AVIFAUNAL SPECIALIST REPORT

10MVA 132/11KV OLIFANTSHOEK SUBSTATION

August 2017

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DECLARATION OF CONSULTANT'S INDEPENDENCE

I, Gerhard Botha, as the appointed 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,
- » act as an independent specialist, in line with the definitions in the Regulations;
- » 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, 2014 and any specific environmental management Act;
- » will not have any 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, 2014 and any specific environmental management Act;
- » am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 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 48 of GN No. R. 982.

Gerhard Botha Pr.Sci.Nat 400502/14 (Ecological Science)
August 2017

1 INTRODUCTION

1.1 Applicant

Eskom Holdings SoC Limited

1.2 Project

The project will be referred to as the 10MVA 132/11kV Olifantshoek substation.

1.3 Proposed Activity

The Olifantshoek Substation will be comprised of the following:

- A new 10MVA **on-site substation** (100m X 100m) to be constructed in close proximity to the existing 22/11kV Olifantshoek substation.
- The decommissioning of the existing 22/11kV Olifantshoek Substation.

The proposed substation will have a footprint of approximately of 100m x 100m. The footprint of the substation may include a metering station, control building, admin building, workshop and associated infrastructure. The table below provides an overview of the technical details of the substation components to be constructed:

Table 1: Summary of components associated with the proposed substation.

Project Component	Specification
Mega Volt Ampere	10
Size of the substation	71m x 49m within a footprint of 100m x 100m
Distance between equipment	9m
Footprint of the development	100m x 100m
Number of transformers	One 10 MVA transformer

Two alternative locations have been identified for the proposed substation, including;

- Approximately 500m east of the urban area of Olifantshoek and 50m south of the N14. This is considered to be the **preferred substation location**.

» Approximately 30m to the east of the existing Olifantshoek substation. This is considered to be the **alternative substation location.**

The existing Olifantshoek substation will be decommissioned on completion of the new proposed substation.

The new substation will be connected to the Emil switching station via a new 132kV Olifantshoek overhead power line.

1.4 Location

The project is located in the Olifantshoek region, which falls within the Ga-mogara Local Municipality and the John Taolo Gaetsewe District Municipality. The study area for the proposed new substation is located around the eastern edge of the town of Olifantshoek (Figure 1). Two alternative substation locations are being considered for the development.

The approximate location (farm properties and geographic coordinates) for the proposed project is as follows:

» **Proposed location of substation**

Farm Property:

- Preferred Location: Portion 1 of the Farm Neylan 574
- Alternative Location: Erf 155

Geographical Coordinates

- Preferred Location: -27.931425°; 22.748489°
- Alternative Location: -27.936425°; 22.741388°

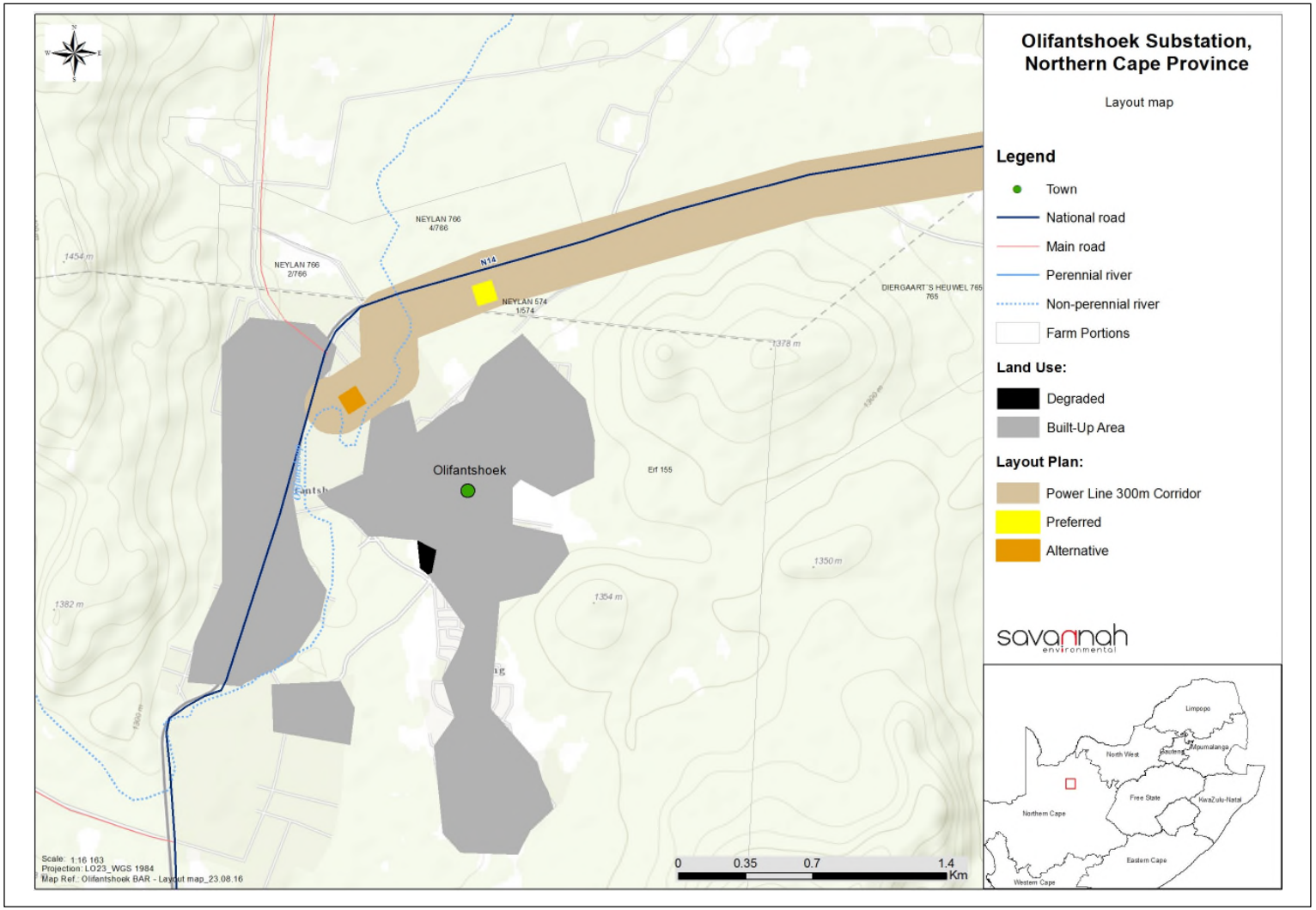

Figure 1: Layout of the substation alternatives.

1.5 Terms of reference

The most important objective of this avifaunal impact assessment is to determine the impacts that the proposed activity may have on avifauna species. The following are the tasks/objectives of the study:

» Field visit to identify important avian habitats associated with the proposed development as well as avian micro-habitats and species that will potentially use these niches;
» A description of the current avifauna within the study area and the identification of Red Data Species potentially affected by the proposed development and associated infrastructure;
» Integration of the site data collected within avian atlases and counts within the area to develop a comprehensive avifaunal database likely to be present within the development footprint;
» Identify potential negative impacts on the avifaunal diversity and species composition at the site of the proposed development and assess the significance of these impacts;
» To provide recommended mitigation measures for the potential impacts in order to avert or lower the significance of the negative impacts on avifauna.

All avifaunal data was collected throughout all identified habitats using various methods including (see Section 2.2 for a description of methodology used):
» Walked-transects,
» Vehicles drive surveys,
» Existing power Line inspection, and
» Fixed point surveys

1.6 Conditions of this report

Findings, recommendations and conclusions provided in this report are based on the authors' best scientific and professional knowledge and information available at the time of compilation. This report may not be amended or extended without the prior written consent of the author. Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

1.7 Assumptions and Limitations

It is difficult to apply pure scientific methods within a natural environment without limitations, and consequential assumptions need to be made. The following constraints may have affected this assessment:

» In this instance, the 2722DC & DD QDGCs are covered by the South African Bird Atlas Project (SABAP2), with data recorded on 20 (DC) and 15 (DD) data cards. This means that the species diversity and densities recorded by SABAP2 provides a limited interpretation of the avifauna potentially occurring in the study area;
» Conclusions of this report were based on experience of these recorded species and other species in different parts of South Africa. Bird behaviour cannot be entirely reduced to formulas that will hold true under all circumstances. By virtue of their mobility, avian species can rapidly adapt and relocate;
» It is important to note that, although the predicted impacts are mostly concerned with Red Data species, the non-Red Data species will also benefit from the proposed mitigation measures as they share the same habitat and face the same potential impacts; and
» Limited time in the field means that important components of the local avifauna (i.e. nest sites or localised areas of key habitats for rare or threatened species) could have been missed. The alternatives of the proposed substation were however surveyed and no nest sites were recorded to the best of this specialist's capabilities, given the time and extent of such a task.

2 METHODOLOGY

The main objective of the Avifauna Report is to provide a description of the avifauna, their interactions with their surrounding environment and how activities associated with the proposed development could potentially impact on the immediate as well as surrounding avifaunal character. To obtain the achieved results the following methodology was implemented.

2.1 Data scouring and review

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

» 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.

» Bird distribution data of the Southern African Bird Atlas Project obtained from the Animal Demography Unit of the University of Cape Town, in order to ascertain species occurrence within the study area (Harrison et al. 1997);
» The Birds in Reserves Project database was used to augment bird counts data (Animal Demographic Unit 2015).
» The conservation status of all bird species occurring within the quarter degree square determined with the use of the Eskom Red Data book of birds of South Africa, Lesotho and Swaziland (Taylor 2014);
» The Important Bird Areas (IBA) programme according to BirdLife South Africa;
» The conservation status, endemism and biology of all species considered likely to occur within the study area was then determined from Hockey et al. (2005) and Taylor et al. (2015).
» Similar Avifaunal studies that have been undertaken within the region of the study area where also consulted including the survey done for the Solar Park Integration Project (Van Rooyen, 2013) which included a 400kV transmission line stretching from Upington to the Elim switching station as well as numerous 132kV transmission lines.

2.2 Field sampling and assessment methodology

Prior to the site visit a review of all available published and unpublished literature pertaining to bird interactions with plants, substations and power lines was undertaken, summarising the issues involved and the current level of knowledge in the field. Various information sources including data on the local avifauna of the area and previous studies of bird interactions with plants, substations and power lines were examined.

A site visit was conducted from the 24th to the 26th of January 2017 to determine the *in situ* local avifauna and avian habitats present on site. Walked transects, vehicle transects and vantage point surveys were conducted in various habitats across the site. During the survey, not only the development footprint area was surveyed, but a broader area was inspected. The site was thoroughly traversed to obtain a first-hand perspective of the proposed project and birdlife and to:

» Quantify aspects of the local avifauna (such as species diversity and abundance);
» Identify important avian features present on site (such as nesting and roosting sites);
» Confirm the presence, abundance, habitat preference and movements of priority species;
» Identify important flyways across the site; and

» Delineate any obvious, highly sensitive, no-go areas to be avoided by the development.

Data collection methods included the following:

» Vehicle drive surveys: Vehicle surveys were predominantly done along the service roads and other access roads around the study area. Vechile surveys were also done along a section of the N14 as well as along smaller power lines located within close proximity to the proposed locations of the new substation.
» Power Line inspection: As mentioned smaller power lines within the immediate surroundings were also inspected for any possible raptors or other avifaunal species utilising these lines and pylons for perching.
» Walked-transects: Walk-throughs were conducted within both potential substation locations as well as immediate surroundings, including the Olifantsloop River bed and fringing vegetation. These were done along pre-defined areas as well as along random selected areas.
» Fixed point surveys: During the last day of the survey period areas deemed potentially high in avifaunal species diversity was closely monitored for periods of 2 hours each. These areas included:
    - The riparian fringe (ticket type of growth of *A. karroo* in some areas) vegetation associated with the banks and flooding area of the Olifantsloop non-perennial river, just south of the proposed alternative substation site;
    - Olifantshoek Sewage Works;

The following equipment weas utilised during the field work:

» Canon EOS 450D Camera,
» Swarovski SLC 10X42 WB Binoculars,
» Roberts VII Multimedia Android Edition for Data Capturing and Bird Identification,
» Sasol's The Larger Illustrated Guide to Birds of Southern Africa (2005),
» Roberts Bird Guide (2016), and
» A simplified adaption of the Braun-Blanquet Data Form to capture habitat and other environmental data

The survey was primarily conducted by means of a Checklist survey supplemented with some notes on avifaunal movement (especially regarding the larger avifaunal species as well identified nesting species and activities with the patches of higher tree covering). The surveys normally started just before sunrise and ended just after sunset in order to record all possible bird activities throughout the day.

Using the data collected during the desktop phase as well as during the site visit, avian micro-habitats and sensitive habitats for avifaunal communities were identified and mapped.

3 STUDY AREA

3.1 Climate and rainfall

The Olifantshoek/Kathu area is characterised by an arid summer rainfall climate with an average annual temperature of 18.6°C and an average rainfall of 395mm falling predominantly in late summer (highest in March: 74mm). The driest month is July with only 3mm of precipitation. With an average temperature of 25.3°C, January is the warmest month, whilst July is the coldest month with an average of 10.8°C (https://en.climate-data.org/location/27075/).

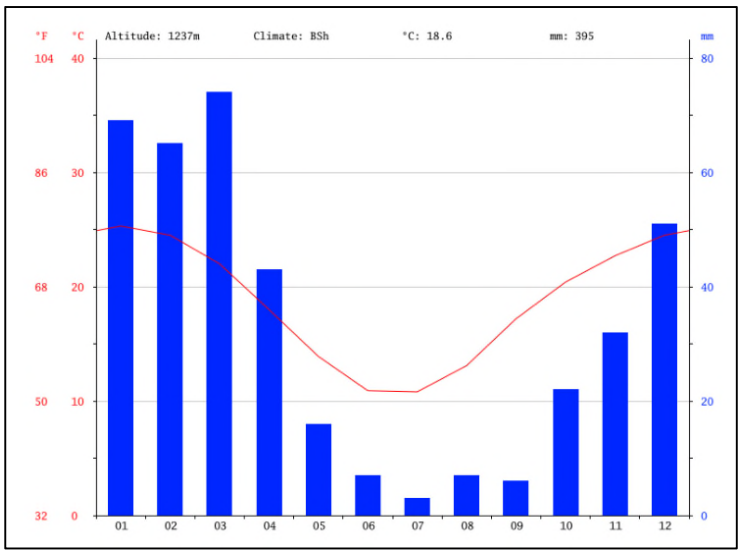

Figure 2: Climate graph of the Olifantshoek/Kathu region (https://en.climate-data.org/location/27075/).

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Okt	Nov	Dec
mm	69	65	74	43	16	7	3	7	6	22	32	51
°C	25.3	24.5	22.0	18.0	13.9	10.9	10.8	13.1	17.2	20.4	22.7	24.5
°C (min)	18.0	17.4	15.2	10.5	5.8	2.4	2.1	4.2	8.4	12.1	14.8	16.9
°C (max)	32.6	31.6	28.9	25.6	22.1	19.5	19.5	22.0	26.0	28.7	30.7	32.2
°F	77.5	76.1	71.6	64.4	57.0	51.6	51.4	55.6	63.0	68.7	72.9	76.1
°F (min)	64.4	63.3	59.4	50.9	42.4	36.3	35.8	39.6	47.1	53.8	58.6	62.4
°F (max)	90.7	88.9	84.0	78.1	71.8	67.1	67.1	71.6	78.8	83.7	87.3	90.0

Figure 3: Climate table of the Olifantshoek/Kathu region (https://en.climate-data.org/location/27075/).

3.2 Existing Land Use

The preferred substation location is situated just outside of the urban boundary of the town of Olifantshoek on land used mostly for farming. Farming practises consist mainly of livestock farming (cattle and goats). The preferred location is furthermore located just south of the N14.

The alternative substation is located within an open space between the formal part of the town to the west and the informal part to the east. This location is adjacent to the existing substation to be decommissioned.

3.3 Vegetation overview

The study area falls within the Eastern Kalahari Bushveld Bioregion (Savannah biome). Several vegetation types characterise the larger area (Mucina & Rutherford, 2006) although the footprint of the proposed development traverses only one vegetation type namely:

» Olifantshoek Plains Thornveld (SVk13) – the bulk of the footprint falls within this vegetation type for both the preferred and alternative subtstion locations.

Olifantshoek Plains Thornveld mostly occupies plains including most of the pediment areas of the Korannaberg, Langeberg and Asbestos Mountains as well as the ridges to the west of the Langeberg. This vegetation type overlies mostly red aeolian sand with silcrete and calcrete and some andesitic and basaltic lava of Griqualand West Supergroup. Hutton soil form forms the dominant soil form. This is a very wide and diverse unit characterised mostly by open tree and shrub layers with, for example, *Acacia luederitzii, Boscia albitrunca* and *Searsia tenuinervis* and with a usually sparse grass layer (Mucina & Rutherford, 2006).

This above described vegetation type is regarded as least threatened. The Olifantshoek Plains Thornveld vegetation is regarded as least threatened due to the fact that very little of the vegetation has been transformed (only about 1%). This vegetation type is however very poorly conserved with less than 0.5% statutorily conserved (within the Witsand Nature Reserve).

3.4 Topography and drainage

The larger surrounding landscape can be described as a largely flat (to very slightly undulating) sandy plain broken to the west with more rugged, medium mountains of the Langeberge. Within the largely flat sandy plain small irregularities within the landscape can be attributed to small localised depressions, vegetated low dunes,

calcrete patches, a low ridge to the south and the two non-perennial watercourses (Ga-Magara and Olifantsloop) that drain the valley towards the north. The Olifantsloop River (42.492km in length terminates into the Ga-mogara River (88.037km in length) which in turns flows into the term Kuruman River, an important tributary of the Molopo. Due to the micro-topography of the underlying substrates (shallower soils over calcrete), small ephemeral pans have formed in isolated areas within this flat valley. The position of the two substation options within this landscape can be described as follows:

- The alternative substation option is located within the pediment section of Langeberg mountain range and within the 1-100-year floodline of the Olifantsloop River (southern/upper portion). This area has a gentle slope towards the Olifantsloop River (south to south-western slope).
- The preferred substation option is located just south of the N14 within the flat sandy plain.

3.5 Avian micro-habitats

Most of the abundance and distribution of avian species can usually be attributed to the vegetation types and bioregions within an area. In determining the suitability of the study area for avian species, it is necessary to look at the habitats available to determine where the relevant species will most likely occur within the study area. These "micro habitats" do not always correspond to vegetation types and are determined by a combination of vegetation type, topography, land use, food sources and other various intrinsic factors.

Investigation of the study area revealed the following important avian micro-habitats.

- *Acacia tortilis – Acacia mellifera* Open Woodland
- Non-perennial watercourses
- *Acacia karroo* Thicket
- Olifantshoek sewage works (Artificial landscape)

In each case, some of the species likely to make use of the various micro-habitats have been described. It must be emphasised that birds will, by virtue of their mobility, utilise almost any area in a landscape from time to time.

Acacia tortilis – Acacia mellifera Woodland

This micro-habitat covers the area just south of the N14 which is characterised by a low ridge transitioning into a flatter area with moderate shallow soils towards the town of Olifantshoek. The preferred substation option is located within this avian micro habitat. The vegetation structure of this habitat can be described as a short to medium open tree layer with a mixture of dwarf shrubs and grasses forming the ground layer. Diagnostic tree species include *A. mellifera, A. tortilis, Boscia albitrunca, Grewia flava, Euclea undulata, Trachonanthus camphoratus and Lycium hirsutum*. Dwarf shrubs found with this area included; *Monechma divaricatum, Hermannia comosa, Pentzia* spp. and *Lycium* spp. A few medium to medium-tall sized *Acacia erioloba* trees are aslo scattered throughout this micro-habitat. Grasses included; *Aristida meridionalis, A. adscensionis, A. congesta, Enneapogon spp., Eragrosits lehmanniana, E. chloromelas, E. pallens, Stipagrostis ciliate, S. uniplumis, Tragus racemosa* and *Melinis repens.*

This micro-habitat is utilised primarily by the same passerine species utilising the more extensive *Tarchonanthus camphoratus – Acacia mellifera* Woodland habitat surrounding this micro-habitat, with avifaunal movement between these habitats occurring frequently. Diversity within this micro-habitat can be described as moderate to moderate-low with disturbances such as the N14 Road, the informal settlement to the south and potential high human movement within the study area, contributiong to the levels of diversity. Key species include the Northern Black Korhaan (*Afrotis afraoides*), Lark species (Family: Alaudidae) and species such as Chats, Thrushes and Scrub-Robbin which will move around within the taller shrubby areas. Probably the most abundant species recorded within this habitat was Chestnut-vented Warbler (*Sylvia subcaerulea*), Kalahari Scrub Robin (*Cercotrichas paean*), Sociable Weaver (*Philetairus socius*) and Scaly-feathered Weaver (*Sporopipes squamifrons*). The denser encroached *Acacia mellifera* patches also provide nesting habitat for smaller species such as the Yellow-bellied Eremomela (*Eremomela ictyropygialis*), Black-chested Prinia (*Prinia flavicans*), Rufous-eared Warbler (*Malcorus pectoralis*) and also Pririt Batis (*Batis pririt*).

Current land use within and around the development footprint of this substation option (preferred option) includes predominantly stock farming (cattle and goat). Grazing pressure has resulted in a decrease in the density of the grass cover. Illegal wood collection from the residents of the informal settlement located less than 100m from the study area has also contributed to the lowering of the tree density within this area.

The impacts associated with the development within this micro-habitat are displacement due to habitat loss and disturbance.

Figure 4: *Acacia tortilis – Acacia mellifera* habitat

Non-perennial watercourses

The southern portion of the Olifantsloop River (flowing through the urban area) is characterised by a developed channel which may become relatively deep in areas (over 3m). These deep channels normally consist out of fine sand and silt and are normally devoid of vegetation (unstable conditions due to high velocity streamflow during rainfall events and the effects of erosion). Steep banks of up to 90° form in a few isolated areas where accelerated water flow (bends within the watercourse) have scoured away the sandy substrate. Where flow velocities are not so intense the channels are normally shallower and may not even be prominent. These areas are normally vegetated with a mixed grass and herb layer with numerous exotic plant species. Key plant species include: Weeds & exotics: *Chenopodium album, Chenopodium carinatum, Verbesina encelioides, Datura stramonium, Tribulus terrestris* and *Argemone ochroleuca;* Herbs: *Heliotropium ciliatum, Acrotome inflate, Limeum agute-carinatum, Hybiscus spp., Chrysocoma ciliate* and *Pentzia incana;* Seges: *Kylinga alba, Schoenoplectus muricinux* and *Cyperus laevigatus;* Grasses*: Chloris virgata, Cynodon dactylon, Eragrostis curvula, Tragus berteronianus, Tragus koelerioides, Urochloa panicoides, Leptochloa fusca, Aristida congesta, A. adscensionis, Enneapogon desvauxii, Eragrostis echinochloidea and E. lehmanniana.* A few tall Eucalyptus camaldulensis trees are also located along the channel bed.

As a result of these disturbances almost none of the avifaunal species recorded within this habitat, reside permanently within the habitat. Most species seek refuge, nest, roost and fulfil most of their activities within the fringing Thicket micro-habitat. The open grassy/weedy river bed is rather frequently visited for very short periods of time by mainly small granivorous passerines in search of ripe grass seeds and nesting material as well as a few insectivorous species in search of prey attracted to moisture and flowering herbs and weeds. These species do not remain long in this habitat after which they return to the fringing thicket. Such avifaunal species include: Granivorous species: Cape Sparrow (*Passer melanurus*), Speckled Pigeon (*Columba guinea*), White-browed Sparrow-Weaver (*Plocepasser mahali*), Blue Waxbill (*Uraeginthus angolensis*), Village Indigobird (*Vidua chalybeate*), Laughing Dove (*Spilopelia senegalensis*) and Cape Turtle-Dove (*Streptopelia capicola*); Insectivorous Species: European Bee-eater (*Merops apiaster*), Pririt Batis (*Batis pririt*), Bokmakierie (*Telophorus zeylonus*), Common Fiscal (*Lanius collaris*), African Hoopoe (*Upupa africana*), Kalahari Scrub Robin (*Erythropygia paena*) and Chestnut-vented Tit-Babbler (*Sylvia subcaerulea*). The only permanent residents within this open area is the Blacksmith Lapwing (*Vanellus armatus*). Additional features providing additional niches within this micro-habitat are the large Eucalyptus trees as well as the steeply eroded banks. The Eucalyptus trees provide roosting and nesting sites as well as foraging areas for avifaunal species such as the Golden-tailed Woodpecker (*Campethera abingoni*), Speckled Pigeon (*Columba guinea*), Southern Yellow-billed Hornbill (*Tockus nasutus*), Gape Turtle-Dove (*Streptopelia capicola*) and Common Cuckoo (*Cuculus canorus*). The steep riverbanks may serve as nesting sites (excevated burrows) for European Bee-eater (*Merops apiaster*), Horus Swift (*Apus horus*) and also potentially the Brown-Throated Martin (*Riparia paludicola*).

Even though none of the substation options are located within the watercourse, the alternative option is located in close proximity to the channel (less than 35m) and within the riparian thicket fringing this portion of the channel and subsequently may potentially impact avifaunal activities within this micro-habitat.

The impacts associated with the development are primarily the impact on movement between this micro-habitat and the fringing riparian thicket within which the alternative option is proposed.

Figure 5: The Olifantsloop river just south of the location of the alternative substation option.

Acacia karroo Thicket

This micro-habitat will only be affected by the alternative substation option. This habitat is characterised by tall *Acacia karroo* specimens forming a dense thicket type of structure fringing this part of the Olifantsloop River. Other tree species found within this area included *Ziziphus mucronata, Grewia flava, Diospyros lycioides* and the invasive alien tree *Eucalyptus camaldulensis*.

Avifaunal diversity within this habitat can be regarded as moderate-high. Key species noted within this unit included: Speckled Pigeon (*Coluba guinea*), various pigeon species, Swallow-tailed Bee-eater (*Merops hirundineus*) European Bee-Eater (*Merops apiaster*), Southern Yellow-billed Hornbill (*Tockus leucomelas*), Acacia Pied Barbet (*Tricholaema leucomelas*), Golden-tailed Woodpecker (*Compethera abingani*), Bokmakierie (*Telophorus zeylonus*), Chestnut-vented Warbler (*Sylvia subcaerulea*), Blue Waxbill (*Uraeginthus angolensis*), Village Indigobird (*Viclua chalybeata*) and Golden Breasted Bunting (*Emberiza flaviventris*).

Current land use within this habitat includes the existing substation and the residential development to the west and the informal settlement to the east. Numerous footpaths traverse the site and the area is used to walk between the informal settlement and the main street of Olifantshoek where most of the

businesses are situated. Livestock from the informal settlement is also allowed to graze these areas. Illegal dumping of general waste and building rubble have also occurred within this area.

The impacts associated with the development within this micro-habitat are displacement due to habitat loss and disturbance.

Figure 6: The dense *Acacia karroo* thicket.

Olifantshoek sewage works

Even though this area is located outside of the servitude area it is still important to take this artificial habitat into account as it is a permanent source of water creating a habitat for water fowls, waders, herons and other bird species associated with such habitats. These species route between this water source and the gravel dam located to the south of the town and may cross the proposed substation location (preferred and alternative). As the location of the alternative substation option will directly result in the lengthening of this section of power line across this potential migratory route, it is worth mentioning the potential impact, resulting from the power line on these species (and can therefore subsequently be regarded as an indirect increase in the potential risk area for bird collision). Species noted within this artificial habitat included: Egyptian Goose (*Alopechen aegyptianca*), South African Shelduck (*Tadorna cana*), Yellow-Billed Duck (*Anas undulata*), Cape Shoveler (*Anas smithii*), Red-billed Teal (*Anas erythrorhyncha*), Little Grebe

(*Tachybaptus ruficollis*), Crowned Lapwing (*Vanellus coronatus*), Kittlitz's Plover (*Charadrius pecuarius*) and Three-banded Plover (*Charadrius ticollaris*).

The increase in risk of collision as a result of the extension of the proposed 132kV overhead power line to the alternative substation location is regarded as an indirect consequence due to the location of this substation option (refer to the report on the proposed 132kV Olifantshoek Power Line). This can be mitigated by implementing visibility measures (bird flappers) along the power line section potentially falling within the flight path of these mentioned bird species.

3.6 Important Bird Areas (IBA)

The preferred and alternative substation locations are not located within close proximity to any Important Bird Area and will therefore have no impact in this regard.

3.7 Avifauna species composition

A total of 228 species were recorded in 2722DD and DC by SABAP1 & 2, with 11 species classified as Red Data species (Barnes 2014). These include Near Threatened Species such as the Black Stork (*Ciconia nigra*), Secretarybird (*Sagittarius serpentarius*) and Black Harrier (*Circus maurus*) and Vulnerable species such as the Cape Vulture (*Gyps coprotheres*), White-backed Vulture (*Gyps africanus*), Lappet-faced Vulture (*Torgos tracheliotus*), Tawny Eagle (*Aquila rapas*), Martial Eagle (*Polemaetus bellicosus*), Corn Crake (*Crex crex*), Kori Bustard (*Ardeotis kori*) and Ludwig's Bustard (*Neotis ludwigii*). Furthermore, 22 species are southern African endemics and 38 are near-endemics (26%).

Reporting rates are an indication of the relative density of a species on the ground in that it reflects the number of times that a species was recorded relative to the total number of cards that were completed for the pentad 1.

During the site survey, a total of 36 bird species were recorded within the study area with 4 species being endemic and 9 being near-endemic.

The most commonly recorded species within the study area were passerine and near passerine species which includes the Bokmakierie (*Telophorus zeylonus*), Lesser Grey Shrike (*Lanius minor*), Fork-tailed Drongo (*Dicrurus adsimilis*), Monotonous Lark (*Mirafra passerine*), Black-chested Prinia (*Prinia flavicans*), Yellow-bellied Eremomela (*Eremomela icteropygialis*), Kalahari Scrub Robin (*Cercotrichas coryphoeus*), Ant-eating Chat (*Myrmecocichla formicivora*), Sociable Weaver (*Philetairus socius*), Scaly-feathered Weaver (*Sporopipes squamifrons*), and Chestnut-vented Warbler (*Sylvia subcaerulea*).

Endemic species recorded during the site survey included the White-backed Mousebird (*Colius colius*), Ant-eating Chat (*Myrmecocichla formicivora*), Rufous-eared Warbler (*Malcorus pectoralis*), Bokmakierie (*Telophorus zeylonys*) and Sociable weaver (*Philetairus socius*).

Red listed species recorded within the greater surrounding environment included the White-backed Vulture - *Gyps africanus* (Endangered), Martial Eagle – *Polemaetus bellicosus* (Endangered) and the Red-footed Falcon – *Falco vespertinus* (Global: Near Threatened). Listed avifaunal species not recorded within the site although highly likely to occur within the area include the Kori Bustard - *Ardeotis kori* (Near Threatened), Secretary Bird - *Sagittarius serpentarius* (Vulnerable), Lanner Falcon – *Falco biarmicus* (Vulnerable) and Peregrine Falcon - *Falco peregrinus* (Near Threatened).

3.8 Avifauna species composition

Table 1 provides a guideline of the Red Data species that have and could potentially be encountered anywhere within the pentad where suitable habitat is available. This was based on observations of avifauna and micro-habitats during the site survey, in combination with documented records within the study area.

Report rates are the likelihood of a particular species occurring within the study site represented as a percentage. Due to the lack of atlas records and subsequent inaccuracies with regards to reporting rates within the proposed study site, these were not included in the analysis.

The specific habitat requirements for each species as well as the most likely associated impacts due to the development were recorded. Species that are in bold were recorded during the site survey.

Table 2: Red listed as well as one species that is not listed that has been recorded either within the relevant quarter degree squares, on site during survey or has a possibility of occurring within the area and which will potentially be affected by the proposed development (NT = Near Threatened; VU = Vulnerable; EN = Endangered; LC = Least Concern) (Species that are in bold were recorded during the site survey; X=impact is relevant to this species)

Name	**Conservation Status**	**Habitat**	**Likelihood of Occurence**		**Habitat Destruction**	**Disturbance**	**Collision with Power Line**	**Electrocution**	**Endemic**
			Preferred Substation Option	Alternative Substation Option					
Secretary Birds *Sagittarius serpentarius*	VU	Grassland/Open Woodland	Likely	Highly Unlikely	X	X	X		
Martial Eagle *Polemaetus bellicosus*	EN	Woodland/Savannah	Unlikely	Unlikely	X	X	X	X	
Kori Bustard *Ardeotis kori*	NT	Grassland/Thornveld	Likely	Highly Unlikely	X	X	X		
White-backed Vulture *Gyps africanus*	EN	Woodland/Savannah	Unlikely	Highly Unlikely	X	X	X	X	Near-Endemic
Red-footed Falcon *Falco vespertinus*	NT	Woodland/Savannah	Likely	Highly Likely		X		X	Endemic
Lanner Falcon *Falco biarmicus*	VU	Woodland/Savannah	Likely	Unlikely		X		X	
Peregrine Falcon *Falco peregrinus*	NT	Woodland/Savannah	Likely	Highly Likely		X		X	

4 SENSITVITY ASSESSMENT

It is important to delineate sensitive avian habitats within the study area in order to ensure the development does not have a long term negative impact on these habitats. Important avian habitats play an integral role in their persistence within a landscape providing nesting, foraging and reproductive benefits.

A sensitivity map was compiled for the study area by making use of the results of the avifaunal micro-habitat assessment (refer to Figure 14).

The prefered substation option is located within area being assessed as being of a **Low Sensitivity** from an avifaunal perspective, whilst the area selected for the alternative substation option is regarded as a **High Sensitivity** from an avifaunal perspective. Subsequently, the preferred substation option is deemed as the most suitable option due to the following reasons:

- The preferred option can be regarded as Low Sensitive as this option will be constructed within a habitat type largely consistent with that which will be traversed by the proposed power line and as such impacts will be contained in fewer habitat types, impacting on a potential lower number of avifaunal species. Furthermore, this micro-habitat has a relatively low species diversity and contain few endemic and near-endemic species with no Red-Data species having been recorded
- The alternative substation is located within a High Sensitive area due do the location within a micro-habitat which is mostly limited and restricted to the upper-middle reach of the Olifantsloop River. This micro-habitat is unique in species composition and vegetation structure when compared to the surrounding vegetation, subsequently creating a unique habitat for avifaunal species preferring such thickets, and which would not have been prominent within the greater study area if not for such micro-habitats. The surrounding and on-site anthropogenic activities and disturbances have likely, to some extent, limited the potential diversity of this micro-habitat.
- Furthermore, the alternative substation location will result in the extension of the proposed 132kV Olifantshoek Power Line section classified as being Medium Sensitive due to this part of the route crossing an area potentially utilised as a preferential flight path by water fowl, waders and herons moving between the sewage works and the gravel dam to the south of the town of Olifantshoek. Therefore, increasing the potential of collision by these species (refer to the assessment report for the proposed 132kV Olifantshoek Power Line for a description of this potential impact as well as proposed mitigation measures).
- The position of the preferred substation is regarded as low sensitive and will have little impact on the avifaunal population within the study area and surrounding landscape, resulting in limited disturbance and loss of potential habitat. Furthermore, the location of the substation within this location will

restrict the size of the proposed power line section falling within the above described potential flight path, lowering the potential impact (collision) associated with this section of the proposed power line.

Overall, it was concluded that with the necessary mitigation measures implemented this **development will have little impact on the avifaunal character of the area with minimal loss.** In terms of the substations, the preferred option is definitely the best option as the alternative option will impact on the *Acacia karroo* thicket which has a moderately-high avifaunal diversity. Furthermore, by selecting the preferred substation location a portion of the power line corridor, which may cross the flight path of water fowl and waders moving between the sewage works and gravel dam, will be significantly shortened thereofore furthermore lowering the risk associated with the power line (refer to the assessment report for the proposed 132kV Olifantshoek Power Line).

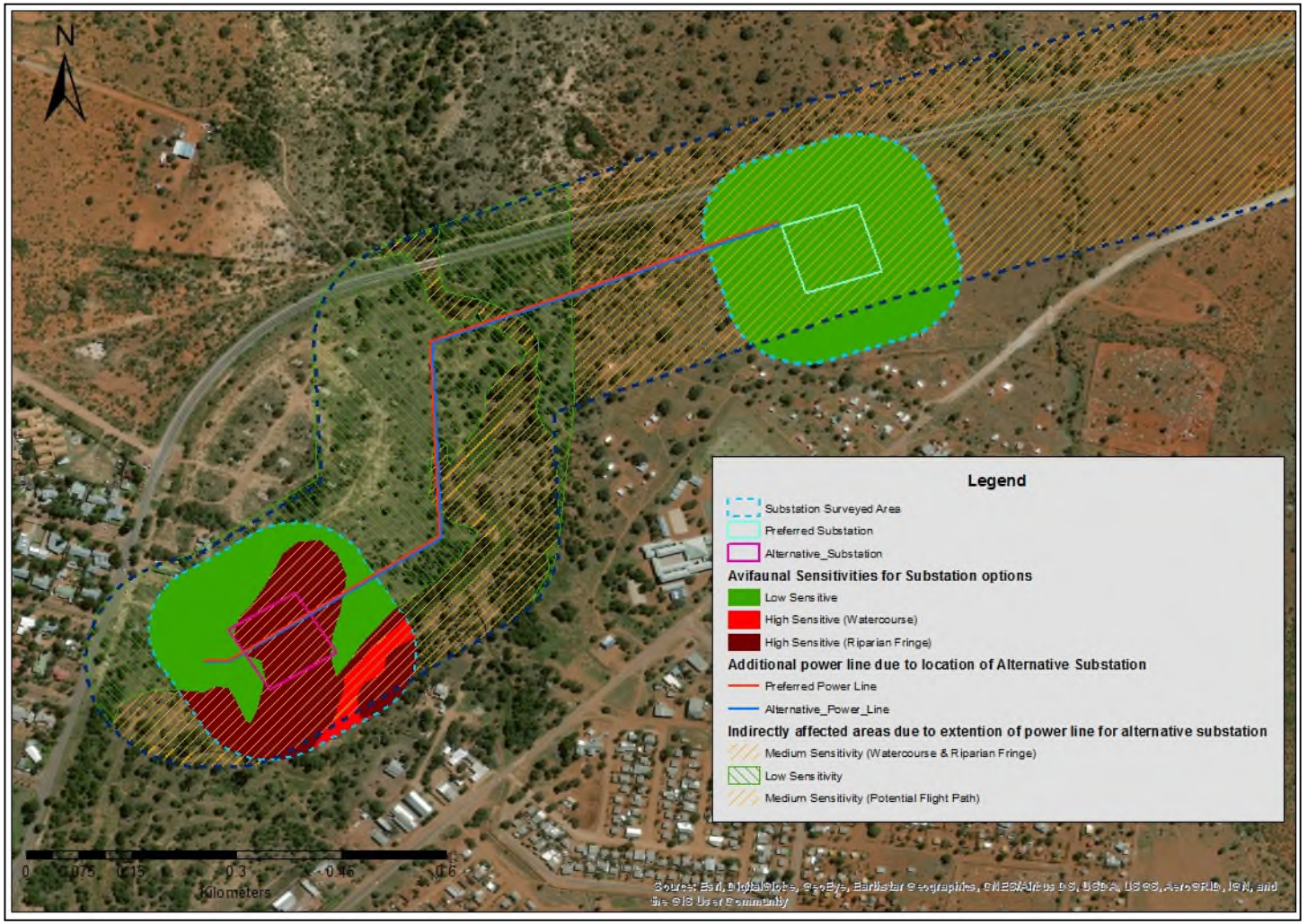

Figure 7: Avifaunal sensitivity map for the proposed 10MVA 132/11KV Olifantshoek Substation Options

5 IMPACT ASSESSMENT

5.1 Methodology used to assess the potential impacts

The Environmental Impact Assessment methodology assists in the evaluation of the overall effect of a proposed activity on the environment. This includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

» The **nature**, which includes a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 was assigned as appropriate (with 1 being low and 5 being high).
» The **duration**, wherein it was indicated whether:
  - the lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2 – 5 years) – assigned a score of 2;
  - medium-term (5 -15 years) – assigned a score of 3;
  - long term (> 15 years) – assigned a score of 4; or
  - permanent – assigned a score of 5;
» The **magnitude**, quantified on a scale from 0 – 10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
» The **probability** *of occurrence*, which describes the likelihood of the impact actually occurring. Probability was estimated on a scale of 1 -5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
» The **significance**, was determined through a synthesis of the characteristics described above and can be assessed as **LOW**, **MEDIUM** or **HIGH**; and
» the **status**, which was described as either positive, negative or neutral.
» the degree of which the impact can be reversed,
» the degree to which the impact may cause irreplaceable loss of resources,

» the degree to which the impact can be mitigated.

The significance was calculated by combining the criteria in the following formula:

S=(E+D+M)P where;

» S = Significance weighting
» E = Extent
» D = Duration
» M = Magnitude
» P = Probability

The significance weightings for each potential impact are as follows;

» < 30 points: **LOW** (i.e. where the impact would not have a direct influence on the decision to develop in the area),
» 30 – 60 points: **MEDIUM** (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: **HIGH** (i.e. where the impact must have an influence on the decision process to develop in the area).

5.2 Impact Statement

The implications of the proposed development are as follows:

» During the construction phase of the substation, disturbance levels will be significantly higher in the immediate vicinity than previously experienced. This disturbance will result from machinery and vehicle disturbance as well as other construction activities.
» During the operation phase, there will be some vehicle activity during the maintenance of the substation.
» The substation infrastructure provides perching and nesting structures for various avifauna, particularly larger raptors.
» There is a possibility that species such as crows/owls could be electrocuted on substation infrastructure.

The tables below provide an assessment of the potential impacts associated with the proposed project. Both substation locations will pose a similar and equal threat to avifauna in the vicinity. Furthermore, most impacts are applicable, and similar, for both the construction, operation as well as the decommissioning phase and therefore the statement will only be provided once (will be mentioned within statement to what phase it has relevance).

The impacts were assessed as follows:

PROPOSED SUBSTATION OPTIONS

I. Construction Phase Impacts

Impact 1: Habitat Destruction

Nature: Habitat Destruction

During the **construction** of the substation, some habitat destruction and alteration will occur, although this is will be limited. These activities may have a very slight impact on foraging, breeding and roosting ecology of avian species within the area through modification of habitat.

It is envisaged that the only Red Data specie that may be potentially displaced (temporarily) by the activities and habitat transformation that will take place as a result of construction are Kori bustard (*Ardeotis kori*). This displacement will only be from a very restricted area. The impact on smaller, non-Red Data species that are potentially breeding in the area will be local and very restricted in extent, and will not have a significant effect on regional or national populations.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (15)**
Status	Negative	
Reversibility	High	
Irreplaceable loss of resources	Only very slight loss of resources	
Can impacts be mitigated?	Yes.	
Mitigation	• The temporal and spatial footprint of the development should be kept to a minimum. • The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area. • Provide adequate briefing for site personnel on the possible important (Red Data) species occurring and/or nesting in the area and the procedures to be followed	

	(for example notification of ECO and avoidance of area until appropriate recommendations have been provided by a specialist). • The above measures must be covered in a site specific EMPr and monitored by an ECO.

Impact 2: Disturbance

Nature: Disturbance

The disturbance of avifauna during the **construction** of the substation may occur. Species sensitive to disturbance include ground-nesting species resident within the development footprint. Disturbance can also influence the community structure of avifauna within close proximity to the development as certain species will be displaced and forced to find alternative territories.

Disturbance could have a negative impact on the breeding activities of various species, particularly if this occurs during a sensitive period in the breeding cycle.

Species of concern are Kori Bustard. Other small avian species do occur within the development footprint but these species are non-Red Data species.

The proposed site is located within an agricultural habitat close to National and Domestic roads. Therefore, species within this landscape often experience disturbance. As a result, disturbance of birds by the proposed substation is anticipated to be of low significance as birds will move away from the area temporarily. The relatively small scale of the development (in relation to the large agricultural landscape) is unlikely to have a significant impact on avifauna. However, species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during both the construction and operation (maintenance) phases.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (21)**
Status	Negative	
Reversibility	High reversibility	
Irreplaceable loss of resources	Only a slight loss of resources	
Can impacts be mitigated?	Impacts can be mitigated to a large extent.	

Mitigation	• Strict control must be maintained over all activities during construction, in line with an approved construction EMPr. • During construction, if any of the Red Data species identified in this report are observed to be roosting and/or breeding in the vicinity, the ECO must be notified and were deemed necessary an appropriate buffer should be placed around the nests and/or roosting areas. If uncertain on the size of such buffer the Environmental Officer (EO) may contact an avifaunal specialist for advice. • The construction equipment camps must be as close to the site as possible. • Contractors and working staff should remain within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted. • Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the construction phase.

II. Operation Phase Impacts

Impact 1: Disturbance

Nature: Disturbance during Operation Phase due to maintenance activities See description for construction disturbance impacts mentioned above.		
	Without Mitigation	**With Mitigation**
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (21)**
Status	Negative	
Reversibility	High reversibility	
Irreplaceable loss of resources	Only slight loss of resources	

Can impacts be mitigated?	Yes.
Mitigation	• Strict control must be maintained over all activities during operation, in line with an approved operation EMPr. • Vehicle movements must be restricted to existing roads and a speed limit of 30km/h must be implemented on all roads associated with the substation during the operation phase. • Contractors and working staff should remain within the development footprint and movement outside these areas, especially into avian micro-habitats, must be restricted.

Impact 2: Electrocution of Birds due to substation infrastructure

Nature: Electrocution of birds on substation infrastructure

Since there is live hardware in the substation yard, the potential exists for birds to bridge the gap between a phase and earth resulting in electrocution. However, very few electrocutions have been recorded on substations. Species likely to be affected are crows, ravens and other species that are tolerant of disturbance. Small raptors such as Lanner Falcons are sometimes attracted into substation yards in pursuit of species nesting there such as sparrows and canaries and may be susceptible to electrocutions.

The impact assessment found the impact of electrocution from substation infrastructure to be of a much lower significance once mitigation in the form of bird friendly structures and bird deterrent measures have been put in place. Species likely to be affected are crows and other non-threatened species with the majority of threatened species avoiding the substation yard as they are sensitive to disturbances.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (30)**	**Low (14)**
Status	Negative	
Reversibility	Low (birds will be injured or killed)	
Irreplaceable loss of resources	Yes	

Can impacts be mitigated?	Yes
Mitigation	• All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents (Hunting, 2002). • Installation of artificial bird space perches and nesting platforms, at a safe distance from energised components (Goudie, 2006; Prinsen et al., 2012).

III. Decommissioning Phase Impacts (of the existing substation as well as the proposed new substation)

Impact 1: Disturbance

Disturbance during Decommissioning Phase due to maintenance activities See description for potential disturbance during operational phase above.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (15)**
Status	Negative	
Reversibility	High reversibility	
Irreplaceable loss of resources	Only a slight loss of resources	
Can impacts be mitigated?	Impacts can be mitigated to a large extent.	
Mitigation	• Strict control must be maintained over all activities during decommissioning, in line with an approved EMPr. • During decommissioning, if any of the Red Data species identified in this report are observed to be roosting and/or breeding in the vicinity, the ECO must be notified and were deemed necessary an appropriate buffer should be placed around the nests and/or roosting areas. If uncertain on the size of such a buffer the Environmental Officer (EO) may contact an avifaunal specialist for advice. • The decommissioning equipment camps must be as close to the site as possible.	

	• Contractors and working staff should remain within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted. • Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads associated with the project during the construction phase.

B. CUMULATIVE IMPACTS

Impact 1: Electrocution of Birds due to substation infrastructure

Potential cumulative impacts are regarded as low and no additional potential deaths of avifaunal species (including Red Data) will occur as this substation will not increase the threat, but will replace the existing substation and subsequently will only replace the threat. As such the substation will not contribute to cumulative impacts.

	Cumulative Contribution of Proposed Project	**Cumulative Impact without Proposed Project**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small (0)	Small (0)
Probability	Imrobable (2)	Improbable (2)
Significance	**Low (10)**	**Low (10)**
Status	Neutral	
Reversibility	High	
Irreplaceable loss of resources	No additional loss of resources expected	
Can impacts be mitigated?	Yes.	
Mitigation	• All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents (Hunting, 2002). • Installation of artificial bird space perches and nesting platforms, at a safe distance from energised components (Goudie, 2006; Prinsen et al., 2012).	
Residual Impacts	None	

5.3 Preferred VS alternative substation options

Regarding the substation options, the preferred option is regarded as being the favourable of the two options. The preferred option will be constructed within an area where impacts will be contained in fewer habitat types, impacting on a lower number of avifaunal species.

On the other hand, the alternative substation will result in a longer power line and will be situated within an additional habitat type (*A. karroo* riparian thicket) which is regarded as more sensitive in terms of avifauna habitat. Not only will the location pose a higher potential threat to an additional habitat but the alternative substation and additional power line may pose a potential threat to avifaunal species from adjacent habitat types (e.g. upper portion of the Olifantsloop watercourse, the sewage plant and dam located to the south of the town of Olifantsloop). The additional power line which will be the result of this alternative substation will cross a potential important route used by water fowl and waders moving between the sewage plant and the dam to the south, subsequently posing a collision threat to these species.

Therefore, from an avifaunal perspective the alternative option should not be considered. The preferred option is therefore considered to be the only viable option.

6 DISCUSSION AND CONCLUSION

The proposed Olifantshoek Substation will have a minimal impact on avifauna due to the limited spatial requirements of the development, the study area being mostly uniform in vegetation composition as well as the avifaunal composition with a small variation occurring between the different micro-habitats. Therefore, the proposed development is unlikely to have any long-term significant impacts on avifauna species within the study area.

During the site survey, a total of 36 bird species were recorded within the study area with 4 species being endemic and 9 being near-endemic.

Endemic species recorded during the site survey included White-backed Mousebird (*Colius colius*), Ant-eating Chat (*Myrmecocichla formicivora*), Rufous-eared Warbler (*Malcorus pectoralis*) and Sociable weaver (*Philetairus socius*).

Red listed species recorded within the greater environment (although none of these species where confirmed within the footprint area of the proposed substation options) included the White-backed Vulture - *Gyps africanus* (Endangered), Martial Eagle – *Polemaetus bellicosus* (Endangered) and Red-footed Falcon – *Falco vespertinus* (Global: Near Threatened). Listed avifauna species not recorded within the study area although highly likely to occur within the area include the Kori Bustard - *Ardeotis kori* (Near Threatened), Secretary Bird - *Sagittarius serpentarius* (Vulnerable), Lanner Falcon – *Falco biarmicus* (Vulnerable) and Peregrine Falcon - *Falco peregrinus* (Near Threatened).

Investigation of the study area revealed the following important avian micro-habitats.

- *Acacia tortilis – Acacia mellifera* Open Woodland
- Non-perennial watercourses
- *Acacia karroo Thicket*
- Olifantshoek sewage works

Although none of the substation options is located within the Non-perennial watercourse, this micro-habitat is located in close proximity to the alternative substation location (less than 35m and within the fringing riparian thicket) and subsequently, this option may potentially impact avifaunal activities within this micro-habitat. As a result of numerous disturbances within this micro-habitat, almost none of the avifaunal species recorded within this habitat, reside permanently within this habitat. Most species seek refuge, nest, roost and fulfil most of their activities within the fringing Thicket micro-habitat. The open, grassy/weedy river bed is rather frequently visited for very short periods of time by mainly small granivorous passerines in search of ripe grass seeds and nesting

material as well as a few insectivorous species in search of prey attracted to moisture and flowering herbs and weeds. These species do not remain long in this habitat after which they return to the fringing thicket.

The *Acacia karroo* thicket will only be affected if the alternative substation is selected, although this is not preferred. This habitat is characterised by a dense stand of relatively tall *A. karroo* trees fringing the upper parts of the Olifantsloop River. This unit provides valuable habitat for numerous species (more than 20 species), of which 4 species are near-endemics.

The *Acacia tortilis – Acacia mellifera* woodland is located south of the N14 and is characterised by a low ridge transitioning into a flatter area with moderate shallow soils towards the town of Olifantshoek. The preferred substation option is located within this avian micro habitat. This habitat was relatively species poor with only 15 species noted. Of these 15 species, 5 species were near-endemics and 2 were endemics.

Even though the Olifantshoek sewage plant is located outside of the investigated area, it is still worth taking into account especially the position of this permanent waterbody relative to the gravel dam located at the southern point of the town. These waterbodies provide habitat for water fowl and waders which may move between these waterbodies. If the alternative site substation is selected, the power line will extend across the potential flight path of these species and may result in some collisions. Subsequently, the preferred substation and power line option should be selected as this will mostly avoid this potential impact.

The dense *Acacia karroo* riparian thicket, as well as the portion of proposed power line that will be located close to the sewage works (as a result of the location of the proposed alternative substation option) are all classified as medium sensitivity areas. The proposed power line corridor opposite the sewage works potentially crosses the flight path of water fowl and waders posing a potential collision risk and by selecting the preferred substation option this portion of power line is notably shortened, significantly lowering the potential significance of this impact.

The *Acacia tortilis – Acacia mellifera* woodland is classified as a low sensitive area as this habitat type is largely consistent with that which will be traversed by the proposed power line and as such impacts will be contained in fewer habitat types, impacting on a potential lower number of avifaunal species.

The impacts associated with the development include displacement due to habitat loss and disturbance and electrocution of birds. All of these impacts can be successfully mitigated and subsequently the development is regarded as a low

threat impact and will not significantly affect the avifaunal character of the area or pose a threat to red data species.

The preferred substation site is deemed, from an avifaunal perspective, as the preferred option as this will exclude any impacts within the *Acacia karroo* thicket as well as shorten the proposed power line, reducing the risk to movements of water fowl and waders between the Sewage works and the gravel dam.

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