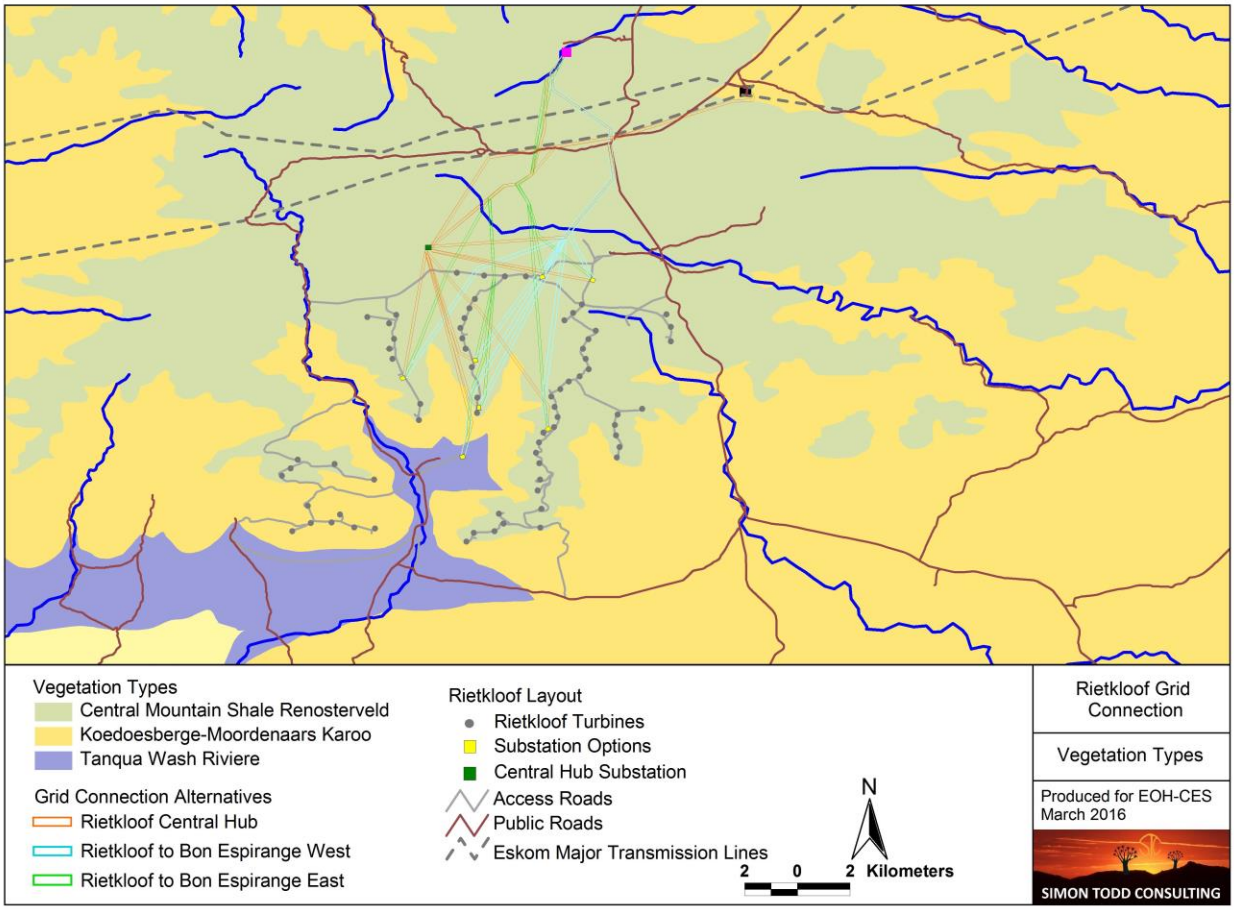


Figure 2. Vegetation map (Mucina and Rutherford 2006) of the Rietkloof Wind Farm electrical infrastructure footprint, with major drainage lines derived from NFEPA in blue. The majority of the affected area falls within the Central Mountain Shale Renosterveld with marginal impact on Koedoesberg-Moordenaars Karoo near the Komsberg substation and in the far south of the project area. Bon Espirange substation is indicated north of the site in purple and Komsberg along the main transmission lines north east of the site at the black square.

According to Mucina and Rutherford (2006) the Koedoesberge-Moordenaars Karoo vegetation type has an extent of 4714km^2. This unit occurs in the Western and Northern Cape on the Koedesberge and Pienaar se Berg low mountain ranges bordering on the southern Tanqua

Karoo and separated by the Klein Roggeveld Mountains from the Moordenaars Karoo in the broad area of Laingsburg and Merweville. Koedoesberge-Moordenaars Karoo is associated with slightly undulating to hilly landscape covered by low succulent scrub with scattered tall shrubs. It occurs on mudstones, shale and sandstone of various origins including Adelaide Subgroup, Ecca Group and Dwyka Group diamictites, which give rise to shallow skeletal soils. Land types are mainly Fc and lesser extents of lb. This vegetation type is classified as Least Threatened and has not been significantly impacted by transformation. Conservation status is however poor and of the target of 19% only a very small proportion is conserved within the Gamkapoort Nature Reserve (<1%). At least 14 endemic species are known from this vegetation type, which is a high number considering that this vegetation unit occupies less than 5000km^2. In addition, the majority of listed species known from the broader area are associated with this vegetation type. It is however very poorly known and little research has been conducted within this unit. The impact on this unit would however be minimal and it occurs only in the immediate vicinity of the Komsberg substation (indicated as a black square in Figure 2).

4.2 SITE DESCRIPTION

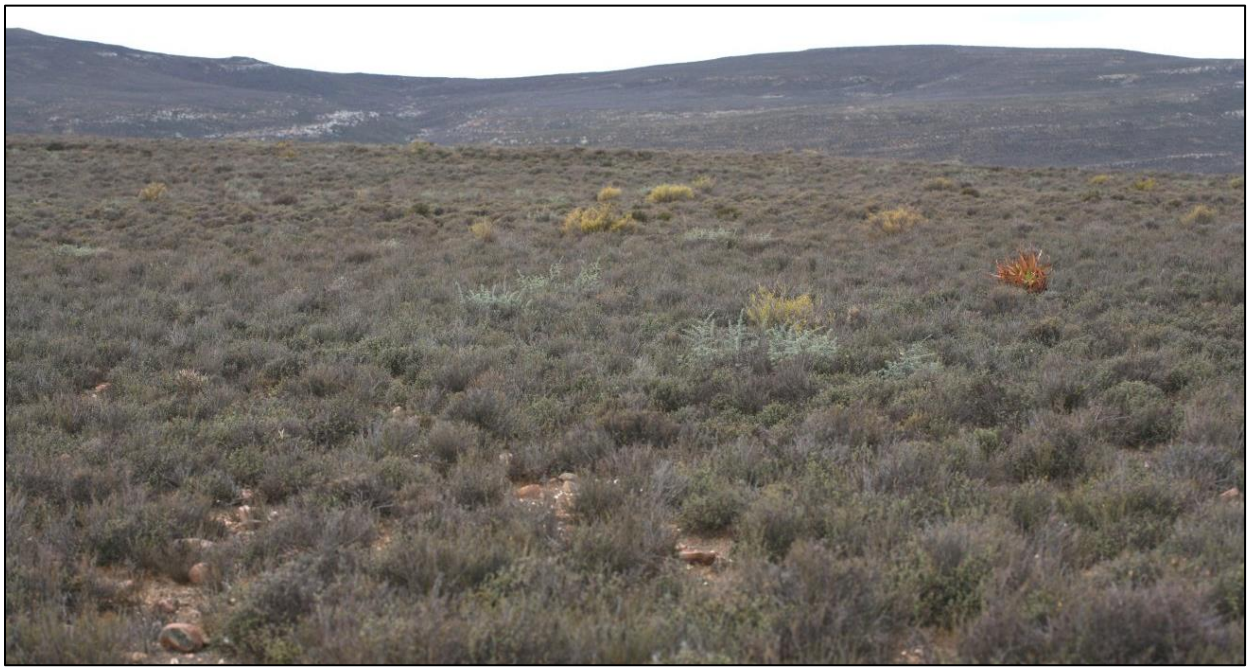
In this section, various typical and important features and sections of the different parts of the site and power line corridor alternatives are illustrated and described in detail to provide context for the assessment.

Approach to the Komsberg substation, showing low renosterveld and karroid scrub of the Koedoesberge-Moordenaars Karoo vegetation type. The lower-lying areas generally have a

lower abundance of species of conservation concern than the higher lying ground. This area would be affected by the two options from the central hub to Komsberg substation.

Looking back along the power line corridors from the site of the Bon Espirange substation area. The vegetation on the plains is dense renosterbos, *Elytropappus rhinocerotis* and in this site it also indicative of past disturbance and much of affected area around the substation has been ploughed in the past.

Central part of the site, near the site of the Rietkloof central hub substation. The existing 400kV line is visible traversing the plain in the distance. This vegetation is considered consistent with the Central Mountain Shale Renosterveld vegetation type of Mucina & Rutherford (2006).



Although the vegetation in the south of the site is classified as Central Mountain Shale Renosterveld, it is a lot more Karroid in nature than the higher lying areas to the north and contains fewer species of conservation concern. This is the typical vegetation within substation options 3, 7 and 4, and to a lesser extent 5 and 6, which are on slightly higher lying ground.

The eastern margin of the site, showing the area near to Fortuin that would affected by substations options 1 and 2.

Typical drainage line in the south of the site, with well developed *Acacia karoo* and *Searsia lancea* in the channel with occasional *Salix mucronata* and patches of *Phragmites australis*.

4.3 ALIEN PLANT SPECIES

The majority of the site is currently free or has low abundance of alien species. There are however disturbed areas around farmsteads, old croplands and livestock watering points which harbor a variety of alien species. Mesquite, *Prosopis* spp. is common at most farmsteads and is a potential problem especially in lowlands habitats around the site and is a potentially significant invader as it can alter hydrological function under dense invasion. Other common invasive and indigenous weedy species observed at the site include *Bromus* spp., *Lolium* spp. *Avena fatua*, *Salsola kali*, *Dittrichia graveolens*, *Amsinckia retrorsa* and *Conyza bonariensis*.

4.4 LISTED & PROTECTED PLANT SPECIES

According to the SANBI SIBIS database, nearly 681 indigenous species have been recorded from the four quarter degree squares around the site. This includes 61 threatened species and an additional 101 species of lower conservation concern (Appendix 1). Although this is a considerably larger area than the study area and includes a wide variety of habitats, many of which are not found within the study area, this is an exceptionally high number for a semi-arid environment. This serves to illustrate the high species richness of the area and high potential impact of the development on plant species of conservation concern.

The only species of conservation concern that were observed at the site were *Brunsvigia josephinae* (VU), *Eriocephalus grandiflorus* (Rare) and *Ehrharta eburnea* (NT), but it is certain that there are a number of additional species present as well. Species of concern are likely to be concentrated along the alluvial soils of the drainage lines and on the high-lying ridges of the site above 1350m.

Apart from the red data listed species, there are many provincially protected species present at the site. Within the Western Cape these are listed within the the *Western Cape Nature Conservation Laws Amendment Act* of 2000. Of particular relevance are the following, which highlights some of the plant genera and families commonly encountered at the site, but is not intended to be a comprehensive list.

Schedule 4 Protected Flora:

- *Amaryllidaceae* – All species
- *Lachenalia* – All Species
- *Iridaceae* – All Species
- *Mesembryanthemaceae* – All species

Within the Northern Cape, the situation is similar and under Northern Cape Nature Conservation Act of 2009 the following families and genera are protected.

Schedule 1: Specially Protected Flora

- Family GERANIACEAE - Pelargonium spp. all species

Schedule 2 Protected Flora

- *Amaryllidaceae* – All species
- *Apiaceae* – All Species
- *Apocynaceae* – All Species
- *Asphodelaceae* – All species except Aloe ferox
- *Iridaceae* – All species
- *Mesembryanthemaceae* – All species
- *Capparaceae* - Boscia spp. Sheperd's trees, all species
- *Androcymbium* spp. - All species
- *Crassulaceae* - All species except those listed in Schedule 1
- *Euphorbiaceae* - Euphorbia spp. All species
- *Oxalidaceae* - Oxalis spp. All species
- *Portulacaceae* - Anacampseros spp. All species

However, it is important to note that these acts are intended to protect rare and endemic or otherwise significant species and not common and widespread species which may form the dominant species over large parts of the site. A final list of affected species would be identified

through a walk-though of the final development footprint prior to construction and would be a requirement for provincial permitting of the development.

4.5 CRITICAL BIODIVERSITY AREAS & BROAD SCALE ECOLOGICAL PROCESSES

The site itself lies with the Western Cape and along the boundary of the Northern Cape as well as along the boundary between the Central Karoo and Winelands District Municipalities within the Western Cape. As a result, the site lies at the junction of three different conservation plans and Figure 3 below is a composite of all these different plans. The project falls entirely within the Western Cape within the Biodiversity Assessment of the Cape Winelands District Municipality (Skowno et al. 2009). These district-wide biodiversity assessments were commissioned to inform Spatial Development Frameworks (SDFs), Biodiversity Sector plans, Environmental Management Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and the Environmental Impact Assessment (EIA) process. The Biodiversity Assessments identify Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. Once gazetted, and incorporated into municipal SDFs and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the act as described in Section 2.4 come into effect. The CBA map for the general area surrounding the site is depicted below in Figure 3.

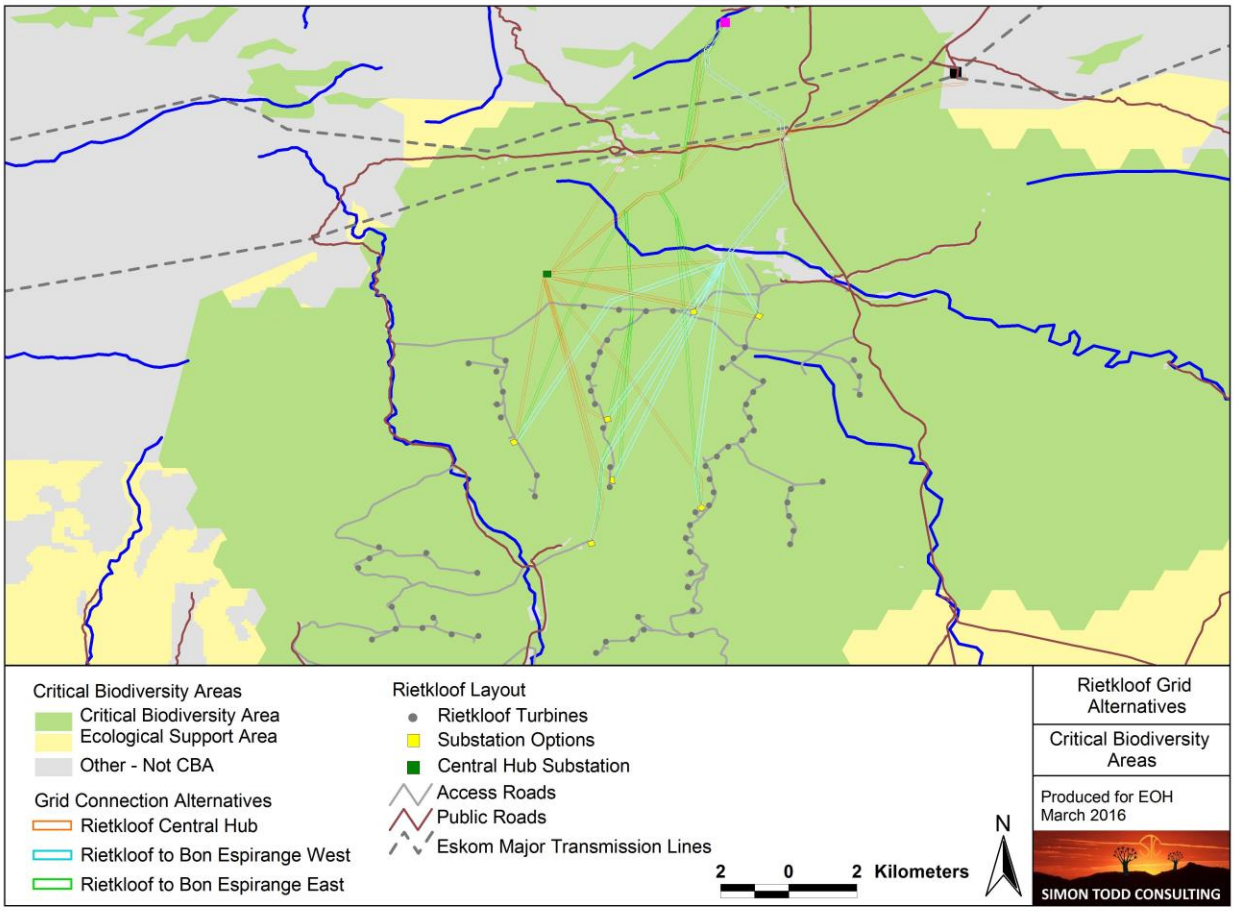


Figure 3. Amalgamated Critical Biodiversity Areas map of the proposed Rietkloof powerline options and the surrounding area.

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged and may not be compatible with the objectives of the CBA. The likely implications and impacts of development within the CBAs and their immediate environment is a potential concern for the Rietkloof powerline development that needs to be carefully addressed as all three powerline route options fall within a CBA. Pertinent issues in this regard include establishing why the area has been identified as a CBA and if there are any mitigation measures that can be implemented that can significantly reduce or avoid impacts to the CBAs.

Although development within CBA is not desirable, the footprint of the power lines within the CBA would be low and not likely to significantly impact on the biodiversity or ecological functioning of the CBA. Within vegetation types that are highly transformed, CBAs include a large proportion of irreplaceable vegetation fragments that cannot be substituted. However, within the study area, all the vegetation types present are little transformed, with both Koedoesberge-Moordenaars Karoo and Central Mountain Shale Renosterveld being 99% intact.

Within semi-arid areas where the majority of vegetation is natural, there are often many choices as to which areas could fall under CBAs and the final solution may be a design issue rather than a clear-cut biodiversity-priority one. Where CBAs have been designed for connectivity and not to capture high biodiversity areas, they are less vulnerable to habitat loss and in the current case, the low footprint of the powerlines would not disrupt the connectivity of the landscape to any significant degree.

4.6 CUMULATIVE IMPACT

According to the map of DEA-registered projects as at January 2016, there are a large number of renewable energy projects in the area (Figure 4). The authorized Roggeveld and Karreebosch facilities are immediately north of the site, while there are several developments to the east as well. Due the topographic diversity of the area, the region is diverse in terms of the different vegetation types represented in the area, with the result that each development footprint tends to impact different vegetation types or plant communities. In the current context, the high-lying ridges are considered most vulnerable to cumulative impact due to their higher diversity and more limited extent. The higher-lying ridges should be avoided as much as possible and in this regard, the grid alternatives from the central hub directly north to the on-site substation are seen as least desirable. The overall footprint of the power line and on-site substations would however be low and the contribution to cumulative impact very low and it not considered significant in the broader context. The expected total footprint of the power line and substation is expected to be less than 10ha, which is a low contribution in relation to other impact sources in the area.

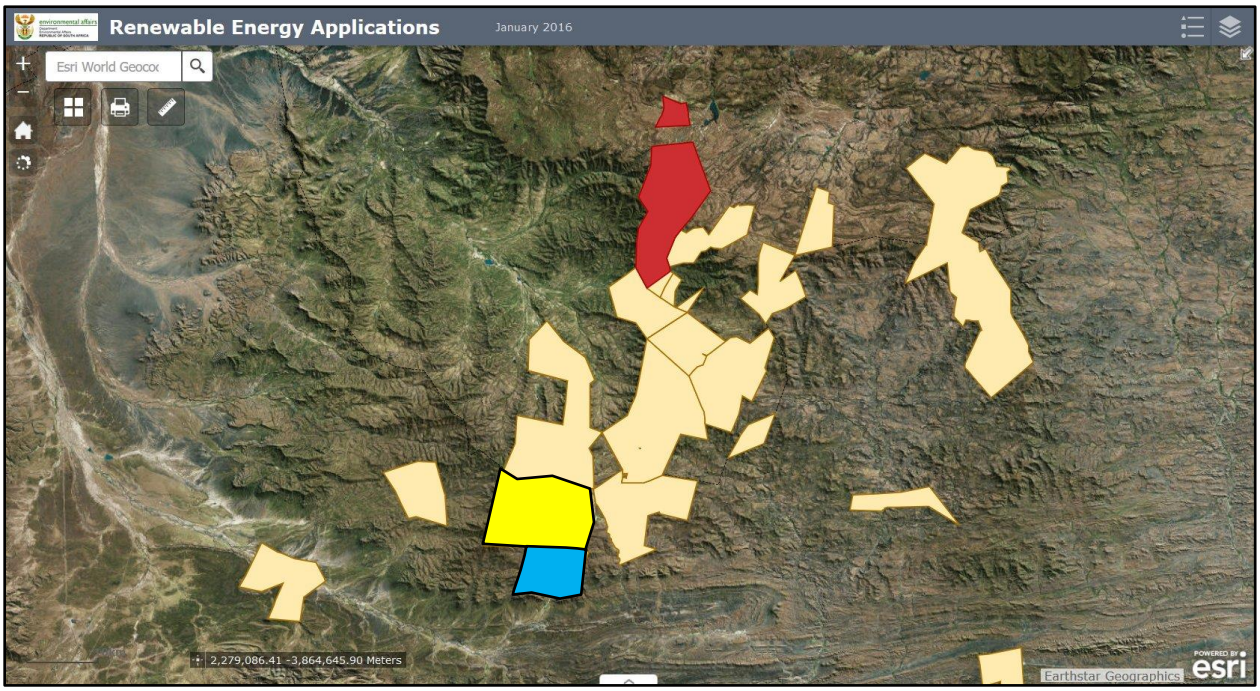


Figure 4. Current DEA-registered projects known from the vicinity of the Rietkloof Wind Energy Facility which is indicated in blue, with the adjacent Rietkloof site in yellow. There are some errors and omissions on the map as well as not all affected land parcels have been indicated, but it nevertheless illustrates that high potential development pressure in the area, especially on the high-lying ground below the escarpment

4.7 FAUNAL COMMUNITIES

Mammals

At least 50 mammal species potentially occur at the site (Appendix 2). Due to the diversity of habitats available, which includes rocky uplands, densely vegetated kloofs and riparian areas, as well as open plains and low shrublands, the majority of species with a distribution that includes the site are likely to be present in at least part of the broader site. However, human activity in proximity to the power line is fairly high and there is also a limited subset of these habitats present within the footprint, suggesting that significantly less species would actually be impacted by the power lines.

Despite trapping and hunting by the local landowners, medium sized carnivores such as jackal and caracal appear to remain relatively common in the area. The ridges, hills and uplands of the site, with rocky outcrops, rocky bluffs and cliffs provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Hewitt's Red Rock Hare *Pronolagus saundersiae*, Namaqua Rock Mouse *Micaelamys*

namaquensis and Rock Hyrax, *Procavia capensis*. The lowlands 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 grimmia*.

A number of antelope are relatively common at the site. 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 are able to tolerate moderate to 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 present along the ridges and are somewhat more specialized in their habitat requirements. Klipspringer are associated with steep slopes, cliffs and rocky outcrops.

The Riverine Rabbit *Bunolagus monticularis* which is listed as Critically Endangered 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 in the Tanqua Karoo to the west. The drainage systems within the site do not contain wide flood plains or alluvial terraces which are the known favoured habitat of the Riverine Rabbit. As a result, it is highly unlikely that this species occurs at the site and an impact on this species is therefore not considered likely.

The major impact of the development of the grid connection infrastructure on mammals is likely to occur during the construction phase when noise and disturbance would be generated. There is little that can be done to avoid this impact as disturbance cannot be avoided at this time. The development would generate some disturbance of fauna during construction but disturbance and habitat loss during operation would be minimal and is not considered significant.

Reptiles

There is a wide range of habitats for reptiles present at the site, including rocky uplands and cliffs, open flat and lowlands and riparian areas. As a result the site is likely to have a rich reptile fauna which is potentially composed of 7 tortoise species, 16 snakes, 15 lizards and skinks, two chameleons and 11 geckos. The only currently listed species which may occur at the site is the Karoo Padloper *Homopus boulengeri* which is listed as Near Threatened.

Species observed in the immediate area (Figure 10) or on-site include Karoo Tent Tortoise *Psammobates tentorius tentorius*, Angulate Tortoise *Chersina angulata*, Marsh Terrapin *Pelomedusa subrufa*, Puff Adder *Bitis arietans*, Karoo Girdled Lizard *Cordylus polyzonus*, Southern Rock Agama *Agama atra*, Cape Skink *Mabuya capensis* and Cape Cobra *Naja nivea*. Tortoises were relatively abundant at the site and a large number of 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 the large number of vehicles at the site during construction would generate some impact on tortoises and reptiles in general. During the operational phase, impacts are likely to be significantly reduced compared to operation.

Common reptiles at the Rietkloof site include the Angulate Tortoise left and the Karoo Girdled Lizard right.

Amphibians

Although there are no perennial rivers at the site, the larger drainage lines in the area were observed to contain rocky, sheltered pools that are likely to contain water on a near-perennial basis. In addition, there are a number of earth farm dams at the site which would also represent important breeding sites for water-dependent species. The amphibian diversity at the site is however likely to be relatively low as the site lies within the distribution range of only nine frog and toad species. No species of conservation concern are known from the area and all the species which may be present are quite widespread species of low conservation concern.

The Karoo Dainty Frog, *Cacosternum karooicum* is listed as Data Deficient reflecting the little-known distribution and ecology of this species. To date, the Karoo Dainty Frog has been recorded from a few scattered locations across the Karoo in the Western and Northern Cape, but it is likely that it occurs more widely across the karoo in general. The site also falls within the distribution of two other regional endemic species, the Cape Sand Frog, *Tomopterna delalandii* and the Raucous Toad, *Amietophrynus rangeri*. The Cape Sand Frog occurs in lowlands and valleys in fynbos and Succulent Karoo throughout most of the Western Cape and into Namaqualand. The Raucous Toad is more widely distributed and occurs throughout much of South Africa inland and along the east coast into Gauteng and Mpumalanga. There do not

therefore appear to be any range-restricted species which occur at the site which would be vulnerable to population-level impacts.

In general, the most important areas for amphibians at the site are the riparian areas, seeps and wetlands and the man-made earth dams which occur in the area. As these are widely recognized as sensitive habitats, impacts to these areas are avoided largely at the design phase of the development. Consequently, direct impacts on amphibians due to the power line infrastructure are likely to be low. Amphibians are however highly 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. Careful and appropriate bunding of pollutants, as well as spill protection and response measures, would be required from contractors in order to minimise this risk.

4.8 SITE SENSITIVITY ASSESSMENT

The ecological sensitivity map of the Rietkloof 132kV line corridor alternatives of the site is depicted in Figure 5 below. The high-lying areas within the central and northern parts of the site are considered the most sensitive areas. The large basin which forms the central and western part of the site is considered relatively low sensitivity.

The different major options for the powerline routes are:

- On-site substation to Central Hub Substation to Komsberg or Bon Espirange
- Rietkloof on-site substation to Bon Espirange Substation East
- Rietkloof on-site substation to Bon Espirange Substation West

Preferred alternatives for each option are as follows:

<u>On-site substation to Central Hub Substation to Komsberg or Bon Espirange:</u>

- The shorter routes are preferable, except for the connection to Komsberg which is seen as preferable to the connection to Bon Espirange as there is already an existing 400kV line along the large part of the route to Komsberg SS.

<u>Rietkloof on-site substation to Bon Espirange East:</u>

- The shorter routes are preferable and the option from Substation 1 is the preferred option.
- The route from substation 3 is least preferred.

<u>Rietkloof on-site substation to Bon Espirange Substation West</u>

- Most of these options traverse the high-lying ground in the centre of the site which is considered sensitive. As a result, the options from substations 3,4,5,6 and 7 are least desirable, but are not considered fatally flawed.

- The options from substations 1 and 2 are considered highly preferable to the other options and would generate significantly less impact. Partly as a result, substation 1 is considered the most preferable substation location.

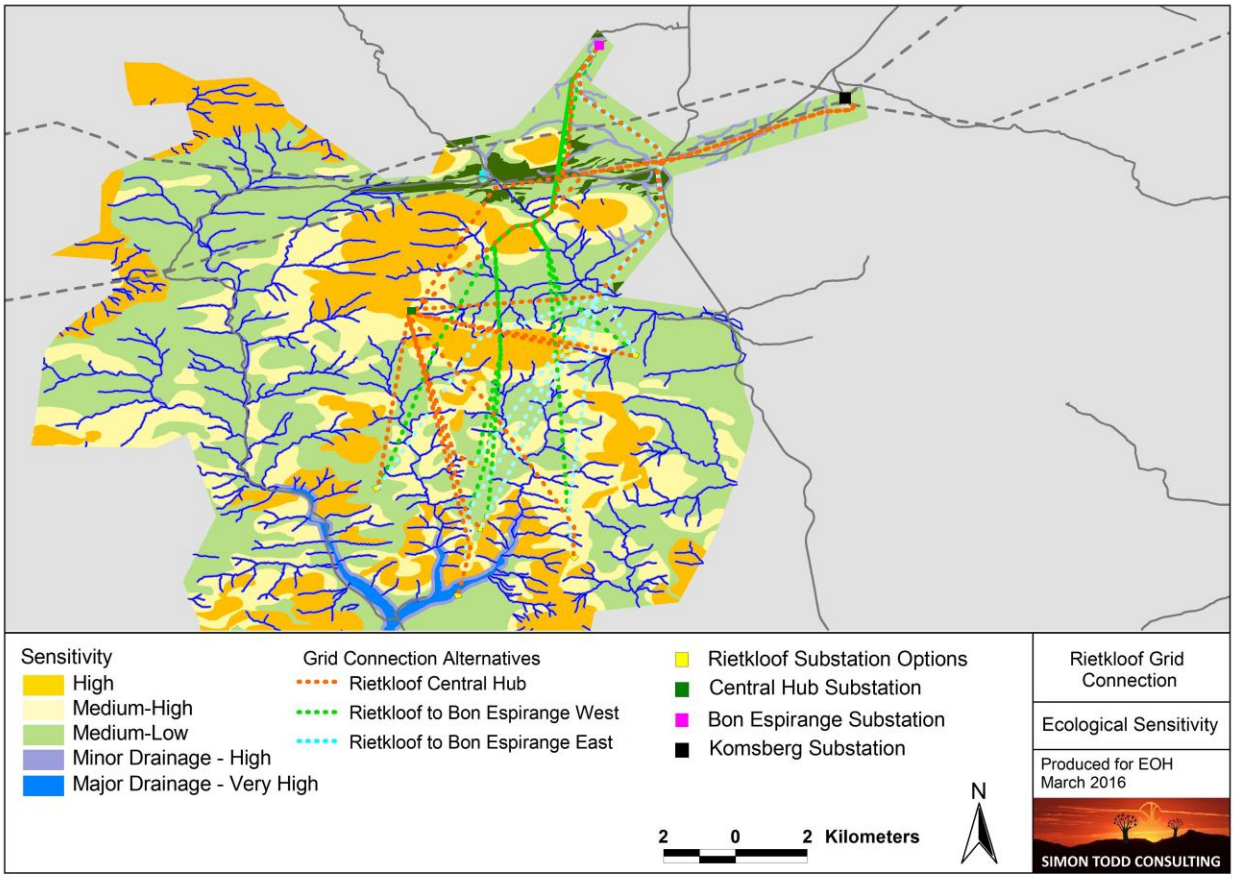


Figure 5. Ecological Sensitivity map of the Rietkloof WEF power line route corridors for the 132kV line alternatives

In general, the majority of the power line corridors traverse renosterveld shrublands of moderate sensitivity. Within these habitats there are likely to be relatively few listed or protected species present although there may be some localised areas where such species are concentrated. The substation options in the south are within less sensitive areas, however, the additional power lines required to connect to the grid may negate any advantage of locating the substations in these areas. The impact on vegetation at the site is likely to be relatively low given the low footprint of the power line and substations. There are however a number of minor drainage lines along the route and the pylons should be positioned to minimise impact on the riparian areas. Although there are likely to be some protected species along the power line routes, impacts on these species can be minimised through a pre-construction walk through of the power line route and substation footprint to ensure that any individuals directly beneath the line or within the footprint can be avoided.

5 IMPACT ASSESSMENT

5.1 IDENTIFICATION OF POTENTIAL IMPACTS AND ASSOCIATED ACTIVITIES

The development of the Rietkloof 132 kV power lines and substation infrastructure would potentially result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat due to construction of the power line and substation. The following impacts are identified as the major impacts associated with the development and which are assessed for the preconstruction, construction and operational phases of the development.

5.2 IDENTIFICATION OF IMPACTS TO BE ASSESSED

The likely impacts on the terrestrial ecology of the site resulting from the development of the Rietkloof powerline and substation are identified and discussed below with reference to the characteristics and features of the site.

Impact 1. *Impacts on vegetation and listed or protected plant species*

The development would require vegetation clearing for powerlines and substation. Apart from the direct loss of vegetation within the development footprint, listed and protected species could be impacted. These impacts are likely to occur during the construction phase of the development, with additional vegetation impacts during operation likely to be relatively low.

Impact 2. *Direct Faunal Impacts*

Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed if proper management and monitoring is not in place. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. Many of these impacts can however be effectively managed or mitigated. During the operational phase activity at the site will be considerably reduced and residual impact will be largely restricted to disturbance from turbine noise and occasional human activity.

Impact 3. *Increased Erosion Risk*

The disturbance created during construction would leave the site vulnerable to soil erosion, especially as many parts of the site are steep, and the region generally dry with little rainfall.

Vegetation recovery and growth within the study area is further mostly slow, leading to exposed surfaces and increase erosion potential. Measures to limit erosion will need to be a key element of mitigation measures at the site. This impact would be initiated during construction, but would occur largely during the operational phase.

Impact 4. *Alien Plant Invasion*

The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some alien plant invasion is inevitable and regular alien plant clearing activities would be required to limit the extent of this problem.

Cumulative Impact 1. Cumulative *Impacts on Critical Biodiversity Areas and broad-scale ecological processes*

The substations and powerline options are all within Critical Biodiversity Areas. While CBAs are not necessarily no-go areas, development within CBAs is not encouraged as such development may compromise the ecological functioning of the CBA or result in direct biodiversity loss within the CBA if not approached carefully and managed effectively. The footprint of the substation and power lines can however be kept at a low level and impact reduced accordingly. Micro-siting of pylons may allow for further avoidance of sensitive regions identified during the planning phase and the pre-construction walkthrough. The expected total footprint of the power line and substation is expected to be less than 10ha, which is a low contribution in relation to the extent of the affected vegetation type as well as the other negative contribution sources.

6 ASSESSMENT METHODOLOGY

The assessment methodology used was in accordance with the recent revised 2014 EIA regulations and the EOH CES Impact Assessment methodology. The significance of environmental impacts is a function of the environmental aspects that are present and to be impacted on, the probability of an impact occurring and the consequence of such an impact occurring before and after implementation of proposed mitigation measures.

The methodology is described in the main EIA report and is not repeated here. The specialist has added one factor not included in the Assessment methodology: the ***Degree of confidence in prediction,*** which refers to the degree of confidence in the predictions, based on the availability of information and specialist knowledge.

7 ASSESSMENT OF IMPACTS

An assessment of the likely extent and significance of each impact identified above is provided below for each phase of the development as relevant.

7.1 PLANNING & CONSTRUCTION PHASE

Impact 1. *Impact on vegetation and listed plant species due to transformation within the development footprint.*

There are listed and protected species confirmed present at the site and it is some of these species would be impacted during site clearing. Although a preconstruction walk-through can reduce this impact, there is still likely to be some unavoidable impact on vegetation and listed plant species. Overall, after mitigation, the impact is likely to be of **Low** significance.

	Temporal Scale	Spatial Scale	Severity	Likelihood	Significance	Confidence
Without Mitigation	Permanent	Localized	Moderate	Definite	Moderate	High
With Mitigation	Permanent	Localized	Slight	Probable	Low	High
Can the impact be reversed?			No – some transformation is an unavoidable outcome of the development and this cannot easily be reversed.			
Will impact cause irreplaceable loss of resources?			Yes, some loss of rare habitats or species may occur.			
Can impact be avoided, managed or mitigated?			Possibly, through avoidance, but some residual impact is likely			
Will this impact contribute to any cumulative impacts?			Yes. Transformation for infrastructure will contribute to some cumulative transformation and habitat loss in the area, however, the total extent of transformation is considered to be low.			

Mitigation measures:

- A preconstruction walk-though of the approved development footprint is required to ensure that sensitive habitats and species are avoided, where possible.
- Ensure that temporary infrastructure areas are within low sensitivity areas, preferably previously transformed areas if possible.
- Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development.
- Routes should also be adjusted within their corridors to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-though survey.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Demarcate all areas to be cleared with construction tape or similar material. However caution should be exercised to avoid using material that might entangle fauna.

Impact 2. *Direct faunal impacts due to construction phase noise and physical disturbance.*

The construction phase will involve some disturbance at the site due to the operation of heavy machinery, human presence and noise from blasting and machinery. This will deter larger fauna from the area and smaller fauna may suffer direct habitat loss or be killed if they are unable or too slow to move away from construction activities. As the construction activities cannot be avoided, it is not possible to mitigate some of these impacts. They are however transient and disturbance levels will subside significantly in the operational phase. Construction phase faunal disturbance is considered to have a **Low** significance after mitigation.

	Temporal Scale	**Spatial Scale**	**Severity**	**Likelihood**	**Significance**	**Confidence**
Without Mitigation	Short Term	Localized	Severe	Probable	Moderate	High
With Mitigation	Short Term	Localised	Moderate	May Occur	Low	High
Can the impact be reversed?			Construction phase disturbance will be transient, but some faunal habitat loss would be long term.			
Will impact cause irreplaceable loss of resources?			Provided that impacts to sensitive habitats such as drainage lines are minimized, then no irreplaceable loss of habitat resources are likely to occur.			
Can impact be avoided, managed or mitigated?			Possibly, through avoidance, but some residual impact is likely			
Will this impact contribute to any cumulative impacts?			Yes. Construction phase disturbance will contribute towards cumulative faunal impacts in the area, this will however be transient and localised.			

<u>Mitigation measures:</u>

- Preconstruction walk-through of the facility to identify areas of faunal sensitivity.
- During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- The illegal collection, hunting, harvesting or trading of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site.
- No fires should be allowed within the site as there is a risk of runaway veld fires.
- No fuelwood collection should be allowed on-site.
- No pets should be allowed on site apart from that of the landowners.
- If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs), which do not attract insects and which should be directed downwards.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- No unauthorized persons should be allowed onto the site and site access should be strictly

controlled and vehicles which need to roam around the site should be accompanied by the ECO or security personnel.

- All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site.
- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.

7.2 OPERATIONAL PHASE

Impact 1. *Following construction, the site will be highly vulnerable to soil erosion*

Areas disturbed during construction will remain vulnerable to disturbance for some time into the operational phase and will require regular maintenance to ensure that erosion is minimised. With mitigation, this impact can however be reduced to a **Low** level.

	Temporal Scale	Spatial Scale	Severity	Likelihood	Significance	Confidence
Without Mitigation	Medium Term	Localized	Severe	Definite	Moderate	High
With Mitigation	Short Term	Localised	Moderate	Probable	Low	High
Can the impact be reversed?			With appropriate mitigation the impact can be ameliorated			
Will impact cause irreplaceable loss or resources?			The loss of large amounts to topsoil would potentially be an irreplaceable loss of resources.			
Can impact be avoided, managed or mitigated?			With appropriate control measures, erosion risk can be mitigated			
Will this impact contribute to any cumulative impacts?			Yes. Erosion will contribute towards cumulative habitat loss and degradation in the area. However, if erosion is effectively controlled, then this contribution would be low.			

Mitigation measures:

- Erosion management should take place according to the Erosion and Rehabilitation Plan.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- All erosion problems observed should be rectified as soon as possible, using the appropriate

erosion control structures and revegetation techniques.

- All cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow. The most appropriate species for use should be identified in the management plans for the development.

Impact 2. *Following construction, the site will be highly vulnerable to alien plant invasion*

Disturbed areas are vulnerable to alien plant invasion and it is likely that disturbed areas such as roads and pylon footprints will be foci for alien plant invasion. Uncontrolled invasion can result in invasion into the intact rangeland and where woody species are involved, this can result in loss of biodiversity and a decline in ecosystem services. With regular clearing and management, this impact can be reduced to a **Low** significance level.

	Temporal Scale	**Spatial Scale**	**Severity**	**Likelihood**	**Significance**	**Confidence**
Without Mitigation	Permanent	Study Area	Moderate	Probable	Moderate	High
With Mitigation	Short Term	Localized	Low	May occur	Low	High
Can the impact be reversed?			With appropriate mitigation the impact can be ameliorated			
Will impact cause irreplaceable loss or resources?			With mitigation there would not be loss of resources			
Can impact be avoided, managed or mitigated?			With appropriate control measures, alien plants can be controlled and reduced to very low impact			
Will this impact contribute to any cumulative impacts?			Yes. Alien plant invasion would contribute towards cumulative habitat loss and degradation in the area. However, if alien plants are effectively controlled, then this contribution would be low.			

Mitigation measures:

- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous shrub layer should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as *Prosopis* are already present in the area and are likely to increase rapidly if not controlled.
- Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems.

- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. Ultimately the best avenue to reduce alien abundance is to encourage the return of indigenous species. Where mowing and fire control methods are not appropriate, such as with this site, appropriate annual-grass specific herbicides or biocontrol agents may be used for *Avena*, *Lolium* and *Bromus* spp. (taking into account herbicide resistance), as their effectual control will be difficult without. Regardless, herbicide use is to remain limited to the absolute minimum deemed necessary for control, taking care to avoid drift spray or non-target exposure and damage.

7.3 DECOMMISSIONING & REHABILITATION

Impact 1. *Faunal Impacts due to Decommissioning Phase activities such as noise and disturbance due to the presence of construction staff and the operation of heavy machinery*

Decommissioning will require the use of heavy machinery on-site and will generate a lot of noise and disturbance which would have a negative impact on fauna. This impact would however be relatively short-lived and would ultimately result in the removal of the development and rehabilitation of the site and as such the ultimate impact of decommissioning on fauna would be **Low** after mitigation.

	Temporal Scale	Spatial Scale	Severity	Likelihood	Significance	Confidence
Without Mitigation	Short Term	Study Area	Moderate	Probable	Low	High
With Mitigation	Short Term	Study Area	Moderate	May occur	Low	High
Can the impact be reversed?			Yes. This impact will be transient and restricted to the decommissioning period.			
Will impact cause irreplaceable loss or resources?			No, this is unlikely			
Can impact be avoided, managed or mitigated?			Partially. Some management is possible, but residual impact from general disturbance and human activity cannot be avoided.			
Will this impact contribute to any cumulative impacts?			Yes. The noise and activity will contribute towards disturbance in the area, but this will be transient and the contribution would be low to moderate			

<u>Mitigation measures:</u>

- Any potentially dangerous fauna such snakes or fauna threatened by the decommissioning activities should be removed to a safe location.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of

the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.

- All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact.

Impact 2. *Soil Erosion Risk Following Decommissioning will be high*

Decommissioning will result in a lot of disturbance which will leave the site vulnerable to erosion. As a result the site should be monitored for erosion problems for at least 2 years after decommissioning or until vegetation cover has recovered to within 60% of natural levels. With mitigation, this impact can be reduced to a **Low** significance.

	Temporal Scale	**Spatial Scale**	**Severity**	**Likelihood**	**Significance**	**Confidence**
Without Mitigation	Long Term	Localized	Moderate	Probable	Moderate	High
With Mitigation	Medium Term	Localised	Slight	Probable	Low	High

Can the impact be reversed?	With appropriate mitigation the impact can be ameliorated
Will impact cause irreplaceable loss or resources?	The loss of large amounts of topsoil would potentially be an irreplaceable loss of resources.
Can impact be avoided, managed or mitigated?	With appropriate control measures, erosion risk can be mitigated
Will this impact contribute to any cumulative impacts?	Yes. Erosion will contribute towards cumulative habitat loss and degradation in the area. However, if erosion is effectively controlled, then this contribution would be low.

<u>Mitigation measures:</u>

- Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as result of the disturbance, and if they do, to immediately implement erosion control measures.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area.

Impact 3. *Alien plant invasion will be highly likely within disturbed areas following decommissioning*

Decommissioning will leave the site vulnerable to alien plant invasion and alien plants should be monitored and managed for at least two years following decommissioning or until an adequate cover of perennial plants has been established in disturbed areas. With mitigation, this impact can be reduced to a **Low** significance.

	Temporal Scale	Spatial Scale	Severity	Likelihood	Significance	Confidence
Without Mitigation	Long Term	Study area	Moderate	Probable	Moderate	High
With Mitigation	Medium Term	Localised	Slight	Probable	Low	High
Can the impact be reversed?			With appropriate mitigation the impact can be ameliorated			
Will impact cause irreplaceable loss or resources?			With mitigation there would not be loss of resources			
Can impact be avoided, managed or mitigated?			With appropriate control measures, alien plants can be controlled and reduced to very low impact			
Will this impact contribute to any cumulative impacts?			Yes. Alien plant invasion would contribute towards cumulative habitat loss and degradation in the area. However, if aliens are effectively controlled, then this contribution would be low.			

Mitigation measures:

- Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned.
- Regular monitoring for alien plants within the disturbed areas for at least two years after decommissioning.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.

7.4 CUMULATIVE IMPACTS

Impact 1. *Cumulative Impact on CBAs and Broad-Scale Ecological Processes due habitat loss and the presence and operation of the facility*

Cumulative impacts are a concern at the site due to the large amount of wind energy development in the area. Furthermore, the powerline development is within an NPAES Focus area as well as several CBAs and could result in increased habitat fragmentation and reduced

landscape connectivity. The impact on the NPAES Focus area would be low and would not compromise the future use options for these areas, but this impact should be considered in conjunction with the associated wind energy development as the power line is not independent of the wind farm. The impact of the development on the NPAES Focus area is dealt with in detail in the main Rietkloof EIA fauna and flora study and the additional contribution of the power line is not considered significant. Overall, though the predicted footprint from powerlines is low and the cumulative impact of the development is considered to be **Low** after mitigation.

	Temporal Scale	**Spatial Scale**	**Severity**	**Likelihood**	**Significance**	**Confidence**
Without Mitigation	Long Term	Study Area	Moderate	Probable	Moderate	High
With Mitigation	Long Term	Study area	Slight	Probable	Low	High
Can the impact be reversed?			The impact would last for the lifetime of the development.			
Will impact cause irreplaceable loss or resources?			Not likely			
Can impact be avoided, managed or mitigated?			To some extent, but the main impact results from the loss and transformation of habitat as well as the presence of the powerline which cannot be avoided but would be of limited significance only.			
Will this impact contribute to any cumulative impacts?			Yes. The development of the site will contribute to habitat loss and degradation of habitat within CBAs, especially within the higher-lying areas which have a limited extent and contain the majority of species of concern.			
Mitigation measures: • Minimise development footprint within the High sensitivity parts of the site. • The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. • Avoid impact to potential corridors such as the riparian corridors associated with the larger drainage lines within the facility area, as far as possible.						

8 ASSESSMENT OF ALTERNATIVES

Although each substation has several connection options, there are no alternatives considered apart from the no-go alternative. The no-go alternative would result in the continuation of the current land use at the site which is extensive livestock grazing. When properly managed, this is a sustainable land use that can be used indefinitely. However, many parts of the site have been heavily grazed in the past, leading to some degradation of the site. The no-go alternative

would maintain the current land use, resulting in some degradation due to overgrazing or alien invasion in parts of the site, but would also result in biodiversity maintenance across the majority of the site. Therefore the impact of the no-go alternative on terrestrial biodiversity is considered to be a low negative impact. The development of the wind farm with associated grid connection considered here would not result in the cessation of farming activities and the development would be an additional impact to the prevailing low-level farming impact.

9 CONCLUSIONS & RECOMMENDATIONS

Although there are some areas within the study area and within the power line corridors that are considered high sensitivity, the footprint of the development is low and the power lines themselves are sufficiently flexible that any sensitive features potentially within the footprint can be avoided. As a result, the direct impact of habitat loss resulting from the development of the grid connection infrastructure is seen to be low. The major concerns regarding the development of the Rietkloof grid connection infrastructure is likely to stem from secondary impacts such as erosion. Several of the routes traverse steep slopes and the access roads required for construction of the power lines in these areas will remain vulnerable to erosion for the life is the development. This can however be well mitigated though the use of erosion control structures and regular monitoring during the lifespan of the development.

In terms of the different alternatives, the following recommendations are made:

<u>On-site substation Alternatives</u>

- In terms of the different on-site substation alternatives, Alternatives 3,4,5,6 and 7 are less preferred as they are in an areas with little current disturbance or sensitive habitats.
- Alternative 1 and Alternative 2 are both considered acceptable.
- **Alternative 1 is considered the preferred Alternative**

<u>On-site substation to Central Hub Substation to Komsberg or Bon Espirange:</u>

- The shorter routes are preferable, except for the connection to Komsberg which is seen as preferable to the connection to Bon Espirange as there is already an existing 400kV line along the large part of the route to Komsberg SS.

<u>Rietkloof on-site substation to Bon Espirange East:</u>

- The shorter routes are preferable and the option from Substation 1 is the preferred option.
- The route from substation 3 is least preferred.

<u>Rietkloof on-site substation to Bon Espirange Substation West</u>

- Most of these options traverse the high-lying ground in the centre of the site which is considered sensitive. As a result, the options from substations 3,4,5,6 and 7 are least desirable but not fatally flawed.
- The options from substations 1 and 2 are considered highly preferable to the other options and would generate significantly less impact. As substation 1 is preferred, the Komsberg

Overall and with the suggested mitigation measures applied, the impact of the Rietkloof Grid Connection infrastructure would be local in nature and of low significance.

Summary assessment for the Rietkloof grid connection options, before and after mitigation.

Phase & Impact	Before Mitigation	After Mitigation
Planning & Construction Phase Impacts		
Impacts on vegetation and listed plant species	Moderate	Low
Faunal impacts due to construction activities	Moderate	Low
Operational Phase Impacts		
Increased alien plant invasion risk	Moderate	Low
Increased erosion risk during operation	Moderate	Low
Rehabilitation		
Faunal impacts due to decommissioning activities	Low	Low
Increased alien plant invasion risk after decommissioning	Moderate	Low
Increased erosion risk following decommissioning	Moderate	Low
Cumulative Impacts		
Impacts on broad-scale ecological processes	Moderate	Low

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11 APPENDICES:

Appendix 1. Listed Plant Species

List of plant species of conservation concern which are known to occur in the vicinity of the Rietkloof Wind Farm. The list is derived from the SIBIS:SABIF website. Those in red are confirmed present at the site, but not necessarily within the electrical infrastructure development footprint.

Family	Species	Threat status
AMARYLLIDACEAE	***Brunsvigia josephinae (Redouté) Ker Gawl.***	**VU**
	Strumaria karooica (W.F.Barker) Snijman	**Rare**
	Strumaria pubescens W.F.Barker	**Rare**
ANTHERICACEAE	*Chlorophytum lewisiae Oberm.*	**Rare**
APOCYNACEAE	***Duvalia parviflora N.E.Br.***	**VU**
	Hoodia pilifera (L.f.) Plowes subsp. pilifera	**NT**
ASPHODELACEAE	*Astroloba herrei Uitewaal*	**VU**
	Bulbine torta N.E.Br.	**Rare**
	Haworthia fasciata (Willd.) Haw.	**NT**
	Gasteria disticha	**CR**
	Haworthia serrata	**CR**
	Haworthia pulchella M.B.Bayer var. pulchella	**Rare**
ASTERACEAE	*Cineraria lobata L'Hér. subsp. lasiocaulis Cron*	**Rare**
	Antithrixia flavicoma	**VU**
	Euryops namaquensis	**VU**
	Eriocephalus grandiflorus M.A.N.Müll.	**Rare**
	Phymaspermum schroeteri Compton	**Rare**
	Pteronia hutchinsoniana Compton	**Rare**
	Relhania tricephala (DC.) K.Bremer	**NT**
COLCHICACEA	*Wurmbea capensis*	**VU**
CRASSULACEAE	*Adromischus humilis (Marloth) Poelln.*	**Rare**
	Adromischus phillipsiae (Marloth) Poelln.	**Rare**
	Adromischus mammillaris	**EN**
	Crassula alpestris Thunb. subsp. massonii (Britten & Baker f.) Toelken	**Rare**
EUPHORBIACEAE	*Euphorbia nesemannii R.A.Dyer*	**NT**
FABACEAE	*Amphithalea spinosa (Harv.) A.L.Schutte*	**VU**
	Amphithalea villosa Schltr.	**VU**
	Lotononis comptonii B.-E.van Wyk	**EN**
	Lotononis gracilifolia B.-E.van Wyk	**EN**
	Lotononis venosa B.-E.van Wyk	**VU**
GERANIACEAE	*Pelargonium denticulatum Jacq.*	**Rare**
	Pelargonium torulosum E.M.Marais	**Rare**

HYACINTHACEAE	*Lachenalia maximiliani Schltr. ex W.F.Barker*	**Rare**
IRIDACEAE	*Geissorhiza inaequalis L.Bolus*	**Rare**
	Geissorhiza karooica Goldblatt	**NT**
	Ixia linearifolia Goldblatt & J.C.Manning	**Rare**
	Ixia parva Goldblatt & J.C.Manning	**VU**
	Moraea aspera Goldblatt	**VU**
	Romulea eburnea J.C.Manning & Goldblatt	**VU**
	Romulea syringodeoflora M.P.de Vos	**VU**
MESEMBRYANTHEMACEAE	*Cleretum lyratifolium Ihlenf. & Struck*	**Rare**
	Lampranthus amoenus (Salm-Dyck ex DC.) N.E.Br.	**EN**
OXALIDACEAE	*Oxalis tenuipes T.M.Salter var. tenuipes*	**Rare**
POACEAE	***Ehrharta eburnea Gibbs Russ.***	**NT**
POLYGALACEAE	*Muraltia karroica Levyns*	**VU**
PROTEACEAE	*Leucadendron teretifolium (Andrews) I.Williams*	**NT**
	Protea convexa E.Phillips	**CR**
	Protea lepidocarpodendron (L.) L.	**NT**
RUTACEAE	*Acmadenia argillophila I.Williams*	**NT**
SCROPHULARIACEAE	*Globulariopsis wittebergensis Compton*	**Rare**
	Oftia glabra Compton	**Rare**
	Selago albomontana Hilliard	**Rare**

Appendix 2. List of Mammals

List of Mammals which potentially occur at the Rietkloof Wind Farm site. Taxonomy and habitat notes are derived from Skinner & Chimimba (2005), while conservation status is according to the IUCN 2016.

Scientific Name	Common Name	Status	Habitat	Likelihood
Afrosoricida (Golden Moles):				
Chlorotalpa sclateri	Sclater's Golden Mole	LC	Montane grasslands, scrub and forested kloofs of the Nama Karoo and grassland biomes	Low
Chrysochloris asiatica	Cape Golden Mole	LC	Coastal parts of the Northern and Western Cape	High
Macroscledidea (Elephant Shrews):				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
Elephantulus edwardii	Cape Rock Elephant Shrew	LC	From rocky slopes, with or without vegetation, from hard sandy ground bearing little vegetation, quite small rocky outcrops	Confirmed
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Confirmed
Hyracoidea (Hyraxes)				
Procavia capensis	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	Confirmed
Lagomorpha (Hares and Rabbits):				
Bunolagus monticularis	Riverine Rabbit	CR	Confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo.	V.Low
Pronolagus saundersiae	Hewitt's Red Rock Hare	LR/LC	Confined to areas of krantzes, rocky hillsides, boulder-strewn koppies and rocky ravines	Confirmed
Lepus capensis	Cape Hare	LR/LC	Dry, open regions, with palatable bush and grass	Confirmed
Lepus saxatilis	Scrub Hare	LR/LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	High
Rodentia (Rodents):				
Cryptomys hottentotus	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	Confirmed
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Confirmed

Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	High
Acomys subspinosus	Cape Spiny Mouse	LC	Associated with rocky areas on mountain slopes in Fynbos	Low
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	High
Steatomys krebsii	Kreb's African Fat Mouse	LC		
Micaelamys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	Confirmed
Micaelamys granti	Grant's Rock Mouse	LC	Restricted to the karoo where they are associated with rocky terrain.	High
Parotomys brantsii	Brants's Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	High
Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	Low
Otomys unisulcatus	Bush Vlei Rat	LC	Shrub and fynbos associations in areas with rocky outcrops Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	Confirmed
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	High
Tatera afra	Cape Gerbil	LC	Confined to areas of loose, sandy soils of sandy alluvium. Common on cultivated lands.	Low
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Dendromus melanotis	Grey Climbing Mouse	LC	Often associated with stands of tall grass especially if thickened with bushes and other vegetation	High
Primates:				
Papio hamadryas	Chacma Baboon	LR/LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	Confirmed
Eulipotyphla (Shrews):				
Myosorex varius	Forest Shrew	LC	Prefers moist, densely vegetated habitat	High

Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Carnivora:				
Proteles cristatus	Aardwolf	LR/LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	Confirmed
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	High
Panthera pardus	Leopard	SARDB NT	Wide habitat tolerance, associated with areas of rocky koppies and hills, mountain ranges and forest	Low/Moderate
Felis nigripes	Black-footed cat	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.	High
Genetta genetta	Small-spotted genet	LR/LC	Occur in open arid associations	High
Genetta tigrina	Large-spotted genet	LR/LC	Fynbos and savanna particularly along riverine areas	Low
Suricata suricatta	Meerkat	LR/LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	Confirmed
Cynictis penicillata	Yellow Mongoose	LR/LC	Semi-arid country on a sandy substrate	Confirmed
Galerella pulverulenta	Cape Grey Mongoose	LR/LC	Wide habitat tolerance	Confirmed
Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	Confirmed
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Confirmed
Aonyx capensis	Cape Clawless Otter	LC	Predominantly aquatic and do not occur far from permanenetpermanenet water	Medium
Ictonyx striatus	Striped Polecat	LR/LC	Widely distributed throughout the sub-region	Confirmed
Mellivora capensis	Ratel/Honey Badger	SARDB EN	Catholic habitat requirements	High
Rumanantia (Antelope):				
Sylvicapra grimmia	Common Duiker	LR/LC	Presence of bushes is essential	Confirmed
Pelea capreolus	Grey Rhebok	LC	Associated with rocky hills, rocky mountainsides, mountain plateaux with good grass cover.	Confirmed
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	Confirmed
Raphicerus campestris	Steenbok	LR/LC	Inhabits open country,	Confirmed

Raphicerus melanotis	Cape Grysbok	LC	Thick scrub bush, particularly along the lower levels of hills	Medium
Oreotragus oreotragus	Klipspringer	LR/cd	Closely confined to rocky habitat.	Confirmed

Appendix 3. List of Reptiles.

List of reptiles which are known from the broad area around the Rietkloof Wind Farm site, according to the SARCA database, derived for the degree square 3220CD, DC and 3320AB, BA.

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	*Agama*	*atra*		Southern Rock Agama	Least Concern
Agamidae	*Agama*	*hispida*		Spiny Ground Agama	Least Concern
Atractaspididae	*Homoroselaps*	*lacteus*		Spotted Harlequin Snake	Least Concern
Chamaeleonidae	*Bradypodion*	*gutturale*		Little Karoo Dwarf Chameleon	Least Concern
Chamaeleonidae	*Chamaeleo*	*namaquensis*		Namaqua Chameleon	Least Concern
Colubridae	*Psammophis*	*crucifer*		Cross-marked Grass Snake	Least Concern
Colubridae	*Pseudaspis*	*cana*		Mole Snake	Least Concern
Colubridae	Dasypeltis	scabra		Rhombic Egg-eater	Least Concern
Colubridae	*Dipsina*	*multimaculata*		Dwarf Beaked Snake	Least Concern
Cordylidae	*Cordylus*	*minor*		Western Dwarf Girdled Lizard	Least Concern
Cordylidae	*Hemicordylus*	*capensis*		Graceful Crag Lizard	Least Concern
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern
Cordylidae	*Pseudocordylus*	*microlepidotus*	*namaquensis*	Nuweveldberg Crag Lizard	Least Concern
Elapidae	*Hemachatus*	*haemachatus*		Rinkhals	Least Concern
Elapidae	*Naja*	*nigricincta*	*woodi*	Black Spitting Cobra	Least Concern
Elapidae	*Aspidelaps*	*lubricus*	*lubricus*	Coral Shield Cobra	Not Listed
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*capensis*		Cape Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*formosus*		Southern Rough Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*geitje*		Ocellated Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*kladaroderma*		Thin-skinned Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*maculatus*		Spotted Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*mariquensis*		Marico Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*oculatus*		Golden Spotted Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*purcelli*		Purcell's Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*weberi*		Weber's Gecko	Least Concern
Gerrhosauridae	*Cordylosaurus*	*subtessellatus*		Dwarf Plated Lizard	Least Concern
Gerrhosauridae	*Tetradactylus*	*tetradactylus*		Cape Long-tailed Seps	Least Concern
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern
Lacertidae	*Pedioplanis*	*burchelli*		Burchell's Sand Lizard	Least Concern
Lacertidae	*Pedioplanis*	*laticeps*		Karoo Sand Lizard	Least Concern
Lacertidae	*Pedioplanis*	*lineoocellata*	*pulchella*	Common Sand Lizard	Least Concern

Leptotyphlopidae	*Namibiana*	*gracilior*		Slender Thread Snake	Least Concern
Lamprophiidae	*Boaedon*	*capensis*		Brown House Snake	Least Concern
Lamprophiidae	*Prosymna*	*sundevallii*		Sundevall's Shovel-snout	Least Concern
Lamprophiidae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern
Lamprophiidae	*Psammophylax*	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Least Concern
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern
Scincidae	*Trachylepis*	*sulcata*	*sulcata*	Western Rock Skink	Least Concern
Scincidae	*Trachylepis*	*variegata*		Variegated Skink	Least Concern
Testudinidae	*Chersina*	*angulata*		Angulate Tortoise	Least Concern
Testudinidae	*Homopus*	*areolatus*		Parrot-beaked Tortoise	Least Concern
Testudinidae	*Homopus*	*boulengeri*		Karoo Padloper	Near Threatened
Testudinidae	*Homopus*	*femoralis*		Greater Padloper	Least Concern
Testudinidae	*Psammobates*	*tentorius*	*tentorius*	Karoo Tent Tortoise	Not listed
Testudinidae	*Psammobates*	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed
Typhlopidae	*Rhinotyphlops*	*lalandei*		Delalande's Beaked Blind Snake	Least Concern
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern

Appendix 4. List of Amphibians

List of amphibians which potentially occur at the Brand Valley Wind Farm. Taxonomy and habitat notes are from du Preez and Carruthers (2009) and conservation status from the IUCN 2010. (Status: LC = Least Concern, DD = Data Deficient) and additional data is from the ADU Amphibian Database for Quarter degree squares: 3220CD, 3220DC, 3320AB, 3320BA.

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
Amietophrynus rangeri	Raucous Toad	Not Threatened	Rivers and stream in grassland and fynbos	Endemic	High
Vandijkophrynus gariepensis	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	High
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	High
Cacosternum boettgeri	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	High
Amietia fuscigula	Cape River Frog	Not Threatened	Large still bodies of water or permanent streams and rivers.	Widespread	Confirmed
Cacosternum karooicum	Karoo Caco	DD	Dry kloofs and valleys in the Karoo	Endemic	High
Cacosternum karooicum	Karoo Dainty Frog	DD	Arid areas with unpredictable rainfall. Breeds in small streams as well as man-made dams.	Karoo Endemic	High
Tomopterna delalandii	Cape Sand Frog	Not Threatened	Lowlands in fynbos and Succulent Karoo	Endemic	High
Tomopterna tandyi	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	High