BASIC ASSESSMENT FOR THE 132/11kV SUBSTATION FOR THE OLIFANTSHOEK - EMIL 132KV POWER LINE, NORTHERN CAPE PROVINCE:

FAUNA & FLORA SPECIALIST REPORT

savannah environmental

PRODUCED FOR SAVANNAH ENVIRONMENTAL

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CONTENTS

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 exsiting Emil switching station and the proposed new 132/11kV Olifantshoek /substation. Savannah Environmental has been appointed to undertake the required Basic Assessment for the proposed power line and Substation. Thisstudy is for the proposed 132/11kV Olifantshoek Substation only, for which two substation alternatives are considered.

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

Both substation alternatives are located within the same vegetation type, the Olifantshoek Plains Thornveld, and are located in close proximity to the Olifantsloop River (non-perennial watercourse). Although there are some protected tree species within the development footprint of the Preferred Alternative, the number of affected individuals is low and would not affect the local populations of the affected species which are common and widespread in the area.

Although there are some listed fauna which are likely to occur in the area, the substation sites are located within the urban edge of Olifantshoek and are not located in an area that would be of significance for any fauna. As a result, impacts on fauna are likely to amount to some habitat loss for the more tolerant resident fauna of the area and would be of local significance only. Although the Substation Alternatives are not located within a CBA, they are located within an Ecological Support Area. The loss of the 1ha development footprint from the ESA would not have a significant impact on the ESA, given the low footprint of the development as well as the location of the substation within the urban edge of Olifantshoek in an area that is not considered to be of high ecological value.

The major impacts associated with the development of the 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 long-term impacts on fauna and flora during operation would be very low. Overall and with the suggested mitigation measures applied, the impact of the proposed Olifantshoek 132/11kV Substation would be of local extent and low significance. The Preferred Alternative is supported as the preferred option and would generate the lowest long-term impact on fauna, flora and ecosystems. There are no impacts associated with

the development of the substation that are considered to be high and which cannot be mitigated to a low level. As such, there are no ecological reasons to oppose the development.

NEMA 2017 CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	See Page 8 as well as main EIA Report
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	
(c) an indication of the scope of, and the purpose for which, the report was prepared;	P9
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3, Section 4
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 3 Section 4
(g) an identification of any areas to be avoided, including buffers;	Section 4.1
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 4.1
(i) a description of any assumptions made and any	Section 2.4

uncertainties or gaps in knowledge;	
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 4
(k) any mitigation measures for inclusion in the EMPr;	Section 4
(l) any conditions for inclusion in the environmental authorisation;	Section 4
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 4
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 6
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(p) any other information requested by the competent authority	
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

PROFESSIONAL PROFILE OF CONSULTANT:

Simon Todd Consulting has extensive experience in biodiversity assessments, having provided ecological assessments for more than 150 different developments distributed across the country. This includes a large number of developments in the Northern Cape Province and in the vicinity of the current project. Simon Todd is a recognised ecological expert with specific experience in semi-arid environments and is a past chairman of the Arid-Zone Ecology Forum and has 20 years' experience working throughout the country. Simon Todd is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Recent power line projects or other studies in the area include the following:

- Fauna and Flora Specialist Study for the Proposed Legoko Solar PV Project and Grid Connection, Kathu, Northern Cape. Cape EAPrac 2015.
- Fauna and Flora Specialist Study for the Proposed RE Capital 10 Solar Power Plant and associated grid connection infrastructure, Postmasburg, Northern Cape. Cape EAPrac 2015.
- Botanical Walk-Through Study of Kumba Iron Ore Expansion Area at Dingleton, Northern Cape. MSA Group 2017.
- Fauna and Flora Specialist Study for the 50kV Power Line from Garona to the Proposed New Transnet Garona Traction Feeder Substation. Nsovo Environmental Consulting 2014.
- Proposed Juno-Aurora 765kV Power Line in the Western Cape: Fauna & Flora Specialist Report for Impact Assessment. Nzumbululo Heritage Solutions 2015.
- The proposed Mookodi Integration Phase 2 132kV Power Lines and Ganyesa Substation near Vryburg, North West Province: Fauna & Flora Specialist Basic Assessment Report. Sivest 2014.

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 132kV power line is being proposed between the existing 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 132kV power line and substation. A separate authorisation processes are being followed for the power line and substation components of the development. The current study is for the 132/11kV Olifantshoek Substation only and the power line is covered in another study.

As part of the Basic Assessment process, this specialist ecological and biodiversity study characterises the ecological features of the substation site and provides an assessment of the likely impacts associated with the construction and operation of the 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 the existing Emil Eskom switching station of the national grid with the proposed 132/11kV Olifantshoek Substation, as well as the decomissiong of the existing Olifantshoek Substation (due to insufficient capacity). The whole project will comprise the construction of a new power line of up to 35km from the proposed 132/11kV Olifantshoek Substation to the existing Eskom Emil switching station. Three power line options have been considered, and two substation alternatives (Figure 1) which are considered in the current study. The substation would be 100x100m (1ha) in extent.

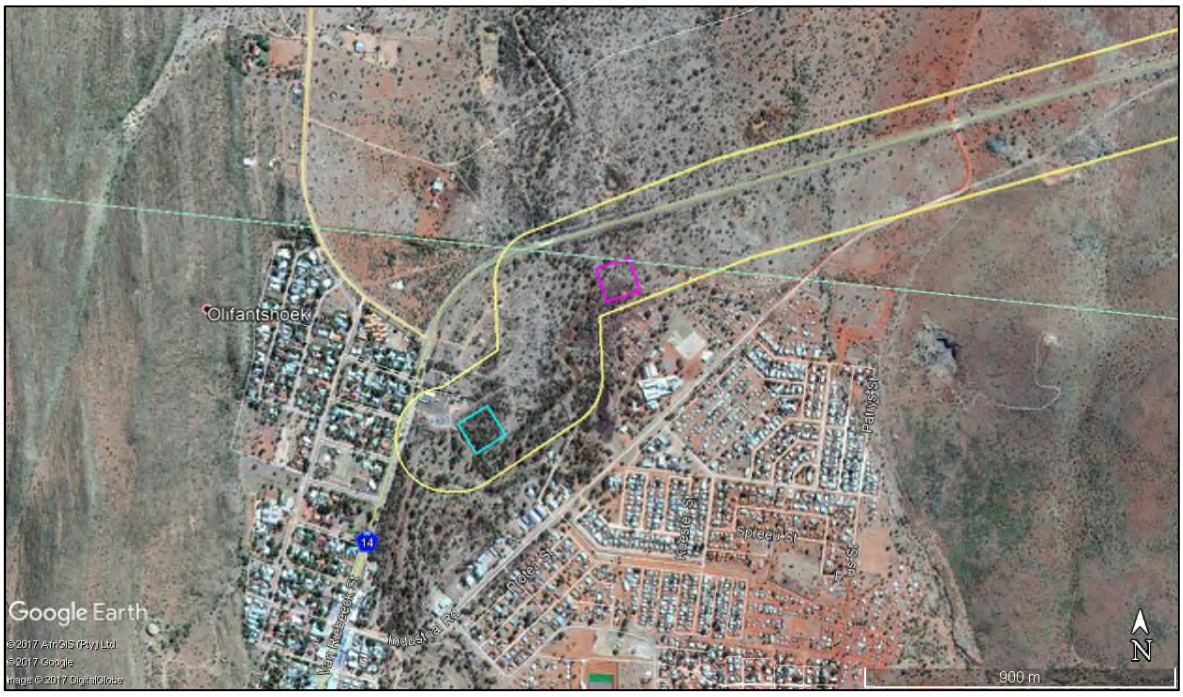

Figure 1. Layout of the two substation alternatives that are being assessed in this study, showing the preferred option in purple and alternative in blue. The three power line options share a similar alignment on their approach to the substation and there are no differences in the power lines within the study area.

1.3 ASSESSMENT APPROACH & PHILOSOPHY

The assessment was conducted according to the 2014 EIA Regulations, as amended in April 2017, as well as 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 were consulted and used where necessary in the study and includes the following:

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006 and 2012 Powrie update) 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 2) 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 (2017).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected 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.

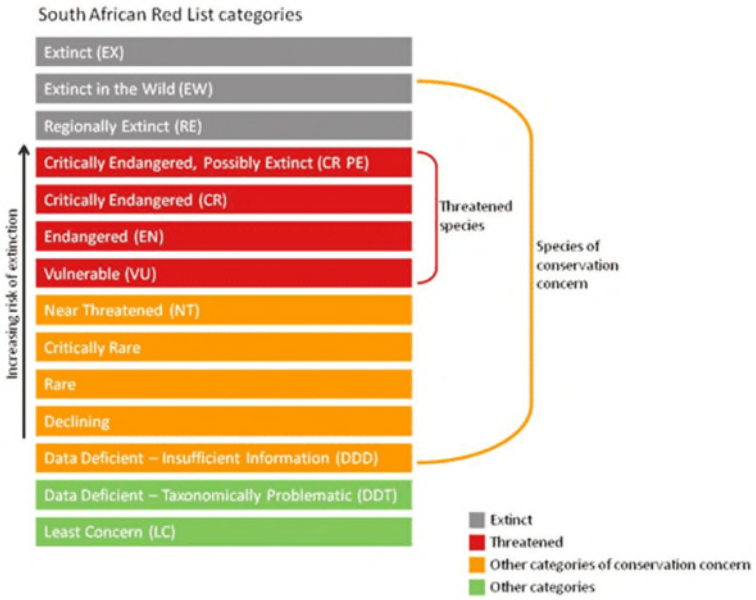

Figure 2. Schematic representation of the South African Red List categories. Taken from http://redlist.sanbi.org/redcat.php

2.2 SITE VISIT

The site was visited from 20-23 September 2016, during which the substation sites as were investigated in the field. The fauna and flora present in the affected areas were observed and noted in the field and sensitive features present in or near the development footprint were mapped where present. The presence of 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. The substation sites are of limited extent and it is highly unlikely that there are any features present in the affected areas that were not observed in the field.

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 if present. 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 categorised between the above categories, such as Medium-High, where an area appeared to be of intermediate sensitivity with respect to the two defining categories. However, there are no ranged sensitivities such as medium to high as this adds uncertainty to the mapping and assessment.

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 was fairly dry but was 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 sites are also of limited extent and as such it is highly unlikely that there are any significant features present in the affected areas that were not observed in the field. 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 two vegetation types present in the area around the substation options, but only one within the affected area (Figure 3). Both options fall within the Olifantshoek Plains Thornveld vegetation type.

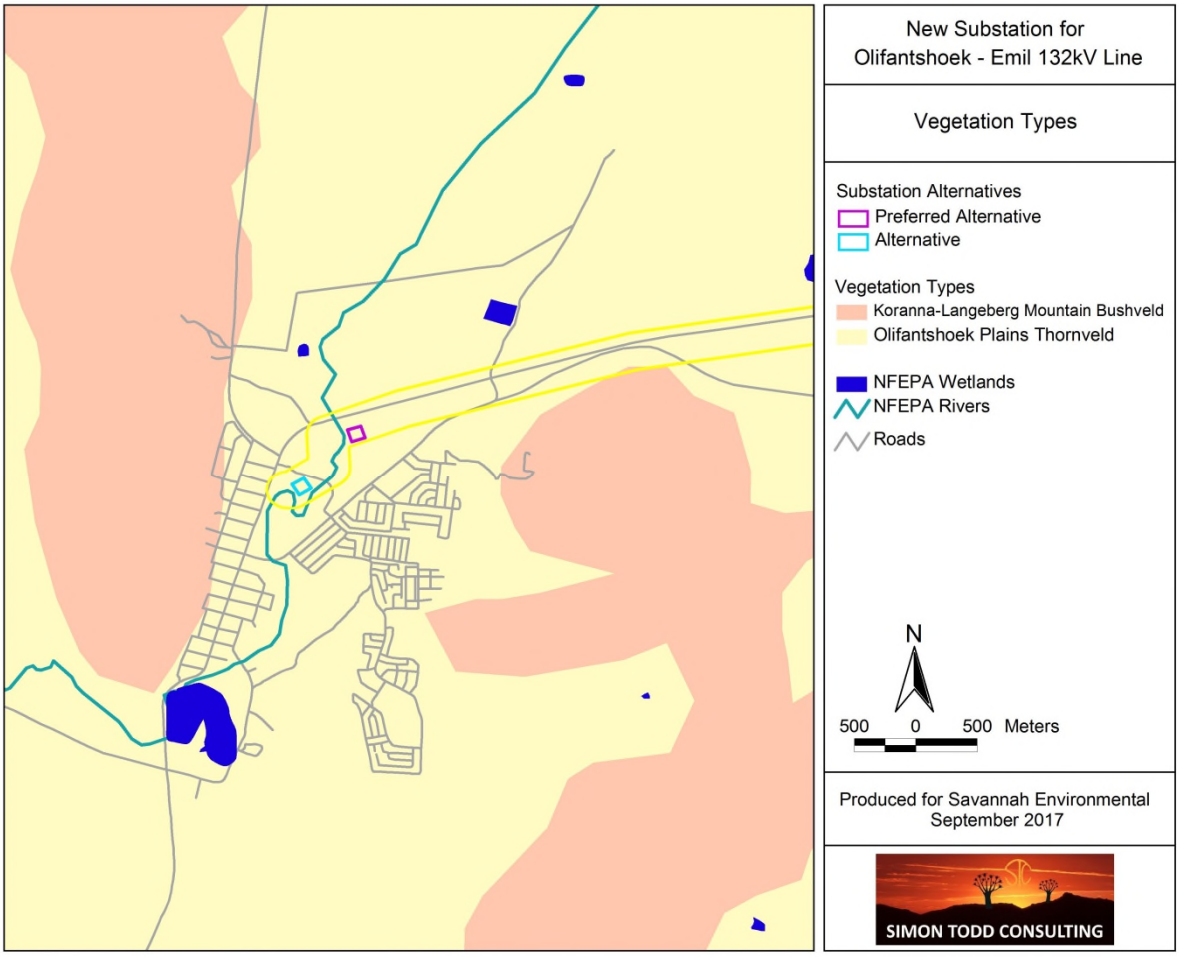

Figure 3. Broad-scale overview of the vegetation in and around the Olifantshoek substation sites. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006, 2012), and also includes NFEAP drainage lines and wetlands in the area.

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 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 characteristic and associated species associated with this unit as provided by Mucina and Rutherford (2006) are not repeated here but the actual species present in the affected area are described below.

3.2 SITE DESCRIPTION

Two substation site options located within the urban edge of Olifantshoek are proposed for the establishment of the new substation. The proposed transmission line from the exsting Emil substation will approach Olifantshoek on the south side of the N14 road between Olifantshoek and Kathu, leading to either substation option with the preferred option located east of the alternative option, which is located closer to the town.

The Alternative Option supports a dense, tall thicket of *Acacia karoo* (reaching over 5m in height), a shrub layer comprising mostly *Ziziphus mucronata*, *Grewia flava* and some *Tarchonanthus camphoratus* (Figure 4). Although a few *Prosopis* individuals are present, the site appears relatively intact. The grass layer is dominated by *Stipagrostis uniplumis*, *Aristida stipitata* subsp. *stipitata, Elephantorrhiza elephantina*, *Hermannnia tomentosa* and *Gnidia polycephala*. The site is located in close proximity to the Olifantsloop River (non-perennial) and the presence of *Acacia karoo* suggests that this area is within the influence of the Olifantsloop River and is essentially part of the historical floodplain. Due to the dense vegetation of the site and the proximity to the Olifantsloop River, this option is not considered highly favourable.

Figure 4. The Alternative Substation Option is dominated by tall *Acacia karoo* trees and appears to be in a relatively natural state, despite numerous footpaths through the site.

The Preferred Alternative represents intact Olifantshoek Plains Thornveld habitat dominated by large *Acacia erioloba* (4 to 5m in height) (Figure 5). Other tree species present include the protected *Boscia albitrunca* (one individual)*, Ziziphus mucronata* and shrubs such as *Acacia hebeclada* and *Acacia mellifera*. The ground layer is heavily grazed and includes species of grasses and shrubs such as *Stipagrostis uniplumis*, *Schmidtia pappophoroides*, *Chrysocoma ciliata*, *Pegolettia retrofracta*, *Geigeria filifolia*, *Leucas capensis*, *Senna italica* subsp. *arachoides, Elephantorrhiza elephantina*, *Felicia muricata* subsp. *muricata*, *Melolobium candicans*, *Asparagus retrofractus* and *Gazania krebsiana* subsp. *krebsiana*. No alien tree species were detected at the site, although some *Prosopis* trees were present in the vicinity. Although there are more protected species within the footprint of this preferred alternative, it is considered more favourable than the alternative option as it is not located in close proximity to the Olifantsloop River and is located within an area considered to be of low ecological significance due to its location within the urban edge and the generally impacted nature of the site.

Figure 5. Looking south over the location of the Preferred Alternative substation site, which supports some large *Acacia erioloba* trees and occasional *Boscia albitrunca* with a heavily grazed grass layer. The informal settlement encroaching on the site is visible behind the trees.

3.3 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* is no longer red listed, but is still nationally and provincially protected and is present at the site in fairly high numbers. *Boophone disticha* (Declining) is the only listed species known from the area and has been observed near the site but not within the development footprint. There are also additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, all species within the *Euphorbiaceae*, *Oxalidaceae* and *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. There appears to be only a single individual of *Boscia albitrunca* within the development footprint and this is not considered to be a

significant impact on this species which is common and abundant in the area. The overall impact on listed and protected species would be low after mitigation and avoidance and no highly significant impacts on such species are anticipated.

3.4 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

According to the Northern Cape Conservation Plan, the Substation Alternatives do not fall within a CBA, but are located within an Ecological Support Areas (ESA) associated with the Olifantsloop drainage line (non-perennial river) (Figure 7). The presence of the substation would not compromise the functioning of the ESA in any way, especially given the low footprint of the substation (1ha) as well as the proximity to the existing urban area. The impact of the development of the Olifantshoek substation is not likely to result in significant disruption of any broad-scale ecological processes. As such, potential impacts on CBAs or ESAs are not considered to be a significant concern associated with the development.

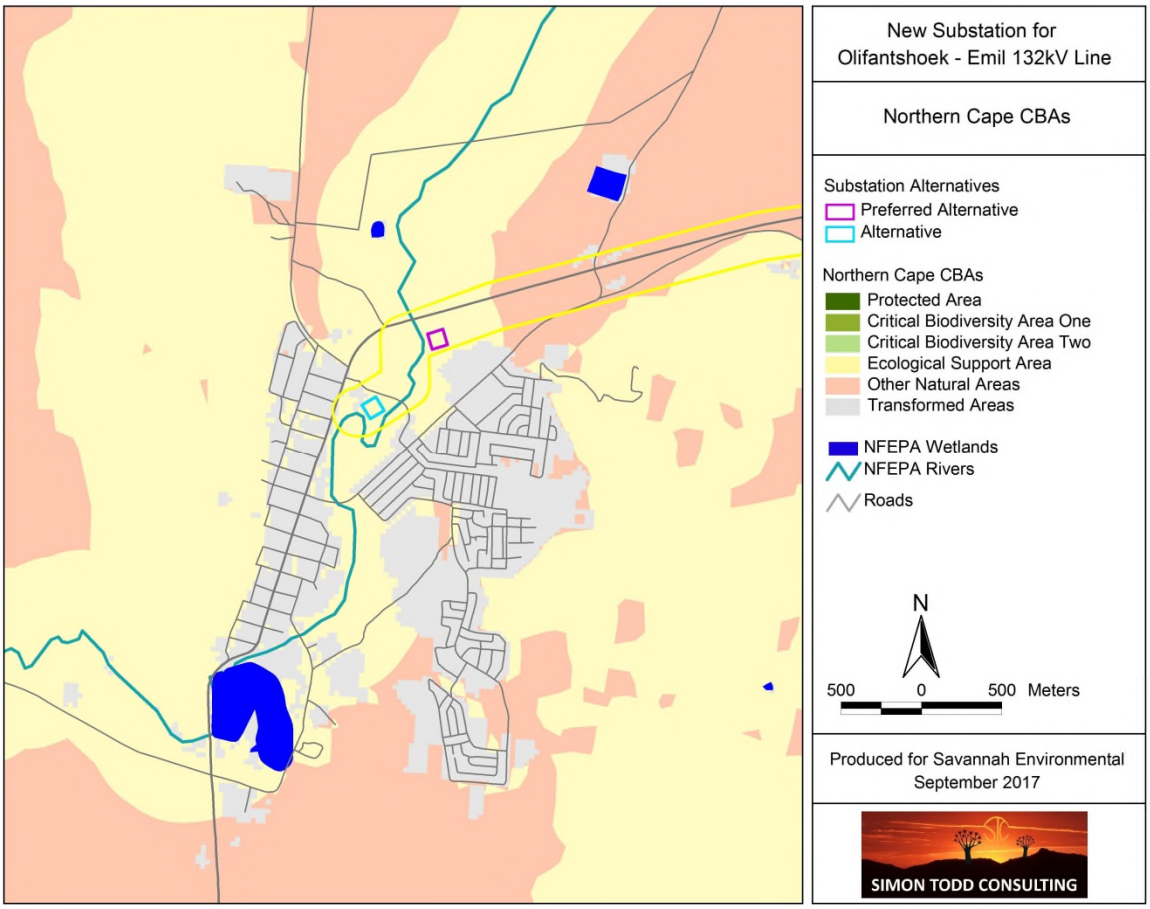

Figure 7. Broad-scale overview of the Critical Biodiversity Areas and Ecological Support Areas in and around the Olifantshoek powerline site. The map is an extract of the Northern Cape Conservation Plan (Holness & Oosthuizen 2016)

3.5 FAUNAL COMMUNITIES

Mammals

The 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 restricted to the Olifantsloop River (non-oerennial) which provides greater cover as well as moisture and forage availability. However, given the proximity of the substation alternatives to Olifantshoek, the actual significance of the sites for mammals would be low.

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 in the area, 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). However, none of these listed species are likely to be using the affected area given its location within the urban edge of Olifantshoek and as a result, there are not likely to be any significant impacts on listed mammals resulting from the construction and operation of the substation.

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 nearby Olifantsloop River is the most important feature for amphibians in the immediate area. The proximity of the Substation Options to the Olifantsloop River is a potential concern as the river could be impacted by erosion or pollution resulting from the development. The Olifantsloop River is however an ephemeral river and holds water only occasionally, as a result, the species prevalent in the area are likely to be those which are relatively independent of water such as the Karoo Toad *Vandijkophrynus gariepensis* and Power's Toad *Sclerophrys poweri*. 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. There does not appear to be any breeding habitat for this species in the vicinity of the substation options and an impact on this species is not likely. Overall, impacts on amphibians are likely to be local in extent and of low significance.

4 IMPACT ASSESSMENT

4.1 SITE SENSITIVITY ASSESSMENT

The ecological sensitivity map of the area around the Olifantshoek Substation Alternatives is illustrated below in Figure 7. The Alternative Substation Option is considered less favourable due to the proximity of the site to the Olifantsloop River (non-perennial) and the location of the site in an area of dense vegetation associated with the floodplain of the Olifantsloop River. The Preferred Substation Alternative is considered more favourable, even though it is also located in close proximity to the Olifantsloop River, it is outside of the floodplain and poses less long-term risk to the fauna and flora of the area as well as ecological processes. Although there are some protected tree species within the development footprint of the Preferred Alternative, the total number of affected individuals is low and would not impact the local populations of these species which are abundant in the area. Overall, the development of the substation at the Preferred Alternative is likely to generate local impacts of low significance only.

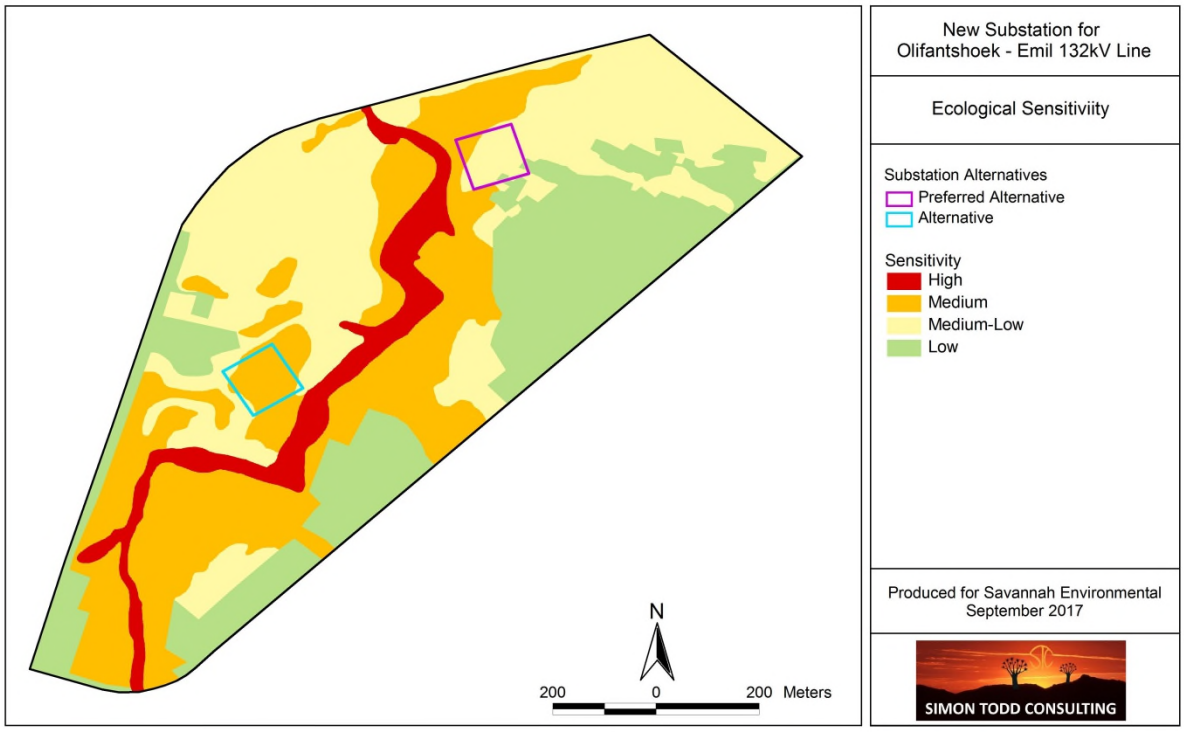

Figure 7. Ecological sensitivity map of the area around the proposed Olifantshoek 132kV Substation Alternatives.

4.2 IMPACT RISK FACTORS

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

Planning & Construction Phase

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

Operation Phase

- Site maintenance activities
- Substation operation and presence
- Human presence

Decommissioning

- Operation of heavy machinery at the site

- Human presence

The above impacts are described briefly below and assessed for each phase of the development as appropriate thereafter:

Construction Phase

Impacts on vegetation and protected plant species

Some vegetation loss will occur as a result of the development and it is also likely that at least some individuals of listed or protected plant species will be impacted by the development of the substation as a number of protected trees can be confirmed at the site. Although some individuals of *Acacia erioloba* and *Boscia albitrunca* are present at the site, impacts on these species are likely to be of relatively low significance as they are widespread and abundant in the area.

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna during construction. 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. However, given the location of the site in the urban edge of Olifantshoek, it is not likely to be used by many larger or more shy fauna and impacts are likely to be restricted to some local habitat loss for the more tolerant resident species.

Operation Phase

Degradation of ecosystems

Maintenance activities such as vegetation clearing around the substation or access roads as well as the large amount of disturbance created during construction will leave the site vulnerable to degradation through alien plant invasion and soil erosion. This is of potential concern especially given the proximity of the sites to the Olifantsloop River and the potential for erosion and alien plant invasion to affect this ecosystem.

Decommissioning & Closure

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna during decommissioning. 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. However, given the proximity of the site to Olifantshoek and the encroachment of the urban edge to the substation, this is not likely to lead to any significant impacts in this area.

Degradation of ecosystems

It is likely that decommissioning will generate moderate levels of disturbance that will leave the site 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, especially to the adjacent Olifantsloop River.

Cumulative Impacts

There are a number of cumulative impacts in the area, most notably the existing 275 and 400kV power lines as well as the extensive mining activity taking place towards Kathu. The mining activity is however largely associated with the rocky hills of the area with some infrastructure such as processing plants and railway infrastructure on the plains. The proposed substation 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 and the important areas in this regard are not present in the location of the proposed substation. The total direct habitat loss of around 1ha associated with the substation would be of little consequence in the broader context due to the limited extent of this loss as well as the location within an area that is not of high ecological value.

4.3 ASSESSMENT OF IMPACTS

Planning & Construction Phase

Impact 1: Impacts on vegetation & protected plant species 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 substation. There are some protected trees species confirmed present at the substation sites. However, there are no highly sensitive features within the sites and overall post-mitigation impacts are likely to be **Low**.

	Without Mitigation		**With Mitigation**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)	Low (3)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (36)**	**Low (24)**	**Low (27)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	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 by the development.			
Mitigation	• A preconstruction walk-through of the development footprint is required in order to locate species of conservation concern that can be translocated or avoided, as well as to comply with Northern Cape Conservation Act permit conditions. • Vegetation clearing to commence only after the walk-through has been conducted and the necessary permits obtained. • Preconstruction environmental induction for all construction staff on site is required 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 the demarcated construction areas etc. • The Environmental Control Officer or specialist to provide supervision and oversight of vegetation clearing activities near sensitive areas. • Vegetation clearing to be kept to a minimum. No unnecessary			

	vegetation to be cleared. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. • Temporary laydown 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. • Access roads and other infrastructure should be kept out of the Olifantsloop River.
Cumulative Impacts	The potential for cumulative impacts is low given the small footprint of the substation and the low ecological value of the site due to its proximity to Olifantshoek.
Residual Impacts	Some residual habitat loss will result from the development, equivalent to the operational footprint of the facility (1ha).

Impact 2. Faunal Impacts During Construction.

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 the 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**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (4)	Low (3)	Low (3)
Probability	Highly Probable (4)	Highly Probable (4)	Probable (3)	Probable (3)
Significance	**Low (28)**	**Low (28)**	**Low (18)**	**Low (18)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Large amounts of noise and disturbance at the site during construction is largely unavoidable, but would be of local impact only as the affected area is located within the urban environmentedge of Olifantshoek.			
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 and 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. • 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.

Operation Phase Impacts

Impact 1. Degradation of Ecosystems

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**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Low (4)	Low (3)	Low (4)
Probability	Probable (3)	Highly Probable (4)	Improbable (2)	Improbable (2)
Significance	**Low (27)**	**Medium (36)**	**Low (14)**	**Low (16)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	High	High
Irreplaceable loss of resources	No	No	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 problem at the site after construction. A 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.
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.

Decommissioning & Closure

Impact 1. Faunal Impacts During Decommissioning

Impact Nature: Disturbance or persecution of fauna during the decommissioning phase may occur. Increased levels of noise, pollution, disturbance and human presence during decomissioning 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**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (4)	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)	Improbable (3)	Improbable (3)
Significance	**Low (21)**	**Low (21)**	**Low (15)**	**Low (15)**
Status	Negative	Negative	Negative	Negative
Reversibility	High	High	High	High
Irreplaceable loss of	No	No	No	No

resources				
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

Impact Nature: Alien plants are likely to invade the site as a result of disturbance created during decommissioning, while this will also leave the site vulnerable to soil erosion.

	Without Mitigation		**With Mitigation**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Medium-term (3)	Medium-term (3)
Magnitude	Low (3)	Low (3)	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)	Improbable (2)	Improbable (2)
Significance	**Low (24)**	**Low (24)**	**Low (12)**	**Low (12)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	High	High
Irreplaceable loss of resources	No	No	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 for at least 3-5 years after decommissioning 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 cumulative impacts from alien species would not be significant.
Residual Impacts	If alien species and erosion at the site are controlled, then there will be very little residual impact.

Cumulative Impacts

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

Impact Nature: The 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**	
	Preferred	**Alternative**	**Preferred**	**Alternative**
Extent	Locall (1)	Locall (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)	Low (3)	Low (3)
Probability	Probable (3)	Probable (3)	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (27)**	**Low (24)**	**Low (24)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	To a large extent but some impact will remain due to vegetation clearing.			
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 associated with the substation.			

5 ASSESSMENT OF ALTERNATIVES

The two substations are compared below. The Preferred Alternative is supported here and is seen as the preferable option and would pose less risk to the fauna and flora of the site as well as sensitive habitats in the area.

Alternative	**Preference**	**Reasons (incl. potential issues)**
SUBSTATION ALTERNATIVES		
Preferred Substation Alternative	Preferred	This substation option is located outside of the Olifantsloop River area and is seen as the preferred substation option and is likely to generate the lowest overall impact on fauna and flora. Although there are some protected trees within the footprint, the impact on these species would be low and is not considered significant.
Alternative Substation	Less preferred	Although there is not a lot of difference between the two substation options, the Alternative Substation location is less preferred given its proximity to the Olifantsloop River as well as the dense vegetation within the site.

6 CONCLUSION & RECOMMENDATIONS

There is not a lot of difference between the two substation sites. Both are within the same vegetation type, Olifantshoek Plains Thornveld, and are located in close proximity to the Olifantsloop River (non-perennial). The Preferred Alternative is supported as the preferred option for the development. Although there are some protected tree species within the development footprint, the number of affected individuals is low and would not affect the local populations of the affected species which are common and widespread in the area.

Although there are some listed fauna which are likely to occur in the area, the substation sites are located within the urban edge of Olifantshoek and are not located in an area that would be of significance for any fauna. As a result, impacts on fauna are likely to amount to some habitat loss for the more tolerant resident fauna of the area and would be of local significance only.

Although the Substation Alternatives are not within a CBA, they are located within an Ecological Support Area. The loss of the 1ha development footprint from the ESA would not have a significant impact on the ESA, given the low footprint of the development as well as the location of the substation in the urban edge of Olifantshoek and in an area that is not considered to be of high ecological value.

The major impacts associated with the development of the 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 long-term impacts on fauna and flora during operation would be very low. Overall and with the suggested mitigation measures applied, the impact of the proposed Olifantshoek 132/11kV Substation would be of local extent and low significance. The Preferred Alternative is supported as the preferable option and would generate the lowest long-term impact on fauna, flora and ecosystems. There are no impacts associated with the development of the substation that are considered to be high and which cannot be mitigated to a low level. As such, there are no ecological reasons to oppose the development.

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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, outcrops or boulder-strewn hillsides they use these preferentially	High

Scientific Name	Common Name	Status	Habitat	Likelihood
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
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

Scientific Name	Common Name	Status	Habitat	Likelihood
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
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

Family	Genus	Species	Subspecies	Common name	Red list category
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