BASIC ASSESSMENT FOR THE CONSTRUCTION OF THE OLIFANTSHOEK - EMIL 132/11KV SUBSTATION AND 31KM POWER LINE, NORTHERN CAPE PROVINCE:

FAUNA & FLORA SPECIALIST REPORT

PRODUCED FOR SAVANNAH ENVIRONMENTAL

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EXECUTIVE SUMMARY

Eskom is currently expanding its transmission capacity within the Olifantshoek/Kathu region of the Northern Cape. As part of this expansion, a new 132kV powerline is being proposed between the Emil switching station and the proposed new 132/11kV Olifantshoek substation. Savannah Environmental have been appointed to undertake the required Basic Assessment for the proposed Olifantshoek 132/11kV substation and 31 km long 132kV power line. The proposed power line (132kV) will traverse a total distance of 31 km between the Emil switching station, west of Sishen Mine, and the town of Olifantshoek. The proposed route is adjacent to an existing 275kV line, with the option of placement to the west (Option 1, the preferred option) or east of this line (Option 2, the alternative route). The location of the proposed substation will be in proximity to Olifantshoek town and the footprint would be approximately 10 000m². Two substation options are assessed (Option A and Option B).

As part of the Basic Assessment process, this specialist ecological and biodiversity study characterizes the ecological features of the power line route and substation site and provides an assessment of the likely impacts associated with the construction and operation of the power line and substation on the fauna and flora of the affected area.

The ecological features appear to be similar for both the proposed power line options, however Option 1 will have a lower overall impact on the receiving environment. The different options have large sections in common and ultimately, Option 1 is considered to be the preferred option due to its lower potential impact on vegetation within the more sensitive areas. There are no significant irreversible impacts associated with the proposed power line options, provided the morphology and hydrology of the sensitive drainage areas are not disturbed during the construction phase of the development. While both substation sites support ecological features that may be considered fairly high value, substation Option A would be considered the most sensitive owing to its contribution towards the riparian zone and associated ecological services of the Olifantsloop River. As such, Option B is considered to be the preferred location and with some fine-scale adjustment of the final position of the substation, impacts on protected trees could also be reduced to some extent.

The major impacts of the development of the power line and substation would occur during the construction phase, due to the disturbance that would take place at this time. Construction phase disturbance would however be transient and while impacts on flora are likely to persist for some time, impacts on fauna during operation would be very low. Although there are some sensitive features present in the area (especially the drainage lines and patches of *Acacia erioloba)*, with proper planning of the pylon and

substation footprints, impacts to these areas can be minimised. Clearing of vegetation under power lines is usually done in areas where there is a high fire risk, but in the current area, fires do not occur as a natural phenomenon as the cover is generally too low. As such, the power line servitude should not be indiscrimately cleared and any trees which are tall and pose a risk to the safety of the line should be cut to a lower height, but it should not be necessary to remove them completely.

The decommissioning of the old Olifantshoek substation is likely to have a low impact due to the existing transformed nature of the site, provided that erosion and alien invasive plant control is continued after decommissioning activities.

Due to the relatively limited length of the power line, it has a small footprint in a habitat extensive across the landscape, and therefore impacts associated with the construction and operation of the power line and substation would be local in nature and of medium-low to low overall significance after mitigation. As such, there are no significant ecological reasons to oppose the construction of the Olifantshoek power line or substation.

DECLARATION OF CONSULTANTS' INDEPENDENCE

I, Simon Todd, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Simon Todd Pr.Sci.Nat 400425/11.

October 2016

1 INTRODUCTION

Eskom is currently expanding its transmission capacity within the Olifantshoek/Kathu region of the Northern Cape. As part of this expansion, a new 132 kV power line is being proposed between the Emil switching station and the proposed new 132/11kV Olifantshoek substation. Savannah Environmental have been appointed to undertake the required Basic Assessment for the proposed Olifantshoek 132/11kV substation and 31km long 132kV power line. The project site is located within both the Gamagara Local Municipality of the John Taolo Gaetsewe district area, and the Tatsebane Local Municipality of the ZF Mcgauw district area.

As part of the Basic Assessment process, this specialist ecological and biodiversity study characterizes the ecological features of the power line route and substation site and provides an assessment of the likely impacts associated with the construction and operation of the power line and substation on the fauna and flora of the affected area.

1.1 SCOPE OF WORK

The Scope of Work is as follows:

1. Undertake a desktop study to broadly describe and characterise the study area in terms of:
    a. Vegetation types and/or habitats;
    b. National conservation status of major vegetation types;
    c. Red Data (threatened and endangered) flora and fauna species;
    d. The potential presence/absence of Red Data fauna species;
    e. The potential presence of trees protected according to the National Forests Act and fauna and flora protected under the National Environmental Management: Biodiversity Act;
    f. The general status of vegetation on site; and
    g. Potential impacts on biodiversity, sensitive habitats and ecosystem functioning.
2. Undertake fieldwork in order to assess and confirm the patterns identified from the desktop assessment.
3. Assess the potential impact of the proposed development on flora, fauna and ecology.
4. Recommend mitigation measures and provide recommendations in order to minimise the impact of the proposed development on flora, fauna and ecology.

1.2 RELEVANT ASPECTS OF THE DEVELOPMENT

The project is being proposed in order to connect Emil Eskom switching station of the national grid with the proposed Olifantshoek substation. This project is referred to as the Olifantshoek Substation and power line and will consist of the following activities and infrastructure:

- Construction and Operation of the new 10MVA Olifantshoek 132/11kV substation (approximately 100m x 100m) and Ancillaries (including a metering station, control building, admin building, workshop and associated infrastructure).

- The construction of a new 31km long 132kV single circuit loop-in-loop-out (LILO) overhead power line from the new Olifantshoek Substation to the Emil Switching Station, and Ancillaries (including access tracks/roads, laydown areas, operational and maintenance facilities); and

- Decommissioning of the existing 22/11kV 2.5MVA Olifantshoek Substation including all site rehabilitation and preservation.

  The proposed project (see Figure 1 and 2) will comprise of the following:

- Construction of a new power line of up to 132kV from the proposed Olifantshoek substation to the Eskom Emil switching station. The grid connections that will be assessed include the following:
  - Corridor Option 1 **(preferred)** = approximately 31km in length;
  - Corridor Option 2 **(alternative)** = approximately 30km in length.

- A new substation approximately 100m x 100m in extent. The substation options that will be assessed (see Figure 2 insert) include the following:
  - Substation Option A **(alternative)**
  - Substation Option B **(preferred)**

The location of the proposed substation will be in proximity to Olifantshoek town and the footprint of the proposed substation would be approximately 10 000m².

The proposed power line (132kV) will traverse a total distance of 31 km between the Emil switching station, west of Sishen Mine, and the town of Olifantshoek. The proposed route is adjacent to an existing 275kV transmission line, with the option of placement to the west (Option 1, the preferred option) or east of this line (Option 2, the alternative route). A 400kV transmission line is currently under construction to the west and directly adjacent to the existing 275kV line. Should the proposed 132kV power line be erected to the west of the transmission servitude (Option 1), it would be adjacent to the 400kV

line currently under construction. If erected to the east of the servitude (Option 2), it would be directly adjacent to the existing 275kV power line.

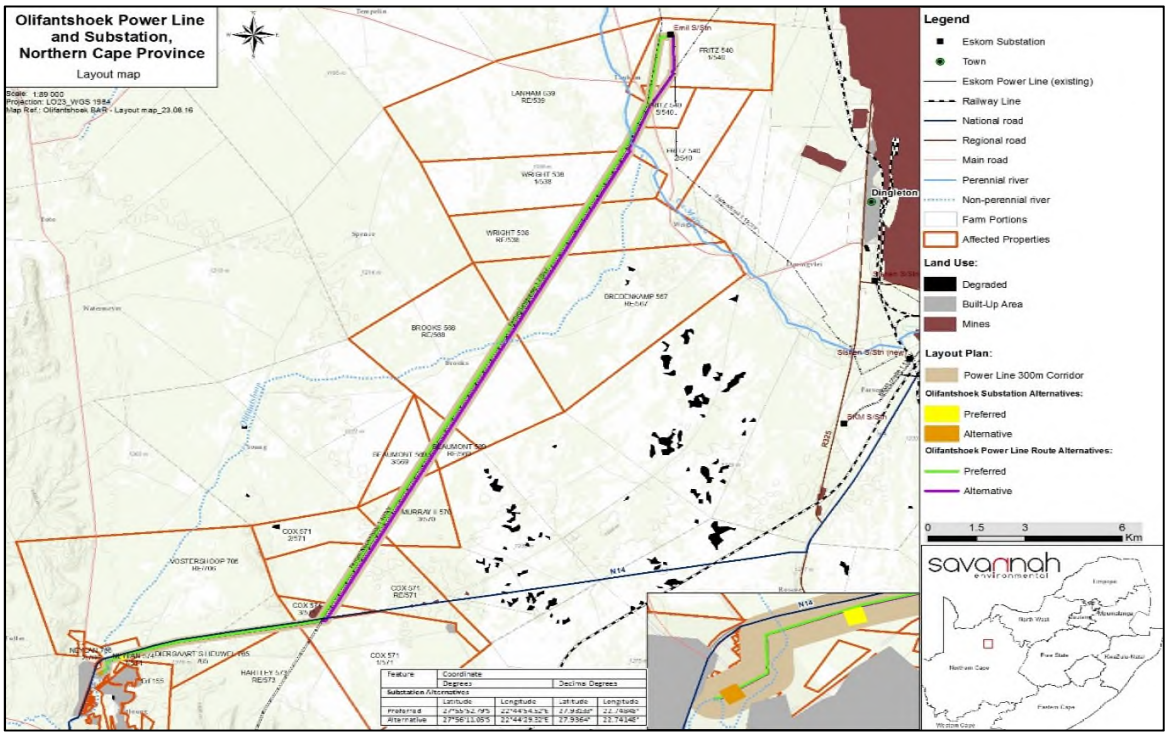

Figure 1. Layout of the power line and substation alternatives that are assessed in this study.

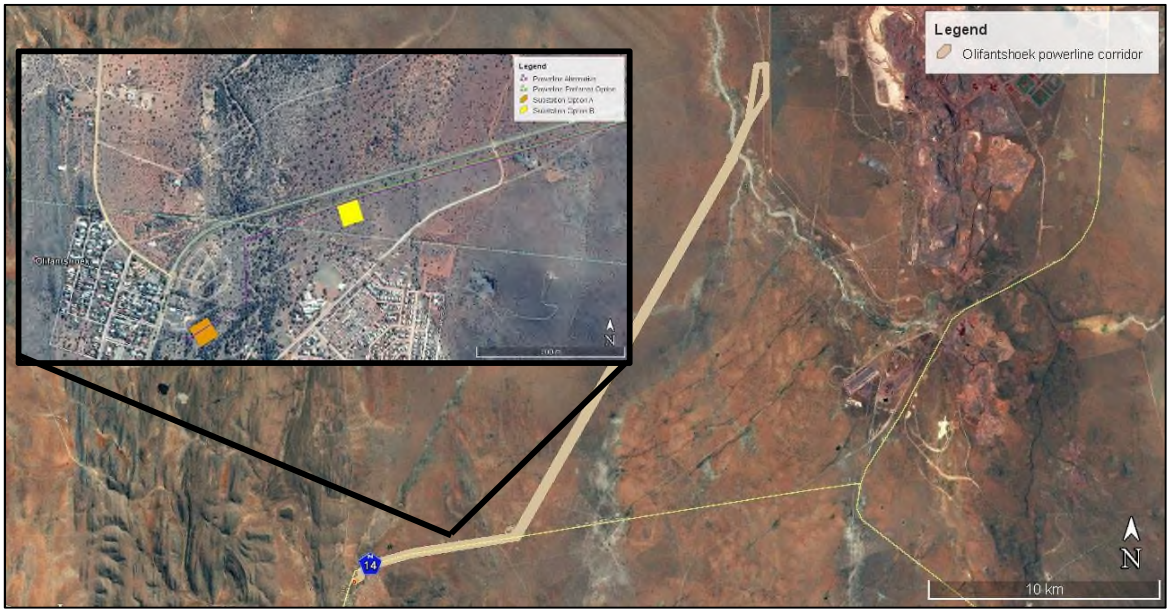

Figure 2. Satellite image of the layout of the proposed Olifantshoek power line and substation alternatives (insert) that are assessed in this study.

1.3 ASSESSMENT APPROACH & PHILOSOPHY

The assessment was conducted according to the 2014 EIA Regulations, 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.

- 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 how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

2 METHODOLOGY

2.1 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.
- Information on plant and animal species recorded for Quarter Degree Squares (QDS) 2722D was extracted from the SABIF/POSA database hosted by SANBI. This is a 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 3) 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 (2016).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- Critical Biodiversity Areas were obtained from the newly developed Northern Cape Conservation Plan for the study area.

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 as well as the ADU Virtual Museum which includes the MammalMap, Frog Atlas of Southern Africa as well as the South African Reptile Conservation Assessment (SARCA) database 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 2016 (See Figure 2) 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. In order 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.

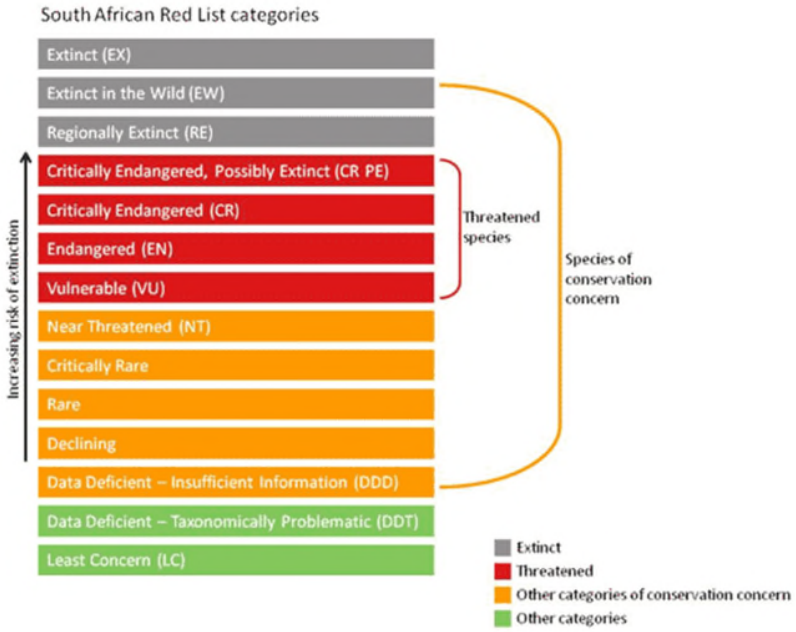

Figure 3. Schematic representation of the South African Red List categories. Taken from

http://redlist.sanbi.org/redcat.php

2.2 SITE VISIT

The site was visited on 20, 22 and 23 September 2016, during which the entire length of the proposed power line was driven and inspected along the existing servitude road. The corridors on both sides of the line were investigated to determine the presence of any sensitive areas and habitats. The presence and approximate density of protected trees in particular was noted, to facilitate the compilation of a sensitivity map for the site. The proposed sites for the substation were also investigated by foot and the presence of habitats considered sensitive, such as pans and riverbeds, were also noted. The presence of mammal fauna was recorded through direct observations and detection of signs (e.g. burrows). Active searches for reptiles and amphibians were also conducted within habitats likely to harbour or be important for such species.

2.3 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 as described above. Features that were specifically captured in the sensitivity map include drainage features, wetlands and dams, as well as rocky outcrops and steep slopes. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a low impact on ecological processes and terrestrial biodiversity. This category represents transformed or natural areas where the impact of development is likely to be local in nature and of low significance with standard mitigation measures.
- **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. 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. Development within these areas is 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 essentially no-go areas from a developmental perspective and should be avoided as much as possible.
- In some situations, areas where also categorized between the above categories, such as Medium-High, where an area appeared to be of intermediate sensitivity with respect to the two defining categories.

2.4 STUDY LIMITATIONS AND ASSUMPTIONS

Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the representivity of the species sampled at the time of the site visit should be critically evaluated. Conditions at the time of the site visit were fairly dry but considered adequate for the assessment as the dominant trees and grasses were still identifiable and it is not likely that there

are any listed plant species present that were not observed during the site visit. The area has been visisted several times in the past on other projects, and the vegetation is not naturally ephemeral. As a result, the timing and duration of the site visit is not seen to pose a significant constraint on the results of the study and it is unlikely that any significant features or species would be revealed by additional site visits.

The lists of amphibians, reptiles and mammals for the site are based on those observed at the site and in the immediate area as well as those likely to occur in the area based on their distribution and habitat preferences. This is a cautious and conservative approach which takes the study limitations into account.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

3.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), there are several vegetation types in the wider area around the project site but only two within the footprint of the power line corridors and substations (Figure 4). The route alternatives fall predominantly within the Olifantshoek Plains Thornveld vegetation type, with the northernmost section within the Kathu Bushveld vegetation type. The substation sites fall only within Olifantshoek Plains Thornveld.

Olifantshoek Plains Thornveld has a relatively limited extent of 8496 km^2 and occurs on most of the pediment areas of the Korannaberg, Langeberg and Asbestos Mountains as well as those of some ridges to the west of the Langeberg. It stretches from the vicinity of Sonstraal in the north, past Olifantshoek to areas north of Niekerkshoop between Volop and Griekwastad in the south as well as from Griekwastad northwards to the flats west of Lime Acres. It is described as a very wide and diverse unit on plains with usually open tree and shrub layers which vary in composition from place to place across the unit. It is classified as Least Threatened and has not been significantly impacted by transformation and about 99% of the original extent remains. It is however very poorly conserved and less than 1% is statutorily conserved in the Witsand Nature Reserve. No endemic species are known from this vegetation unit, which can be ascribed to its relatively limited extent and association with a relatively homogenous and unspecialised habitat.

The Kathu Bushveld vegetation unit occupies an area of 7443 km^2 and extends from around Kathu and Dibeng in the south through Hotazel and to the Botswana border between van Zylsrus and McCarthysrus. In terms of soils, the vegetation type is associated with aeolian red sand and surface calcrete and deep sandy soils of the Hutton and Clovelly soil forms. The main land types are Ah and Ae with some Ag. The Kathu

Bushveld vegetation type is still largely intact and less than 2% has been transformed by mining activity and it is classified as Least Threatened. It is, however, poorly conserved and does not currently fall within any formal conservation areas. Although no endemic species are restricted to this vegetation type a number of Kalahari endemics are known to occur in this vegetation type such as *Acacia luederitzii* var *luederitzii*, *Anthephora argentea*, *Megaloprotachne albescens*, *Panicum kalaharense* and *Neuradopsis bechuanensis*. Other vegetation types that occur in the immediate area include Kuruman Thornveld and Kuruman Mountain Bushveld, neither of which is of conservation concern.

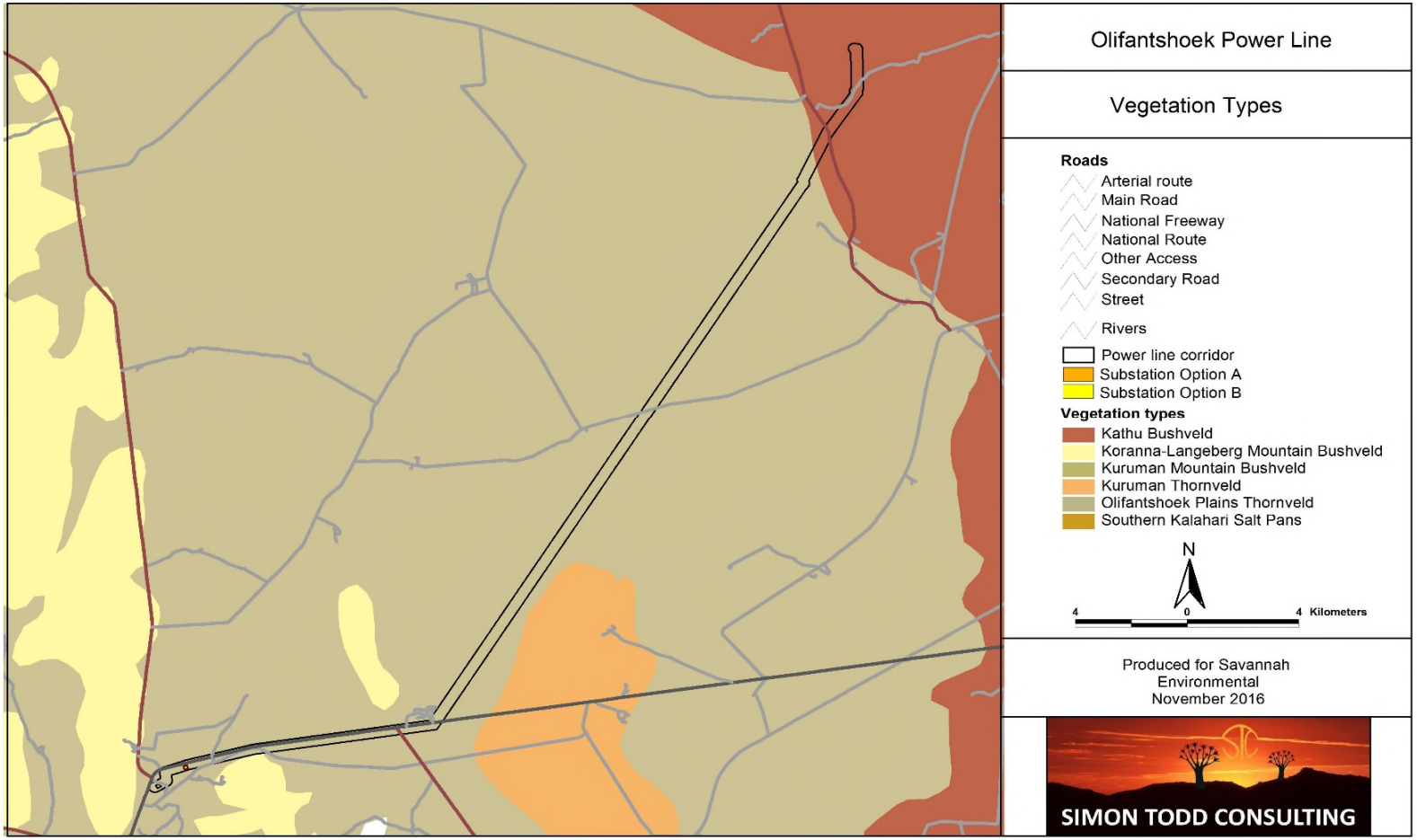

Figure 4. Broad-scale overview of the vegetation in and around the Olifantshoek powerline site and substation site. The vegetation map is an extract of the national vegetation map (Mucina & Rutherford (2006)), and also includes drainage lines within the site.

3.2 HABITATS AFFECTED BY THE POWER LINE

A number of different habitats are traversed by the power line route options and substation options (Figure 5) and these are described in brief below.

Acacia erioloba woodland:

The *Acacia erioloba* woodland (Figure 5) near the Emil switching station and south towards the gravel road to Dibeng, along Option 1, is dominated by small to medium (< 5m) *Acacia erioloba* trees, with larger individuals becoming more common nearer the road. The area under the existing power line within the corridor of Option 2 (Figure 6) has previously been cleared of trees but there has been some recruitment since then. There are several large individuals of *Acacia erioloba* south of the Emil switching station and southwards towards the Dibeng road.

Between the Emil switching station and the Dibeng road along Option 1 there are some previously cleared areas that were apparently used for centre pivot agriculture. These have since been abandoned and with a lot of young *Acacia erioloba* trees have recruited in this area (Figure 7). The overall sensitivity of this area is considered fairly low on account of the previous transformation. However, the recruitment of significant numbers of *Acacia erioloba* in this area increases the sensitivity as a result of the protected status of *Acacia erioloba*.

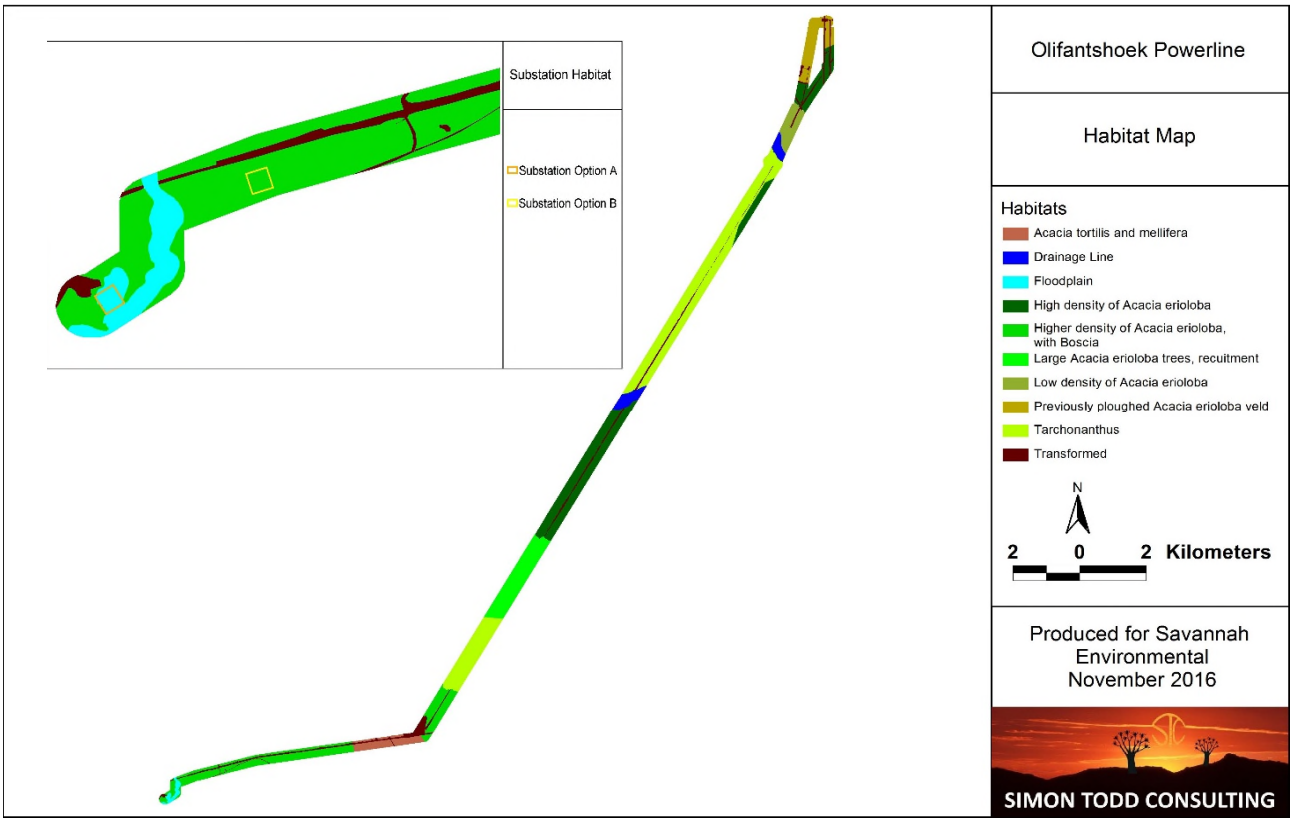

Figure 5. Fine-scale habitat map indicating the different plant communities and sensitive habitats across the powerline corridor, and of the substation options (insert).

Figure 6. Some recruitment of *Acacia erioloba* trees within the servitude along Option 2, looking southwards. Note the large *Acacia erioloba* trees present in the background.

Figure 7. *Acacia erioloba* woodland near the Emil switching station with mostly young trees, photographed here along Option 1. Large mature trees are not common. South of the Dibeng road, the ground becomes harder and stonier towards the approach to

the Gamagara River and *Acacia erioloba* trees become less dense, with *Acacia mellifera* becoming more common.

The *Acacia erioloba* woodland in the middle section of the powerline towards the Olifantsloop drainage line becomes increasingly dense. Further south of the Olifantsloop, the density of *Acacia erioloba* trees remains relatively high (Figure 8), with an increase in young recruiting trees. There are also patches of *Tarchonanthus camphoratus* (Camphor Bush) shrubs dispersed throughout the woodland. Mid-way between the Olifantsloop and the N14 road, there is a significant drop in the density of large *Acacia erioloba* individuals, while the density of young trees remains relatively high. Shrubs such as *Tarchonanthus camphoratus* and *Acacia mellifera* occur in sparsely distributed patches.

Figure 8. South of the Olifantsloop the density of *Acacia erioloba* trees remains relatively high, with an increase in younger trees. Note the large nest in the pylon, most likely constructed by White-backed Vultures (*Gyps africanus*), which are resident in the area.

Drainage Lines

Ephemeral rivers in arid ecosystems have high ecological value, and the riverbed, and particularly the deeper channels within the riverbed of the Gamgara River (Figure 9), are considered highly sensitive habitat. Disturbance within the immediate environment of the Gamagara River should be kept to a minimum.

Figure 9. Southward view along Option 1 towards the Gamagara River, with the existing 275kV line visible on the far left. The soil is harder and stonier here, with fewer *Acacia erioloba* trees and more *Acacia mellifera* shrubs.

The Olifantsloop originates near Olifantshoek and eventually flows into the Gamagara River. It is mostly an inconspicuous grassy depression where it is intercepted by the proposed power line (Figure 10). While it may not feature a distinctive riverbed such as the Gamagara River, similar care should be taken not to disturb the integrity of its morphology and hydrology.

Figure 10. The dry course of the Olifantsloop appears merely as a grassy depression. The surrounding woodland is characterized by a fair density of *Acacia erioloba* trees.

There is a small artificial earth dam constructed within the course of the Olifantsloop which could represent a site for amphibians and provide a water source for fauna. The small pan that lies close to the route of Option 1, can be considered an area of very high sensitivity. It may serve as an important refuge for amphibians, and possibly for the Near Threatened Giant Bullfrog *Pyxicephalus adspersus* which favours such habitats. Care should therefore be taken not to disturb this habitat during the construction of the power line.

Tarchonanthus – grass mosaic woodland:

South of the Gamagara River (Figure 11, 12), the woodland becomes sparse, dominated by patches of *Tarchonanthus camphoratus* and *Rhigozum* sp., alternating with open patches of grassland. Large *Acacia erioloba* trees are still present, but sparsely distributed. Where large *Acacia* trees can be spared from felling within the servitude, the development should have minimal impact on this particular habitat. Hence this area would be considered as medium sensitivity.

The density of *Acacia erioloba* trees is markedly lower along the route of Option 1 when compared to Option 2. This difference in tree density is likely due to the closer proximity of the Option 2 route to the Olifantsloop river, which runs almost parallel with the route for approximately 2 km before it flows into the Gamagara River.

Figure 11. Sparse woodland to the south of the Gamagara River, with the shrub layer dominated by patches of *Rhigozum trichotomum* and *Tarchonanthus camphoratus* shrubs alternating with open patches of grassland.

Figure 12. Mixed *Acacia-Tarchonanthus* woodland showing sparsely distributed *Acacia erioloba* trees along the Option 1 power line route, and a marked increase in the density of shrubs such as *Tarchonanthus camphoratus* and *Acacia mellifera*.

Towards Olifantshoek the density of *Acacia erioloba* declines, especially with respect to young recruiting trees, while *Tarchonanthus camphoratus* become increasingly more common. The grass layer is sparser here, with the intrusion of unpalatable shrubs, a possible indication of over-grazing by livestock (Figure 13).

Figure 13. Recruitment of *Acacia erioloba* is much reduced within this area, while shrubs such as *Tarchonanthus camphoratus* are far more common. Part of the tower trellis structure for the new 400 kV line under construction can be seen lying on the ground on the right.

Acacia tortilis/mellifera woodland:

The woodland habitat occurring along the southern-most sections of the line start shortly before the N14 road, is dominated by *Acacia tortilis* trees and thickets of *Acacia mellifera* (Figure 14). Several *Boscia albitrunca* individuals also occur along this portion towards the N14 road.

Figure 14. Just north of the N14 road between Olifantshoek and Kathu the density of *Acacia erioloba* trees increases marginally. *Acacia tortilis* trees and thickets of *Acacia mellifera* become increasingly more prominent

Figure 15. *Boscia albitrunca* is common along the N14 road to the east of Olifantshoek, with *Acacia erioloba*, *Acacia tortilis* and *Acacia mellifera* also being present.

Both Option 1 and 2 of the proposed power line cross the N14 road approximately 7 km east of Olifantshoek, and then follow the N14 road (on the south side) towards Olifantshoek. The first portion of this route has a low density of protected trees with mostly *Acacia tortilis* and *Acacia mellifera* being present. *Boscia albitrunca* and *Acacia erioloba* both become increasingly more common towards Olifantshoek (Figure 15), while *Acacia karoo* becomes rather prominent on the outskirts of the town due to the presence of the Olifantsloop riparian zone.

3.3 HABITATS AFFECTED BY THE OLIFANTSHOEK SUBSTATION

Two site options (Site A and B) on the outskirts of Olifantshoek (Figure 5, and see Figures 16,17 below) are proposed for the establishment of a new substation. The proposed power line from the Emil switching station will approach Olifantshoek on the south side of the N14 road between Olifantshoek and Kathu, leading to either substation Site B, or Site A, which is located closer to the town.

Site A (alternative) supports a dense, tall thicket of *Acacia karoo* (reaching over 5 m in height), a shrub layer comprising mostly *Ziziphus mucronata*, *Grewia flava* and some

Tarchonanthus camphoratus (Figure 16). Only a few *Prosopis* sp. individuals are present, and hence the site appears relatively intact. The site is not likely to support any sensitive habitat with respect to reptiles, amphibians or mammals.

Site B (preferred) also represents intact habitat with *Acacia erioloba* (4 to 5 m in height) as the dominant tree species (Figure 17). Other tree species include the protected *Boscia albitrunca* (one individual)*, Ziziphus mucronata* and shrubs such as *Acacia hebeclada* and *Acacia mellifera*. No alien tree species were detected at the site, although some *Prosopis* sp. trees were present in the vicinity. The grass layer appears heavily grazed by livestock. There were numerous burrows of South African Ground Squirrel *Xerus inauris*, and earth heaps made by Damaraland Mole-rats *Cryptomys damarensis*, which are common throughout the Kalahari region.

Figure 16. Substation Site A is dominated by tall *Acacia karoo* trees and appears to be in a relatively natural state, despite numerous footpaths through the site.

Figure 17. View (looking south) over Site B, which supports some large *Acacia erioloba* trees, one *Boscia albitrunca*, some shrubs of the following species, *Ziziphus mucronata*, *Acacia hebeclada* and *Acacia mellifera*. An informal settlement encroaching on the site is visible behind the trees.

The site of the existing old Olifantshoek substation is highly transformed due to the long term presence of eletrical infrastructure, and only supports degraded vegetation, predominantly consisting of weedy pioneer species.

3.4 LISTED & PROTECTED PLANT SPECIES

According to the SANBI POSA database, 223 indigenous plant species have been recorded from the quarter degree square 2722D. This includes 1 species of conservation concern. *Acacia erioloba* (Declining) is present at the site in fairly high numbers. It is however likely that *Boophone disticha* (Declining) also occurs at the site, based on the presence of this species at nearby sites. There are also additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* and *Acacia erioloba* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, all species within the *Euphorbiaceae*, *Oxalidaceae*, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. It is not likely that many *Boscia albitrunca* would be affected by the development as this species is mostly restricted to the larger drainage lines at the site. The overall impact on listed and protected species would however be moderate after mitigation and avoidance and no highly significant impacts on such species are anticipated. Relatively large numbers of *Acacia erioloba* would however potentially be affected if the servitude is significantly widened and wholesale clearing of this area occurs.

3.5 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

The Northern Cape Conservation Plan has recently been completed and will be released to the public shortly. The power line and substation footprints do not fall within a CBA, but the corridor does traverse Ecological Support Areas (ESA) associated with the drainage lines (Figure 18) and the substation options also lie within the ESA. The presence of the line would not compromise the the functioning of the ESA in any way, especially as it would be adjacent to an existing line. In addition, the site does not fall within an NPAES focus area. As the footprint of the power line is relatively limited, the impact of the development of the Olifantshoek power line is not likely to result in significant disruption of any broad-scale ecological processes.

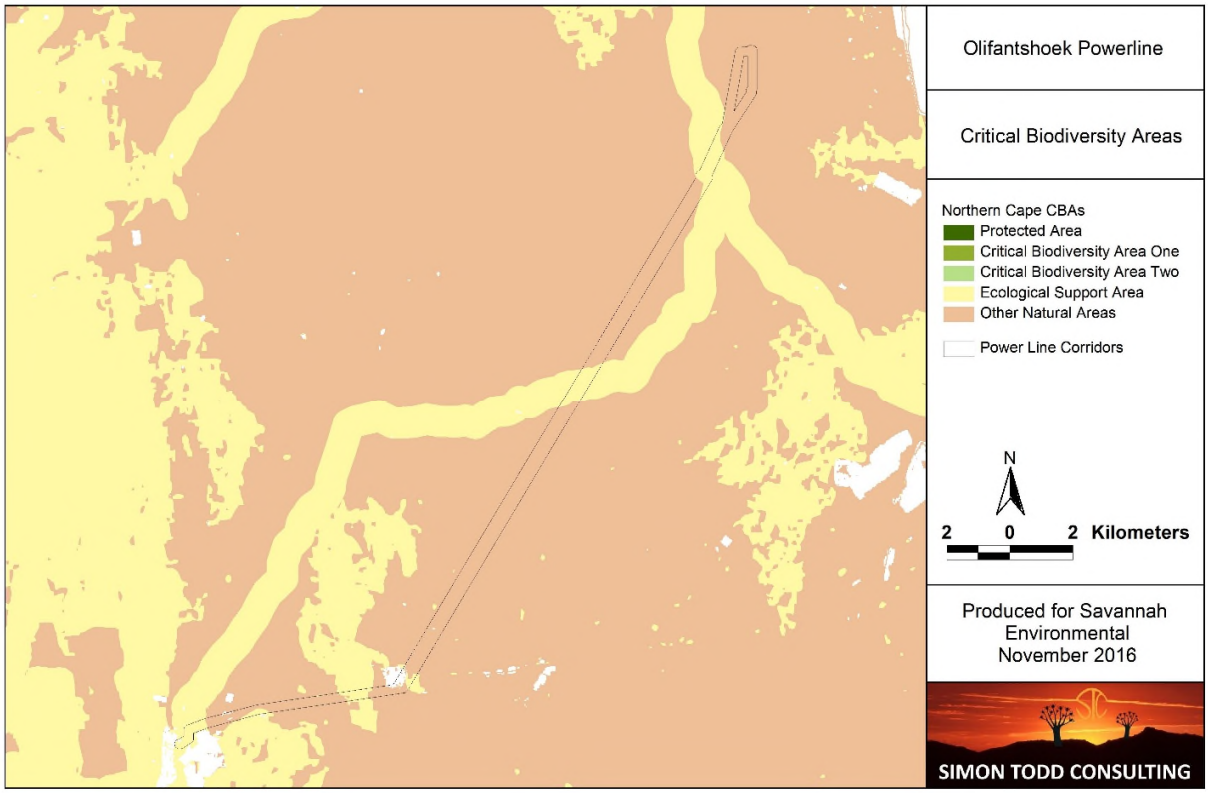

Figure 18. Broad-scale overview of the Critical Biodiversity Areas and Ecological Support Areas in and around the Olifantshoek powerline site. The map is an extract of the Northern Cape Conservation Plan (Holness & Oosthuizen 2016)

3.6 FAUNAL COMMUNITIES

Mammals

The project site falls within the distribution range of 49 terrestrial mammals (Annex 1), indicating that the mammalian diversity in the area is of moderate to high potential. Habitat diversity within the study area is however fairly low as there are no hills or rocky ridges present. Areas of specific significance for mammals are likely to be drainage lines which provide greater cover as well as moisture and forage availability. The intervening veld is not considered highly sensitive from a faunal perspective as similar habitat is widely available in the area.

The following species have been observed in the area South African Ground Squirrel *Xerus inauris*, Springhare *Pedetes capensis*, Aardvark *Orycteropus afer*, Damaraland Mole-rat *Cryptomys damarensis,* Cape Porcupine *Hystrix africaeaustralis*, Cape Fox *Vulpes chama*, Bat-eared Fox *Otocyon megalotis*, Yellow Mongoose *Cynictis penicillata*,

Slender Mongoose *Galerella sanguinea*, Suricate *Suricata suricatta*, Aardwolf *Proteles cristatus*, Steenbok *Raphicerus campestris*, and Common Duiker *Sylvicapra grimmia* as well as a variety of small mammals typical of the area

Four listed terrestrial mammals may occur at the site, the Honey Badger *Mellivora capensis* (Endangered), Brown Hyaena *Hyaena brunnea* (Near Threatened), Southern African Hedgehog *Atelerix frontalis* (Near Threatened) and the African Pangolin *Smutsia temminckii* (Vulnerable). Although the area is used for livestock production, human activity in the area is low and it is likely that all four listed species occur in the general area. As these species have a wide national distribution, the power line would generate an insignificant extent of habitat loss for these species. These species can be expected to occur in very low numbers, or be largely transient (e.g. Brown Hyaena) within the broader area. Due to the minimal extent of habitat transformation associated with power line construction (aside from the removal of trees), the proposed line is not likely to significantly impact any mammal species occurring within the area, including the red-listed species. As the African Pangolin has recently been upgraded to CITES Appendix 1 due to the high rates of illegal trading in this species, there should be strict measures to prohibit poaching of wild animals at the site during all phases of development.

Reptiles

According to the SARCA and the reptile literature (Annex 2), 37 reptile species are known from the area suggesting that the reptile diversity within the site is likely to be moderate to low. Species observed in the area on prior site visits in the vicinity of the site include the Cape Cobra *Naja nivea*, Ground Agama *Agama aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata*, Variable Skink *Trachylepis varia*, Bibron's Blind Snake *Afrotyphlops bibronii*, Cape Gecko *Lygodactylus capensis capensis*, Striped Skaapsteker *Psammophylax tritaeniatus*, Boomslang *Dispholidus typus typus* and Spotted Sand Lizard *Pedioplanis lineoocellata*.

No species of conservation concern are known to occur in the area and impacts on reptiles are likely to be restricted largely to minor habitat loss and disturbance within the development footprint. Within the affected area, there are no large rocky outcrops or other specialised reptile habitats. Potential impacts on reptiles are likely to be local in nature and restricted largely to the construction phase.

Amphibians

The site lies within the distribution range of 6 amphibian species. The only pan within the affected area that is sufficiently large so as to be of importance for amphibians lies outside the powerline corridor and therefore, provided that spills of waste fluids or construction waste are contained, the powerline should have low impact on this pan.

There are no natural perennial water sources within the affected area and all the drainage systems are ephemeral and not likely to hold water for more than a few days at a time. Due to the prevailing aridity of the area, amphibian abundance in the power line corridor is likely to be low. Of these only those which are relatively independent of water such as the Karoo Toad *Vandijkophrynus gariepensis* are likely to be present. The Giant Bull Frog *Pyxicephalus adspersus* (Near Threatened) is the only listed species and occupies shallow grassy pans, vleis and other rain-filled depressions in savannas and grasslands, with its habitat most at risk from transformation. As the only pan in the vicinity lies just outside the powerline corridor, there are unlikely to be any impacts on this species, provided construction activity does not directly impact this pan. Impacts on amphibians are likely to be local in extent and of low significance.

3.7 SITE SENSITIVITY ASSESSMENT

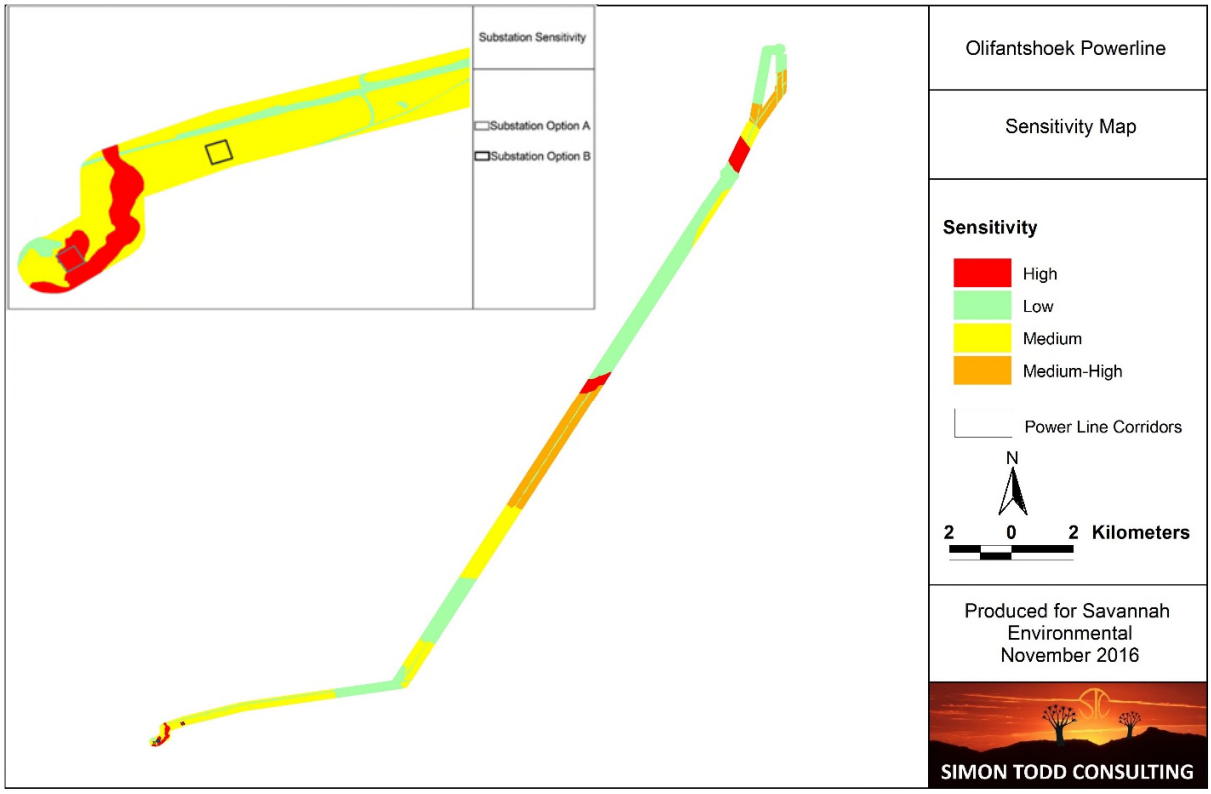

Figure 19. Ecological sensitivity map of the proposed Olifantshoek power line corridor and substation sites (insert).

Power Line Route Alternatives

The ecological sensitivity map of the Olifantshoek powerline alternatives is illustrated above in Figure 19. There is not a lot difference between the different power line alternatives with respect to the nature and extent of sensitive ecological features within

the different alternatives. At a broad level, moderately sensitive habitats include the areas along the routes which support high densities of *Acacia erioloba* trees, and high sensitivity areas include the drainage lines, such as the Gamagara River and the Olifantsloop drainage lines. The footprint includes several transformed areas of low sensitivity including overgrazed *Tarchonanthus* veld, mining areas, servitudes and roads.

There are only two route options for proposed power line, which run mostly parallel to each other but on either side of an existing 275kV line. Both options therefore traverse identical habitat, with no major significant habitat differences. The most notable differences in habitat between the routes include a higher density of large *Acacia erioloba* trees along Option 2 south of the Emil switching station, and then again south of the Gamagara River. Furthermore, Option 1 lies to the west of a 400kV power line which is currently under construction. It therefore seems probable that the ecological disturbance caused during the construction of the proposed line along Option 1 will be lower, since it would be directly adjacent to the 400kV line. Finally, a small pan that lies to the west of Option 1 is considered a sensitive habitat, but it is not located directly within the corridor footprint of Option 1, and mitigation measures recommended below for the potential impacts of the powerline will cover any indirect potential impact to this pan too.

Another feature of concern would be the two drainage lines that would need to be crossed by each alternative. However, the drainage lines are mostly of small extent and it should not be difficult for the power line to cross these features with minimal direct impact. However, the primary purpose of clearing the vegetation beneath power lines is to prevent outages and damage to the line when and if fires occur beneath the lines and as fires are not a natural feature of the area and the wood vegetation is not specifically prone to fires, there is little justified reason to clear extensive areas beneath the power lines in the study area. As such, it should be possible to maintain the direct footprint of the development at a low level of impact and maintain all impacts within acceptable limits.

Substation Alternatives:

The substation site options are located within natural habitat; although substation Option A (alternative) supports trees that are not protected (primarily *Acacia karoo*), but it is part of the sensitive riparian woodland of the Olifantsloop River. The site is also within the limits of Olifantshoek town, thereby potentially requiring the clearing of large protected and unprotected trees along the servitude. Substation Option B (preferred) is located well beyond the outskirts of Olifantshoek, and will therefore not require

additional servitude. It is located on a site that supports several large *Acacia erioloba* trees, and an active population of Damaraland mole-rats, but is considered Medium sensitivity due to the large extent of this habitat across the landscape. While both sites support features that may be considered fairly high value, substation Option A (alternative) would be considered the most sensitive owing to its contribution towards the riparian zone and associated ecological services of the Olifantsloop. As such, Option B is considered to be the preferred location and with some fine-scale adjustment of the final position of the substation, impacts on protected trees could also be reduced to some extent.

The existing substation which is to be decommissioned is situated on Low Sensitivity transformed areas.

4 IMPACT ASSESSMENT

4.1 IMPACT RISK FACTORS

Potential ecological impacts resulting from the construction and operation of the proposed Olifantshoek power line and the new substation would stem from a variety of different activities and risk factors associated with the construction and operational phases of the project including the following:

Planning & Construction Phase

- Vegetation clearing & site preparation
- Operation of heavy machinery at the site
- Human presence

Operational Phase

- Servitude maintenance activities
- Power line presence
- Human presence

Decomissioning

- Operation of heavy machinery at the site
- Human presence

The above impacts would be likely to result in the following impacts which are described briefly below and assessed for each phase of the development (including the power line and substation) as appropriate thereafter:

Construction Phase

Impacts on vegetation and protected plant species

Although direct impact to most sensitive features such as pans can be avoided, some vegetation loss will occur regardless of mitigation and avoidance and it is also likely that at least some individuals of listed or protected plant species will be impacted by the development of the power line and associated infrastructure. The abundance of protected species such as *Acacia erioloba* and *Boscia albitrunca* is high along some parts of the power line route and within the new substation site and some impact on these species is likely. The decommissioning of the old Olifantshoek substation is not likely to affect vegetation due to the high transformation of the existing site.

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna during construction of the power lines and substation. Sensitive and shy fauna would 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. Some mammals or reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the presence of construction personnel or greater site access.

Operational Phase

Degradation of ecosystems

Maintenance activities such as vegetation clearing as well as the large amount of disturbance created during construction of the power line and substation will leave the site vulnerable to degradation through alien plant invasion and soil erosion. In addition, the disturbed areas will also be vulnerable to alien plant invasion, especially woody species such as *Propsopis*, which was observed to be present at the site at a low density, but which could quickly invade disturbed areas. Areas near to wetlands and watercourses are usually particularly vulnerable to alien plant invasion and disturbance in these areas should be kept to a minimum to reduce this risk.

Decommissioning & Closure

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna during decommissioning of the new power line, the new substation and during the decommissioning of the old Olifantshoek substation. Sensitive and shy fauna would move away from the area during decommissioning as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the decommissioning activities and might be killed. Some mammals or reptiles would be vulnerable to illegal collection or poaching during this phase as a result of the presence of construction personnel or greater site access.

Degradation of ecosystems

It is likely that decommissioning will generate moderate levels of disturbance that will leave the site of the power line, new substation and old Olifantshoek substation vulnerable to degradation through alien plant invasion and soil erosion. Disturbance without follow-up maintenance activities would pose a risk of generating soil erosion and alien plant invasion problems. In addition, the use of heavy machinery to remove the infrastructure would also pose a risk of degradation through pollution impacts.

Cumulative Impacts

There are a number of cumulative impacts in the area, most notably the mining activity towards Kathu. These are however largely associated with the rocky hills of the area with some infrastructure such as processing plants and railway infrastructure on the plains. The power line will however contribute little to cumulative impact as the ground layer will remain intact and the loss of some trees is not considered likely to generate significant cumulative impact as trees such as *Acacia erioloba* are widespread and abundant in the area.

However, it was observed that numerous *Acacia erioloba* trees had been felled (the stumps had been chemically treated) within the servitude below the existing 275kV line, south of the Emil switching station. If the clearing of *Acacia erioloba* trees under both the new 400kV line and the proposed 132kV line is to be undertaken extensively along the entire length of the Olifantshoek servitude, this will amount to the loss of hundreds of trees. Besides the ecological consequences of such clearing, the significant amount of cut wood could also encourage illicit trade and sale in camelthorn wood.

4.2 Assessment of Impacts

The impacts for the power line and new susbstation are the same in nature and extent and are assessed below. The impacts of the decommissioning of the old Olifantshoek substation are assessed separately.

4.2.1 Planning & Construction Phase: Power Line and Substation

Impact 1: Impacts on vegetation & protected plant species of the power line and substation during construction

Impact Nature: Impacts on vegetation and protected plant species will occur due to vegetation clearing and disturbance associated with the construction of the powerline and associated infrastructure. There are protected trees present along the route, especially *Acacia erioloba*. However, there are no highly sensitive features within the site and overall post-mitigation impacts are likely to be **Medium**.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Certain (5)	Probable (4)
Significance	Medium (55)	Medium (36)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Impacts on protected plant species can to some extent be mitigated through avoidance, but some impact on vegetation and protected species is inevitable and cannot be avoided.	
Mitigation	• Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated or avoided. • Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained. • 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, remaining within demarcated construction areas etc. • Vegetation clearing activities near sensitive areas should be kept to a minimum and these activities monitored by the Environmental Control Officer. • Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. Preferably *Acacia erioloba* trees under the line should be trimmed and not cut down.	

	• All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. • Temporary lay-down areas should be located within the development footprint or within areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use. • A permit from DENC is required for any vegetation clearing, destruction or translocation of listed or protected plant species. • Existing tracks should be used for access wherever possible. • The morphology and hydrology of the riverbeds should not be altered by unnecessary excavations, dumping of soil or other waste.
Cumulative Impacts	The potential for cumulative impacts is low given the footprint of the line and the level of existing development in the area. Although many *Acacia erioloba* could be affected, this is the dominant tree in the area and the loss of several hundred individuals is not considered highly significant.
Residual Impacts	Some residual habitat loss will result from the development, equivalent to the operational footprint of the facility.

Impact 2. Faunal Impacts During Construction of the Power Line and Substation.

Impact Nature: Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.
There are fauna resident within the site and these will be impacted during construction of the facility. However, faunal diversity and density within the site is low and post mitigation impacts are likely to be **Low** and of **Local** significance only.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (5)	Low (4)
Probability	Probable (4)	Probable (3)
Significance	Medium (32)	Low (21)
Status	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Large amounts of noise and disturbance at the site during construction is largely unavoidable.	
Mitigation	• The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises which are often persecuted out of superstition, or pangolin which are traded illegally. • Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified person in line with the required permit.	

	• No construction activity should be allowed at the site between sunset and sunrise. • All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises. • 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.
Cumulative Impacts	During the construction phase, the activity would contribute to cumulative fauna disturbance and disruption in the area, but the impact would be of local extent and not of high significance with mitigation.
Residual Impacts	There will be minimal residual impact as the facility will have low operational impacts on fauna, after the construction phase.

4.2.2 Operational Phase Impacts: Power Line and Substation

Impact 1. Degradation of Ecosystems during operation of the power line and substation

Impact Nature: Disturbance is likely to increase the vulnerability of the disturbed areas to erosion. Furthermore, these areas are likely to remain vulnerable to alien plant invasion for some time following construction and alien species could invade suitable sites created during the construction disturbance.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Medium (5)	Low (3)
Probability	Probable (4)	Improbable (3)
Significance	Medium (44)	Low (21)
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation	• Erosion control measures should be implemented in areas where soil has been disturbed due to construction activities. • Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site. A long-term control plan will need to be implemented and regular monitoring for alien plants within the development footprint should be undertaken. • 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 and should only be used for woody species which re-sprout following continual manual control.	

Cumulative Impacts	Alien invasion would contribute to cumulative habitat degradation in the area, but if alien species are controlled then the cumulative impact from alien species would not be significant.
Residual Impacts	If erosion and alien species at the site are controlled, then there will be very little residual impact.

4.2.3 Decommissioning & Closure: Power Line and Substation

Impact 1. Faunal Impacts During Decommissioning of the Power Line and Substation

Impact Nature: Disturbance or persecution of fauna during the decommissioning phase may occur.
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna resident or utilising the site. Sensitive and shy fauna would move away from the area during the decommissioning 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. Some mammals and reptiles would also be vulnerable to illegal collection or poaching.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Medium (4)	Low (2)
Probability	Probable (4)	Improbable (3)
Significance	Low (28)	Low (15)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes.	
Mitigation	• The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • Any accidental chemical, fuel, and oil spills that occur at the site during decommissioning should be cleaned up in the appropriate manner as related to the nature of the spill. • No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped. • All disturbed areas should be rehabilitated with a cover of indigenous plants.	
Cumulative Impacts	Cumulative impacts at the decommissioning phase are likely to be low.	
Residual Impacts	With avoidance measures there should be no residual impact on fauna.	

Impact 2. Degradation of Ecosystems following decommissioning of the Power Line and Substation

Impact Nature: Alien plants are likely to invade the decommissioned sites as a result of disturbance created during decommissioning. This impact would be likely to persist from several years after decommissioning until such time as a cover of indigenous species recovered. Disturbance during decommissioning will leave the site vulnerable to soil erosion.		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Medium (5)	Low (3)
Probability	Probable (4)	Improbable (3)
Significance	Medium (44)	Low (21)
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation	• Due to the disturbance at the site during decommissioning, alien plant species are likely to invade the site and a long-term control plan will need to be implemented for several years after decommissioning • Regular monitoring (bi-annual) for alien plants within the development footprint for 2-3 years after decommissioning. • Regular alien clearing should be conducted every year for 2 years using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. • Cleared and disturbed areas should be revegetated with a cover of indigenous grass or shrubs.	
Cumulative Impacts	Alien invasion would contribute to cumulative habitat degradation in the area, but if alien species are controlled then, then cumulative impacts from alien species would not be significant.	
Residual Impacts	If alien species at the site are controlled, then there will be very little residual impact. If erosion is controlled, then there will be very low residual impacts.	

4.2.4 Decommissioning & Closure: Old Olifantshoek substation

Impact 1. Faunal Impacts During Decommissioning of the old Substation

Impact Nature: Disturbance or persecution of fauna during the decommissioning phase may occur. Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna resident or utilising the site. Sensitive and shy fauna would move away from the area during the decommissioning 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. Some mammals and reptiles would also be vulnerable to illegal collection or poaching.		
	Without Mitigation	**With Mitigation**

Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Medium (3)	Low (2)
Probability	Probable (4)	Improbable (3)
Significance	Low (24)	Low (15)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes.	
Mitigation	• The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • Any accidental chemical, fuel, and oil spills that occur at the site during decommissioning should be cleaned up in the appropriate manner as related to the nature of the spill. • No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped. • All disturbed areas should be rehabilitated with a cover of indigenous plants.	
Cumulative Impacts	Cumulative impacts at the decommissioning phase are likely to be low.	
Residual Impacts	With avoidance measures there should be no residual impact on fauna.	

Impact 2. Degradation of Ecosystems following decommissioning of the old Substation

Impact Nature: Alien plants are likely to invade the decommissioned site of the old substation as a result of disturbance created during decommissioning. This impact would be likely to persist from several years after decommissioning until such time as a cover of indigenous species recovered. Disturbance during decommissioning will leave the site vulnerable to soil erosion.

	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Medium (3)	Low (3)
Probability	Probable (4)	Improbable (3)
Significance	Medium (40)	Low (21)
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No

Can impacts be mitigated?	Yes
Mitigation	• Due to the disturbance at the site during decommissioning, alien plant species are likely to invade the site and a long-term control plan will need to be implemented for several years after decommissioning • Regular monitoring (bi-annual) for alien plants within the development footprint for 2-3 years after decommissioning. • Regular alien clearing should be conducted every year for 2 years using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. • Cleared and disturbed areas should be revegetated with a cover of indigenous grass or shrubs.
Cumulative Impacts	Alien invasion would contribute to cumulative habitat degradation in the area, but if alien species are controlled then, then cumulative impacts from alien species would not be significant.
Residual Impacts	If alien species at the site are controlled, then there will be very little residual impact. If erosion is controlled, then there will be very low residual impacts.

4.2.5 Cumulative Impacts of project

Impact. *Cumulative habitat loss and impacts on broad-scale ecological processes.*

Impact Nature: The power line and substation would contribute to cumulative habitat loss and disruptions of broad-scale ecological processes in the area, the contribution is however likely to be low.		
	Cumulative Contribution of Proposed Project	**Cumulative Impact without Proposed Project**
Extent	Locall (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (3)
Probability	Probable (3)	Probable (3)
Significance	Low (30)	Low (24)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To a large extent but some impact will remain due to clearing along the power line corridor.	
Mitigation	• The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. • Mitigation measures of the current site should align with neighbouring sites and other developments in the area.	
Cumulative Impacts	The development will contribute to cumulative impact, but the overall contribution will be low.	
Residual Impacts	Residual impact would be restricted to a small amount of habitat loss and occasional disturbance due to maintenance activities along the line.	

5 CONCLUSION & RECOMMENDATIONS

The ecological features appear to be largely similar for both the proposed power line options, however Option 1 will have a lower overall impact on the receiving environment. The different options have large sections in common and ultimately, Option 1 is considered to be the preferred option due to its lower potential impact on vegetation within the more sensitive areas. There are no significant irreversible impacts associated with the proposed power line and substation options, provided that the clearing of trees in the servitude is reconsidered or reduced to the minimum required to adhere to Eskom safety requirements. The proposed power line and substation footprints will have minimal impact on high sensitivity areas such as the riverbeds and pans, provided the morphology and hydrology of these areas are not disturbed during the construction phase of the development.

The major impacts of the development of the power line and substation would occur during the construction phase, due to the disturbance that would take place at this time. Construction phase disturbance would however be transient and while impacts on flora are likely to persist for some time, impacts on fauna during operation would be very low. Although there are some sensitive features present in the area especially the drainage lines and patches of *Acacia erioloba*, with proper planning of the pylon and substation footprints, impacts to these areas can be minimised. Due to the low overall footprint of the power line and its relatively low length, and the small extent of the substation, impacts associated with the construction and operation of the development would be local in nature and of low overall significance after mitigation.

An important issue relating to the potential impact of the power line is the possibility that the whole power line servitude is cleared of all large woody vegetation. This is usually done in areas where there is a high fire risk, but in the current area, fires do not occur as a natural phenomenon as the cover is generally too low. As such, the power line servitude should not be indiscrimately cleared and any trees which are tall and pose a risk to the safety of the line should be cut to a lower height, but it should not be necessary to remove them completely.

Although the ecological value of the substation sites near Olifantshoek are each considered fairly sensitive, it is expected that the construction of the substation at site Option B will have a lower ecological impact. Although Option B supports protected tree species, the habitat occurs widely in the region, while site Option A supports a restricted and ecologically sensitive habitat type associated with a riparian zone.

The decommissioning of the old Olifantshoek substation is likely to have a low impact due to the existing transformed nature of the site, provided that erosion and alien invasive plant control is continued after decommissioning activities.

Overall and with the suggested mitigation measures applied, the impact of the proposed Olifantshoek 132 kV line and substation would be of local extent and low significance. There are no impacts associated with the development of the power line and substation that are considered to be high and which cannot be mitigated to a low level.

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ANNEX 1. LIST OF MAMMALS

List of mammals which are likely to occur in the vicinity of the site. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2014.2 and South African Red Data Book for Mammals.

Scientific Name	Common Name	Status	Habitat	Likelihood
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 rupestris	Western Rock Elephant Shrew	LC	Rocky koppies, rocky outcrops or piles of boulders where these offer sufficient holes and crannies for refuge.	High
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	High
Lagomorpha (Hares and Rabbits):				
Lepus capensis	Cape Hare	LC	Dry, open regions, with palatable bush and grass	Confirmed
Lepus saxatilis	Scrub Hare	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
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	High
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	High
Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	High
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
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	High
Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies,	High

Scientific Name	Common Name	Status	Habitat	Likelihood
			outcrops or boulder-strewn hillsides they use these preferentially	
Parotomys brantsii	Brants' 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	High
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.	Low
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
Gerbilliscus leucogaster	Bushveld Gerbil	DD	Predominantly associated with light sandy soils or sandy alluvium	Low
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	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
Saccostomus campestris	Pouched Mouse	LC	Catholic habitat requirements, commoner in areas where there is a sandy substrate.	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	High
Eulipotyphla (Shrews):				
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
Erinaceomorpha (Hedgehog)				
Atelerix frontalis	South African Hedgehog	NT	Generally found in semi-arid and subtemperate environments with ample ground cover	Low
Carnivora:				
Proteles cristata	Aardwolf	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	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	High
Hyaena brunnae	Brown Hyaena	NT	Nama and Succulent Karoo and the drier parts of the Grassland and Savanna Biomes.	Likely

Scientific Name	Common Name	Status	Habitat	Likelihood
Felis nigripes	Black-footed cat	LC	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	LC	Occur in open arid associations	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	High
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Confirmed
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance	High
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.	High
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Confirmed
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	Confirmed
Mellivora capensis	Ratel/Honey Badger	NT	Catholic habitat requirements	High
Rumanantia (Antelope):				
Oryx gazella	Gemsbok	LC	Open arid country	High
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	High
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Confirmed
Chiroptera (Bats):				
Neoromicia capensis	Cape Serotine Bat	LC	Wide habitat tolerances, but often found near open water	High
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	In arid areas. often associated with water sources	High
Nycteris thebaica	Egyptian Slit-faced Bat	LC	Wide habitat tolerance	High
Philodota (Pangolins)				
Smutsia temminckii	Ground Pangolin	VU	Savanna species which does not occur in grasslands, forests or desert	Low

ANNEX 2. LIST OF REPTILES

List of reptiles which are likely to occur at the proposed Olifantshoek powerline site, based on distribution records from Branch (1988) and Alexander and Marais (2007), as well as the ADU Virtual Museum's South African Reptile Conservation Assessment (SARCA) database http://vmus.adu.org.za. Conservation status is from the IUCN Red Lists as well as the South African Reptile Conservation Assessment (SARCA) database http://vmus.adu.org.za, Barnes et al. (2014). The majority of reptile species have not been assessed by the IUCN.

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	*Agama*	*aculeata*	*aculeata*	Common Ground Agama	Least Concern
Agamidae	*Agama*	*anchietae*		Anchieta's Agama	Least Concern
Agamidae	*Agama*	*atra*		Southern Rock Agama	Data Deficient
Colubridae	*Lamprophis*	*fuliginosus*		Brown House Snake	Least Concern
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern
Colubridae	*Psammophis*	*namibensis*		Namib Sand Snake	Least Concern
Colubridae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern
Colubridae	*Telescopus*	*semiannulatus*	*semiannulatus*	Eastern Tiger Snake	Least Concern
Colubridae	*Dispholidus*	*typus*	*typus*	Boomslang	Least Concern
Colubridae	*Dispholidus*	*typus*	*viridis*	Northern Boomslang	Not Evaluated
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern
Elapidae	*Dendroaspis*	*polylepis*		Black Mamba	Least Concern
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*	*latirostris*		Quartz Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*rugosus*		Common Rough Gecko	Least Concern
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern
Lacertidae	*Heliobolus*	*lugubris*		Bushveld Lizard	Least Concern

Family	Genus	Species	Subspecies	Common name	Red list category
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern
Lacertidae	*Pedioplanis*	*inornata*		Plain Sand Lizard	Least Concern
Lacertidae	*Pedioplanis*	*lineoocellata*	*lineoocellata*	Spotted Sand Lizard	Least Concern
Lacertidae	*Pedioplanis*	*namaquensis*		Namaqua Sand Lizard	Least Concern
Scincidae	*Acontias*	*lineatus*		Striped Dwarf Legless Skink	Least Concern
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern
Scincidae	*Trachylepis*	*occidentalis*		Western Three-striped Skink	Least Concern
Scincidae	*Trachylepis*	*sparsa*		Karasburg Tree Skink	Least Concern
Scincidae	*Trachylepis*	*spilogaster*		Kalahari Tree Skink	Least Concern
Scincidae	*Trachylepis*	*sulcata*	*sulcata*	Western Rock Skink	Least Concern
Scincidae	*Trachylepis*	*variegata*		Variegated Skink	Least Concern
Testudinidae	*Psammobates*	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed
Testudinidae	*Psammobates*	*oculifer*		Serrated Tent Tortoise	Not listed
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Least Concern
Typhlopidae	*Rhinotyphlops*	*lalandei*		Delalande's Beaked Blind Snake	Least Concern
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Least Concern
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern

ANNEX 3. LIST OF AMPHIBIANS

List of frog species which are likely to occur in general vicinity of the project site, based on the distribution maps provided by Du Preez and Carruthers (2009), as well as the ADU Virtual Museum which includes the Frog Atlas of Southern Africa database http://vmus.adu.org.za. Conservation status is from the IUCN Red Lists and the Frog Atlas database.

Family	Genus	Species	Common name	Red list category
Brevicepitidae	*Breviceps*	*adspersus*	Bushveld Rain Frog	Least Concern
Bufonidae	*Amietophrynus*	*gutturalis*	Guttural Toad	Least Concern
Bufonidae	*Sclerophrys*	*poweri*	Power's Toad	Least Concern
Bufonidae	*Amietophrynus*	*rangeri*	Raucous Toad	Least Concern
Bufonidae	*Poyntonophrynus*	*vertebralis*	Southern Pygmy Toad	Least Concern
Bufonidae	*Vandijkophrynus*	*gariepensis*	Karoo Toad	Least Concern
Hyperoliidae	*Kassina*	*senegalensis*	Bubbling Kassina	Least Concern
Pipidae	*Xenopus*	*laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia*	*angolensis*	Common or Angola River Frog	Least Concern
Pyxicephalidae	*Amietia*	*delallandii*	Delalandi's River Frog	Least Concern
Pyxicephalidae	*Cacosternum*	*boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Pyxicephalus*	*adspersus*	Giant Bull Frog	Near Threatened
Pyxicephalidae	*Tomopterna*	*cryptotis*	Tremelo Sand Frog	Least Concern