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AVIFAUNAL IMPACT ASSESSMENT

PROPOSED SALDANHA BAY NETWORK STRENGTHENING PROJECT, SALDANHA BAY LOCAL MUNICIPALITY, WESTERN CAPE PROVINCE.

NOVEMBER 2016

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Declaration

I, **Craig Widdows,** declare that -

- I act as the independent specialist in this application;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I will comply with the National Environmental Act (NEMA), regulations and all other applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; all the particulars furnished by me in this form are true and correct.

Signature of the specialist:

Date: 11 November 2016

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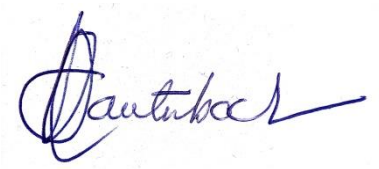
Independent Specialist Declaration

I, **Anita Rautenbach** declare that –

- I act as the independent review specialist in this application;
- I do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if these results in views and findings that is not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity and undertaking of this review;
- I have expertise in undertaking the review of the report, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in conflicting interests in the undertaking of this activity;
- I undertake to disclose to the applicant and the competent authority any material information in my possession that reasonably has or may have the potential of influencing – any decision to be taken with respect to the applicant by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I am aware that a person is guilty of any offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48 (1) (a)-(e) is liable to the penalties as contemplated in Section 49B (1) of the National Environmental Management Act, 1998 (Act. 107 of 1998).



Signature of the Specialist:

Date: 11/11/2016

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Executive Summary

Afzelia Environmental Consultants (Pty) Ltd were appointed by Savannah Environmental (Pty) Ltd to undertake an avifaunal impact assessment for the proposed construction of the Saldanha Bay Network Strengthening Project, Saldanha Local Municipality, Western Cape. The study site is located ~5km north east of Saldanha Bay. The network strengthening project will comprise of the following activities:

- Construction of a new 400/132kV Transmission Substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers;
- Construction of a new 132/66kV Distribution Substation near the current Blouwater Substation in the Saldanha Bay area;
- The construction of 2 x 400kV power lines (approximately 35 - 40 km) from the Aurora Substation to the new proposed distribution and transmission substations;
- Replace two of the four existing 250 MVA 400/132kV transformers with 2 x 500 MVA transformers at Aurora Substation; and
- Establishing 2 x 132 kV feeder bays around Aurora Substation.

A total of 264 bird species are recorded within the 3218CC and 3318AA quarter degree grid square (South African Bird Atlas Project 2), seven of which are considered "Endangered", five are considered "Vulnerable" and six are considered "Near Threatened" (Barnes 2014). Avian species likely to be impacted by the proposed substation and power line development include local populations of waterbirds, locally resident or transient raptors (Martial Eagle) and large terrestrial birds (Secretarybird, Blue Crane, Lesser Flamingo and Greater Flamingo). During the site visit, 51 bird species were recorded within the proposed study site including the Near Threatened Blue Crane (*Anthropoides paradiseus*) and Vulnerable Southern Black Korhaan (*Afrotis afra)*. The avian composition was dominated by small passerine species such as Karoo Scrub Robin (*Cercotrichas coryphoeus*), Grey Tit (*Parus afer*), Southern Double-collared Sunbird (*Cinnyris chalybeus*) and Karoo Prinia (*Prinia maculosa*).

The study site is of moderate significance to avifauna. There are few sensitive areas located within the development footprint and limited significant avifaunal micro-habitats.

The impacts associated with the proposed substation and power line developments include:

- Destruction and alteration of avian habitats;
- Disturbance of birds;
- Collision and electrocution on overhead power lines; and
- Electrocution on substation infrastructure

The construction of the proposed transmission substation at any of the site alternatives is adequate from an avifaunal perspective and poses a limited threat to the birds occurring in the vicinity of this infrastructure. This is largely due to the homogenous nature of the area, high levels of disturbance due to agricultural practices, resulting in

the low avian diversity and abundance. The impact of displacement due to habitat transformation will be moderate, and should only affect a few non-Red Data species at a local level. The construction of the proposed transmission substation at site alternative A is favourable.

The construction of the dual 400kV power line within corridor alternative 3 and 6 are considered to be the most favourable corridors from an avifaunal perspective. It is recommended that the earth wire of the selected power line corridor be marked with anti-collision bird diverters in order to mitigate the collision risk, particularly associated with Blue Crane, Lesser Flamingo, Greater Flamingo and the Southern Black Korhaan. These must be installed as per Eskom's standard practice.

Due to the relative homogenous nature of available habitat and existing levels of disturbance (existing power line and substation infrastructure, roads, urban developments, agricultural/stock farming), within the study area, the proposed strengthening project is unlikely to have a significant, long-term impact on the local avifauna, provided that mitigation measures outlined in this report are implemented.

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1. INTRODUCTION

1.1 BACKGROUND AND LOCALITY OF THE ASSESSMENT AREA

Afzelia Environmental Consultants (Pty) Ltd were appointed by Savannah Environmental (Pty) Ltd to undertake an avifaunal impact assessment for the proposed Saldanha Bay Network Strengthening Project, Saldanha Bay Local Municipality, Western Cape.

Eskom Holdings SOC Ltd is proposing the construction of a new dual 400kV power line of approximately 35km as well as a new transmission substation (Tx) and a new distribution substation (Dx) in the Saldanha Bay area of the Western Cape. The construction development footprint for the transmission substation is 600m x 600m and the distribution substation is 120m x 120m. The infrastructure associated with the proposed development includes:

- Construction of a new 400/132kV transmission substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers;
- Construction of a new 132/66kV distribution substation near the current Blouwater Substation in the Saldanha Bay area;
- The construction of 2 x 400kV power lines from the Aurora Substation to the new proposed distribution and transmission substations;
- Replace two of the four existing 250 MVA 400/132kV transformers with 2 x 500 MVA transformers at Aurora Substation; and
- Establishing 2 x 132 kV feeder bays around Aurora Substation.

The proposed development will be known as the Saldanha Bay Network Strengthening Project, and is planned in order to increase the power capacity within the area. The establishment of the Transmission and Distribution Substations will assist in resolving the transmission capacity constraints at Aurora Substation and will play an important role in addressing the forecasted load requirements from industrial customers; the Industrial Development Zone (IDZ).

The proposed development is located within the Saldanha Bay Local Municipal area in the Western Cape Province (**Figure 1**). The study area (GPS coordinates: 33° 0'10.19"S, 18° 8'3.18"E) is located approximately 5 km to the south-east of Saldanha Bay, between the R27 and R45. The West Coast National Park borders the study area on the south. (**Appendix 4**). The study area falls with the buffer zone of the West Coast National Park and Priority Natural Areas. Further to this, SANParks Managed Areas are located within the study area (West Coast National Park Management Plan for the period 2013-2023). There are three proposed power line corridors, three transmission substation site alternatives and three distribution substation site alternatives. All of the alternatives are located within the quarter-degree squares 3218CC and 3318AA (**Figure 2**).

Overhead power line infrastructure is known to negatively impact various avian species through direct mortality and disturbance of birds and indirectly through the removal of

natural habitats. Direct impacts from substation infrastructure are predicted to be less significant and more likely to be indirect due to habitat loss and disturbance.

1.2 SCOPE OF WORK

- Field visits to identify important avian micro-habitats associated with the proposed project area as well as avian species that may potentially use these niches;
- A description of the current avifauna within the study area and the identification of Red Data species that may be potentially affected by the proposed substation and overhead power lines;
- Integration of the site data collected with data from avian atlases and counts from the area to develop a comprehensive avifaunal database of bird species likely to be present within the development footprint;
- Recommendations on which alternatives are preferable for the construction of the substation and power lines in order to have the least impact on avifauna;
- 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; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

1.3 SOURCES OF INFORMATION

Due to the inherent mobility of birds, it is important to consider avifauna not only on the project site, but also the avifauna within the larger area. The broader project area includes bird distribution data from the following pentads; 3300_1800, 3300_1805, 3300_1810, 3255_1800, 3255_1805, 3255_1810. The primary sources of avifaunal distribution data were obtained from the following sources:

- The Second Southern African Bird Atlas Projects (SABAP2; Harrison et al. 1997, http://sabap2.adu.org.za);
- The Birds in Reserves Project database was used to augment bird counts data (Animal Demographic Unit 2015);
- The conservation and endemic status of all bird species occurring within the pentads determined with the use of The Eskom Red Data book of Birds of South Africa, Lesotho and Swaziland (Taylor et al., 2015) and the BirdLife SA checklist of endemics and near-endemics;
- The Important Bird Areas (IBA) programme according to BirdLife South Africa was consulted (http://www.birdlife.org.za/conservation/important-bird-areas);
- Coordinated Waterbird Count (CWAC) data was consulted and analysed;

- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) was taken into account. This is an intergovernmental treaty (of which South Africa is a signatory) primarily aimed at conserving migratory species;
- Guidelines for mitigating conflict between migratory birds and electricity power grids (2011, The Convention on Migratory Species) was consulted in order to determine mitigation measures for the proposed project;
- A classification of the vegetation types in the study area was obtained from Mucina and Rutherford (2006); and
- Information on the avian micro-habitat level was obtained during the site visit conducted from the 01st – 05th February 2016.

1.4 ASSUMPTIONS AND LIMITATIONS

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

- In this instance the 3218CC and 3318AA Quarter Degree Grid Squares were reasonably well covered by South African Bird Atlas Project (SABAP2), with data recorded on 25-87 data cards. It is therefore assumed that the species diversity and densities recorded by SABAP2 provides an accurate interpretation of the avifauna potentially occurring in the study area.
- Due to their mobility, avian behaviour is relatively unpredictable and cannot be reduced to formulas that will hold true under all circumstances. However, power line and substation impacts can be predicted with a fair amount of certainty due to the vast amount of data available in this regard.
- Many Red Data species are secretive and difficult to observe even during intensive field surveys.
- 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.

2. METHODOLOGY

When predicting the impacts of a proposed power lines and substations on birds, a combination of field experience and specialist knowledge is required. The methodology used to predict avifaunal impacts associated with the proposed project were as follows:

- The various data sets discussed under section 1.3 were collated and examined with the aim of determining the focal species in the study area.

- The data was examined to determine the location and abundance of both Red Data and non-Red Data species which may be susceptible to impacts from the proposed development.
- The broader study area was visited during a five-day site visit. The study area was traversed to obtain a first-hand perspective of the proposed project area and birdlife, and to determine which bird micro-habitats are present. This involved driving around in the broader study area, taking photographs, and walking certain accessible areas, to survey as much as possible of the proposed substation sites and corridor options for the power line.
- A desktop examination of the site, using Google Earth imagery was done to compare the power line corridor alternatives and substation site alternatives. This was confirmed during the site visit.
- Avian micro-habitats and sensitive habitats for avifaunal communities were identified and mapped.
- The impacts of the proposed development on the avifaunal populations were predicted by analysing data on wildlife impacts with power lines and associated substation infrastructure throughout southern Africa.

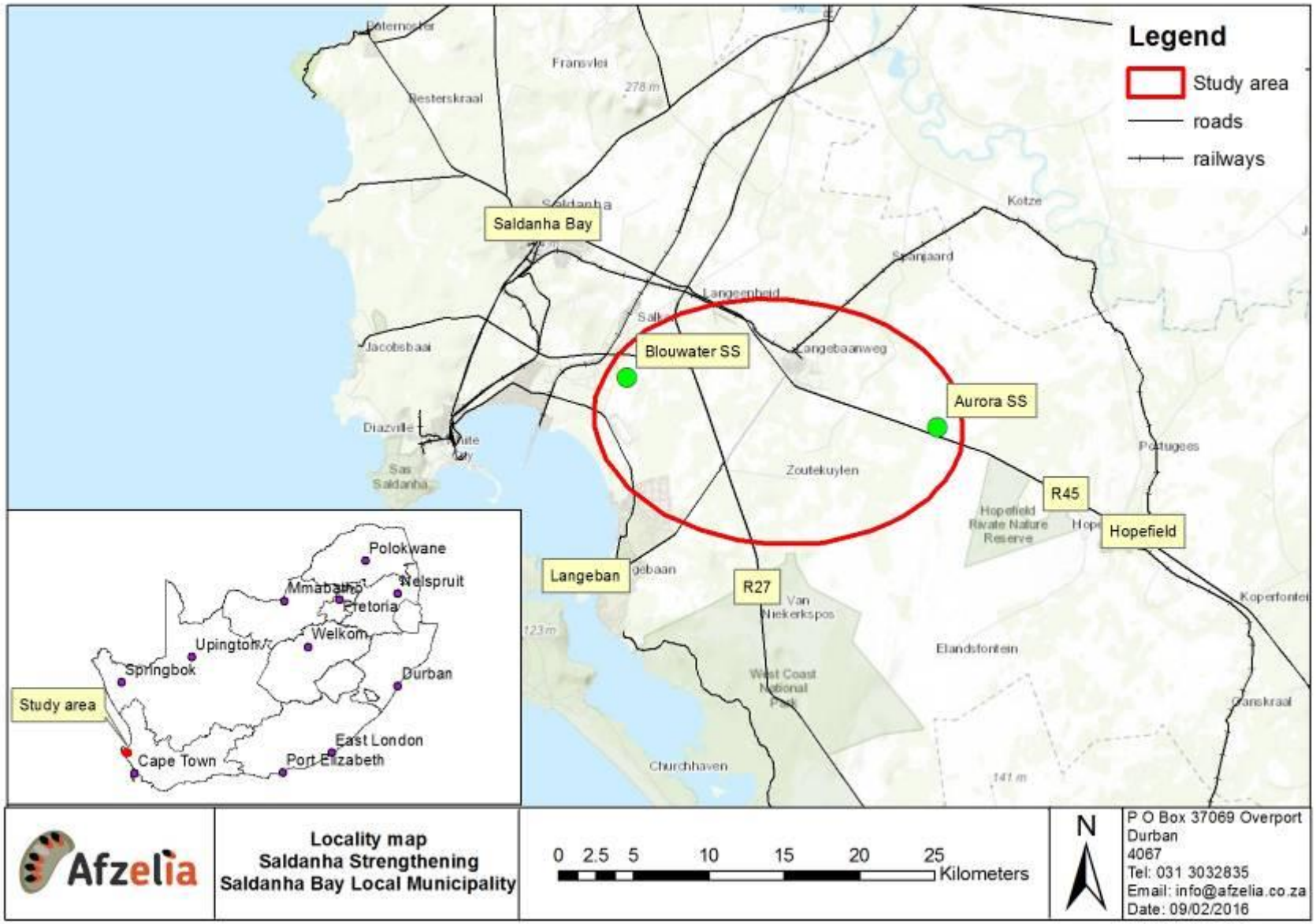


Figure 1: Locality of study area for the proposed substations and power line infrastructure.

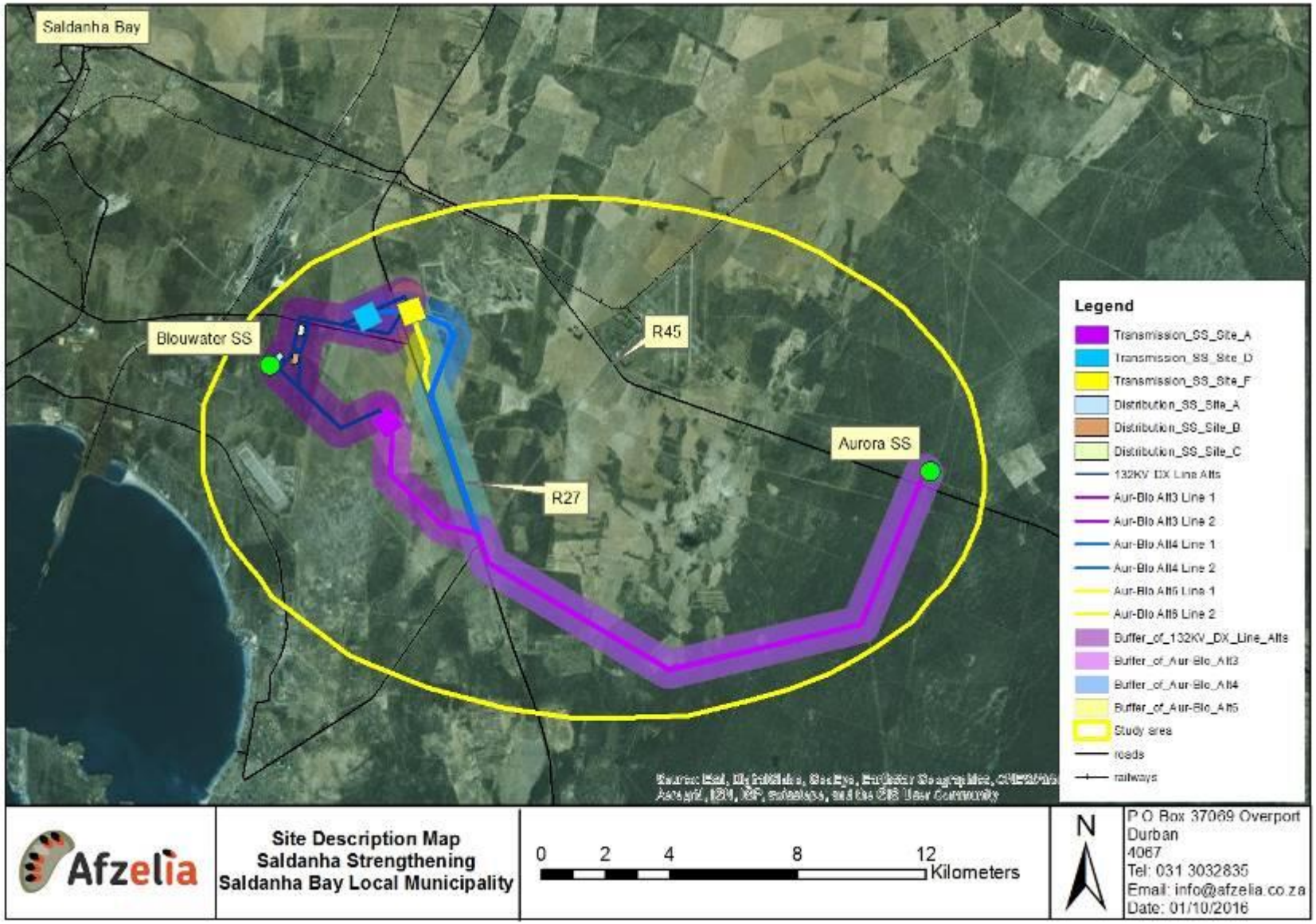


Figure 2. Site description map of the proposed substation site alternatives and power line corridor alternatives.

3. DESCRIPTION OF THE GREATER STUDY AREA

3.1 CLIMATE AND VEGETATION

The Saldanha Bay area is characterised by a winter rainfall pattern with some rain occurring in summer. The mean annual precipitation is approximately 250mm per year. The area receives the lowest rainfall in February (1mm) and the highest in June (49mm). The average daily maximum temperatures range from 16.4 °C in July to 25.1 °C in February. The region is the coldest in June with minimum temperatures of 8.0 °C (Mucina and Rutherford, 2006).

According to the national vegetation map (Mucina and Rutherford, 2006) four vegetation types occur within the study area (**Figure 3**). All four vegetation types form part of the Fynbos Biome. Saldanha Flats Strandveld is the dominant vegetation type located within the study area while the Saldanha Limestone Strandveld occupies the western edge.

The Saldanha Flats Strandveld vegetation type consists of high diversity of low *Sclerrophyllous* shrublands with an open succulent layer forming in the undergrowth. The Saldanha Limestone Strandveld vegetation type consists of low shrublands dominated by low succulent, deciduous and fleshy leaved shrubs (Mucina and Rutherford, 2006).

Both vegetation types are considered Endangered with at least 50% of Saldanha Flats Strandveld transformed mostly by cultivation, development of coastal settlements and road development (Mucina and Rutherford, 2006). It is estimated that 40% of the Saldanha Limestone Strandveld has been transformed due to coastal settlement development and cultivation.

A small outcrop of Saldanha Granite Strandveld is located along the southern section of the site and Hopefield Sand Fynbos Vegetation traverses the northern boundary. Both vegetation types are considered Endangered, with approximately 70% of Saldanha Granite Strandveld and 40% of Hopefield Sand Fynbos transformed by cultivation, urban development and grazing land (Mucina and Rutherford, 2006).

A series (5) of existing power lines exit the Aurora substation and radiate through the landscape. There is also other existing power line infrastructure throughout the study area. The study area has also been transformed by agricultural and industrial development (ArcelorMittal South Africa, Saldanha Works). Furthermore, a series of main roads (R45 and R27), informal roads and railways lines (such as the Sishen–Saldanha railway line) have resulted in varying degrees of transformation and habitat fragmentation resulting in vegetation degradation. Large ornamental (usually exotic) trees located around farmsteads contrast with the Fynbos shrubland vegetation of the surrounding areas.

The main topographical features within the study area consist of flat plains with limited undulations and ridgelines which are characteristic of the west coast coastal plains. The

Berg River is a large watercourse and is located 15km to the east of the site and drains in a north easterly direction.

In examining the region as a whole in terms of avifauna, it is important to relate the avifauna to the biomes and vegetation types present in the area. Harrison *et al.* (1997) in "The Atlas of Southern African Birds" provide a description of the various vegetation types represented in the region and the associated bird species. The distribution of bird species is closely related to broad scale vegetation types (such as biomes) rather than fine-scale vegetation mapping. Therefore, the vegetation description within this report does not focus on lists of plant species, but rather on vegetation structural units such as woodlands, riverine habitats or pans and wetlands.

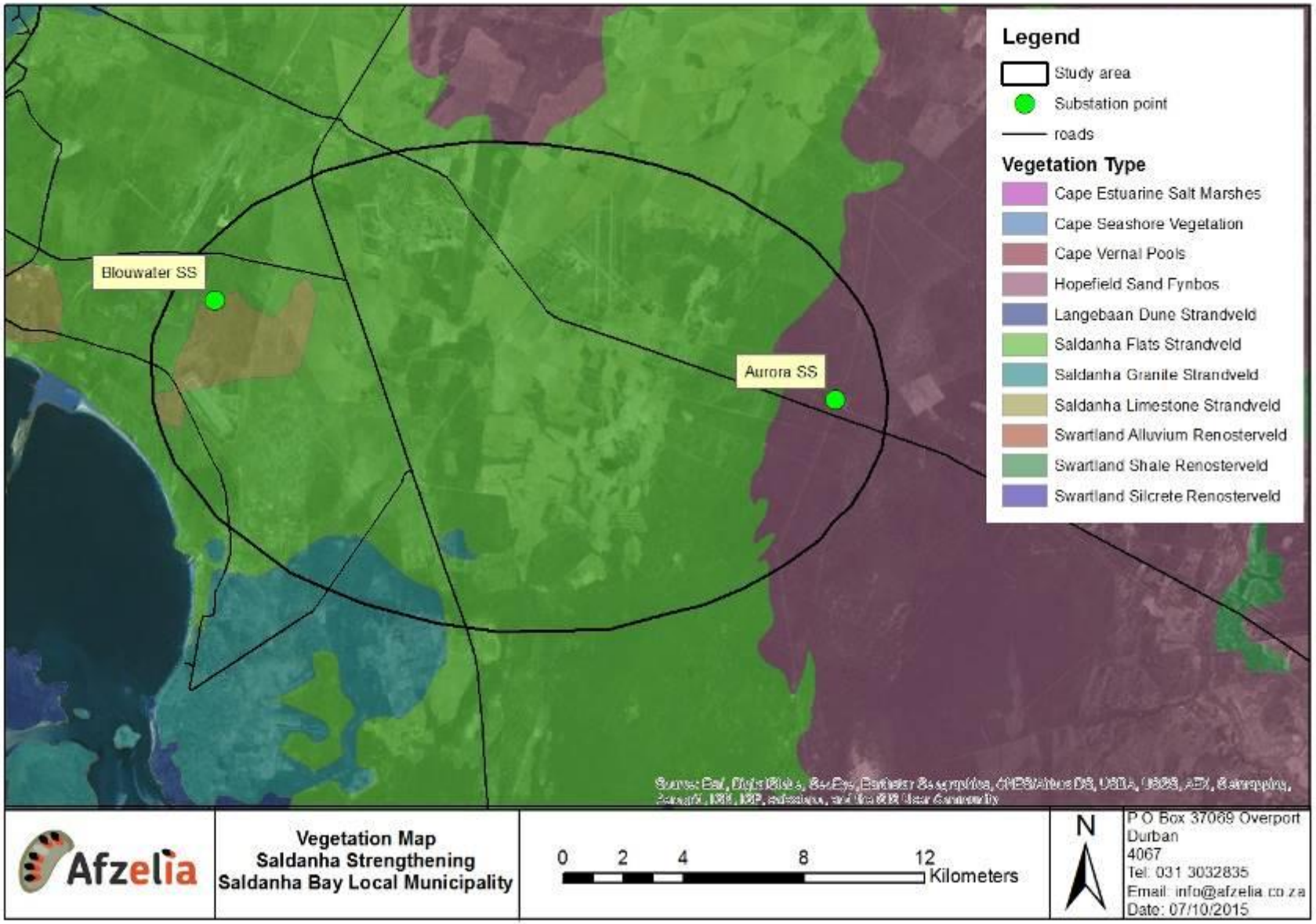


Figure 3. Vegetation types located within the study area and surrounds.

3.2 AVIAN MICRO-HABITATS

In determining the suitability of the study area for avian species, it is important to look at the habitats available to determine the relevant species most likely to occur. 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.

It must be emphasised that due to the mobility of birds, many species will utilise almost any area in a landscape from time to time.

Investigation of the study area revealed the following avian micro-habitats (**Figure 4**). In each case, some of the species most likely to occur in the various micro-habitats have been described.

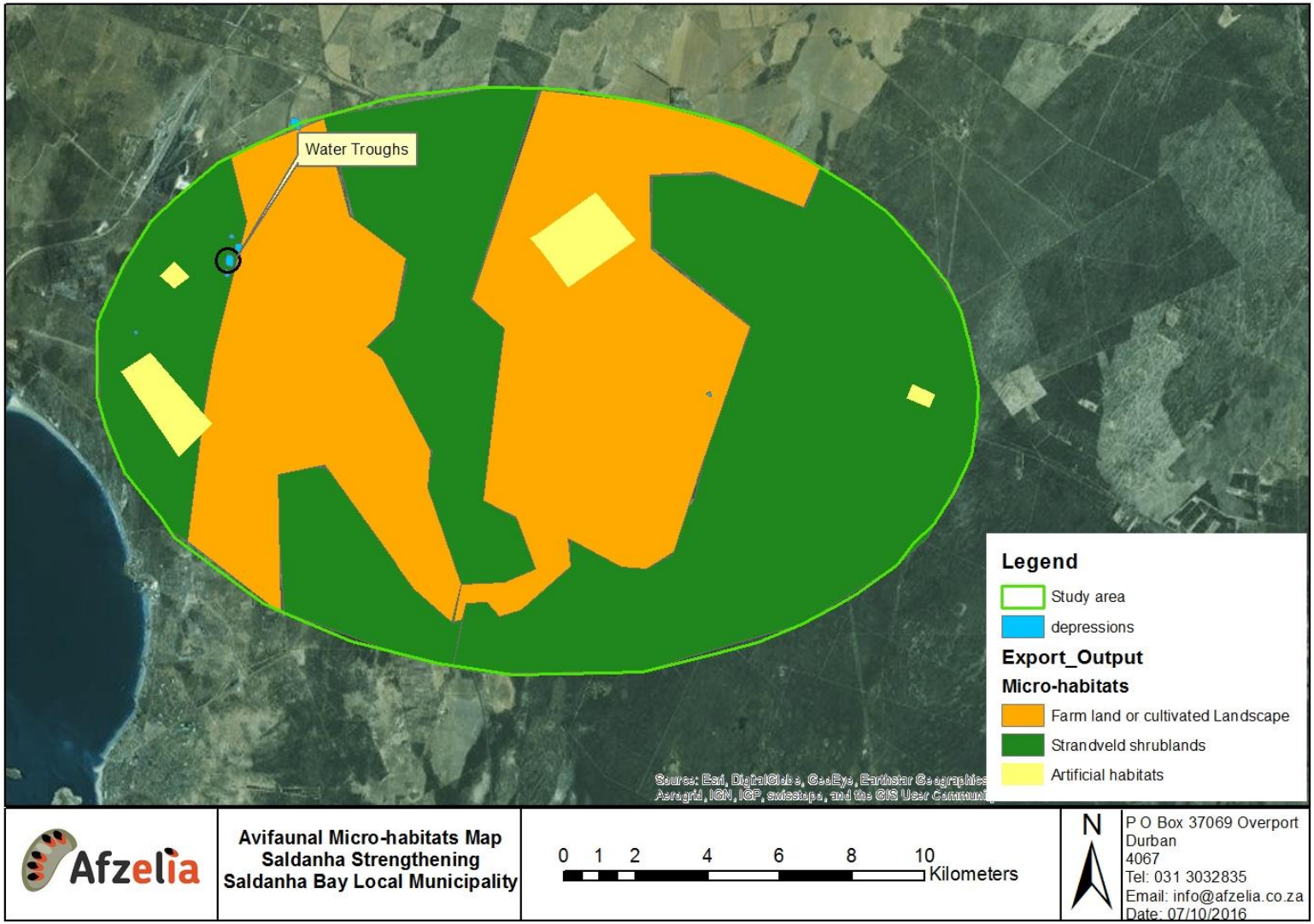


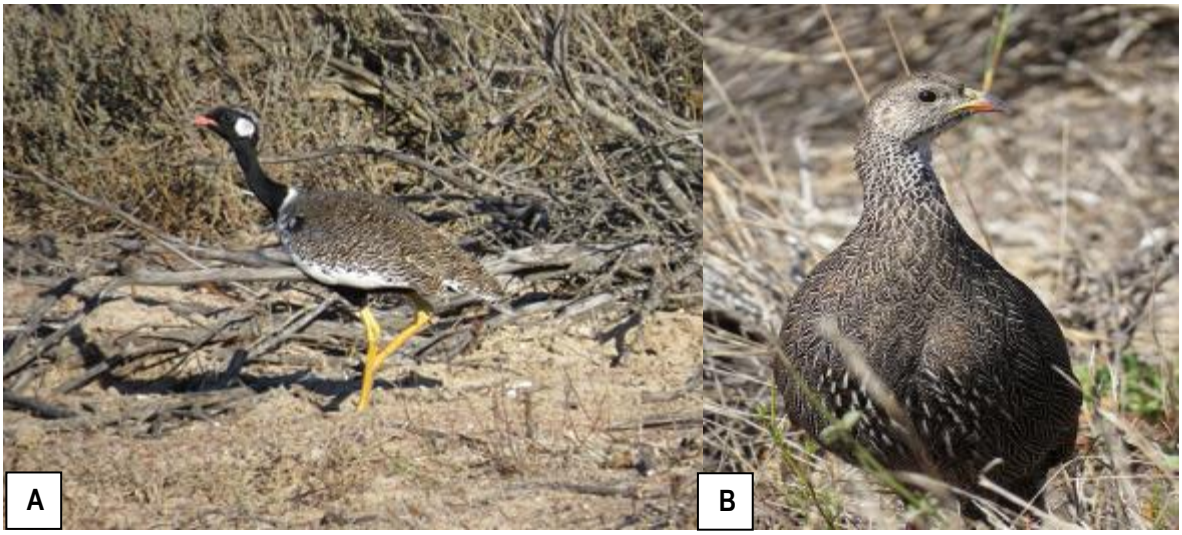
Figure 4. Avian micro-habitats identified within the study area

Strandveld Shrublands

Strandveld low shrublands occupy the central and southern sections of the study area and is the dominant avian micro-habitat (**Photograph 1 and 2**). This micro-habitat is characterised by *plant*s species such as *Euphorbia mauritanica*, *E. tuberosa*, *E. caput-medusae* and *Asparagus capensis*. The avifauna associated with this low-shrubland micro-habitat supports a number of endemic/ near-endemic species; dominated by ground-dwelling species.

Even though the scrublands are negatively impacted on by anthropogenic changes, it still provide important foraging, roosting and nesting habitat for various avifauna species such as Secretarybirds (*Sagittarius serpentarius*), the endemic Cape Spurfowl (*Pternistis capensis*), Black Harrier (*Circus maurus*) and Southern Black Korhaan (*Afrotis afra*) as well as small passerine species such as Karoo Scrub Robin (*Erythropygia coryphoeus*), Grey Tit (*Parus afer*), Southern Double-collared Sunbird (*Cinnyris chalybeus*) and Cape Canary (*Serinus canicollis*).

Photograph 1. The Strandveld shrubland habitat which occupies the central and southern sections of the proposed study area.



Photograph 2. (A) Southern Black Korhaan (Vulnerable) and (B) Cape Spurfowl (Endemic) recorded within the Strandveld shrubland micro-habitats.

Endorheic depressions

The western section of the study area contains endorheic depressions that will hold water during good rainfall years (**Figure 5**, **Photograph 3**). As a result these depressions may provide suitable breeding and foraging opportunities for avian species and attract various waterbirds. When water is present, the depressions in this study area could be used by White Storks (*Ciconia ciconia*), Yellow-billed Duck (*Anas undulata*), Blacksmith Lapwing (*Vanellus armatus*) and a number of migratory wader species. Furthermore, these water sources are often used by large flocks of granivorous bird species such as Cape Sparrow (*Passer melanurus*), Cape Weaver (*Ploceus capensis*) and Canary Species (*Crithagra* ssp).

Photograph 3. Endorheic depressions located within the study area.

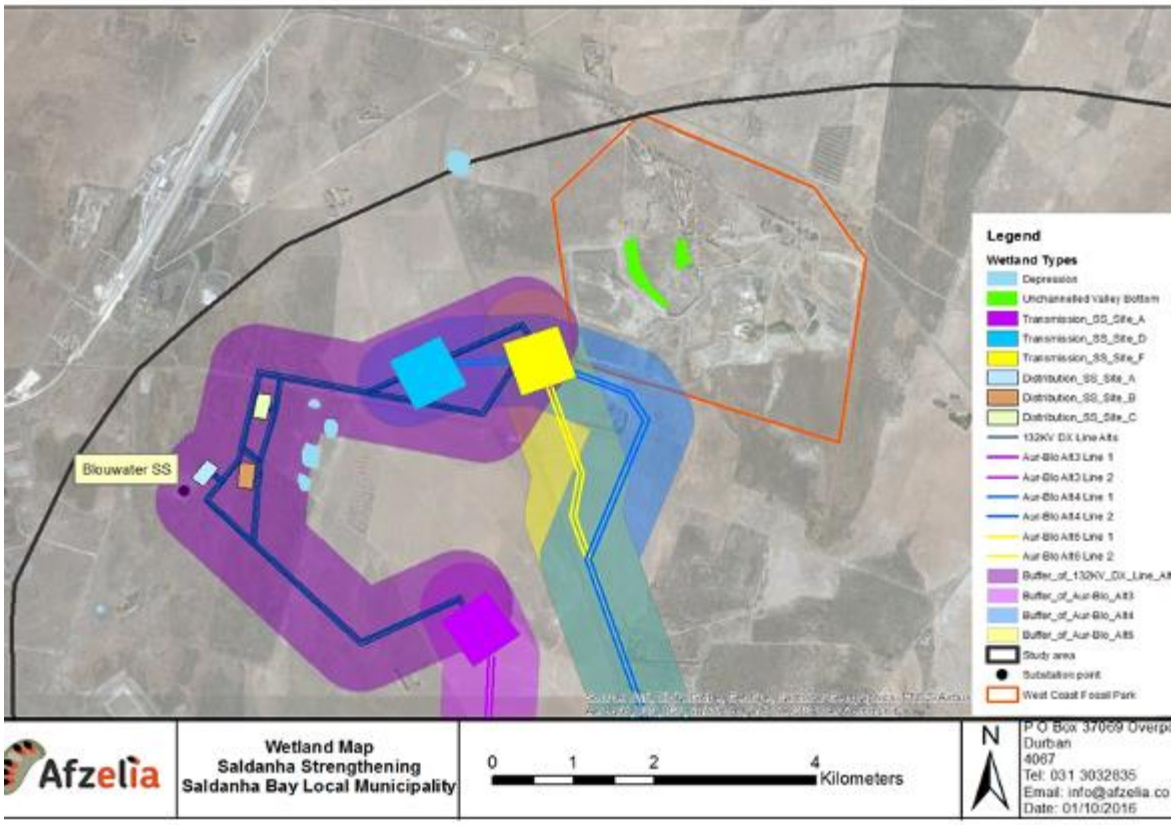


Figure 5. Endorheic depressions identified and delineated within the study area.

Farmland or cultivated landscape

Agricultural lands are found within the study area and are a common micro-habitat (**Photograph 4**). Relevant bird species that will be attracted to these areas include Western Cattle Egret (*Bubulcus ibis*), Black-headed Heron (*Ardea melanocephala),* Blue Crane (*Anthropoides paradiseus*) and small granivorous species (Southern Red Bishops). In particular, the White Stork and Blue Cranes have a high affinity for arable land, with 80% of sightings in South Africa recorded within this habitat (Dean & Ryan 2005).

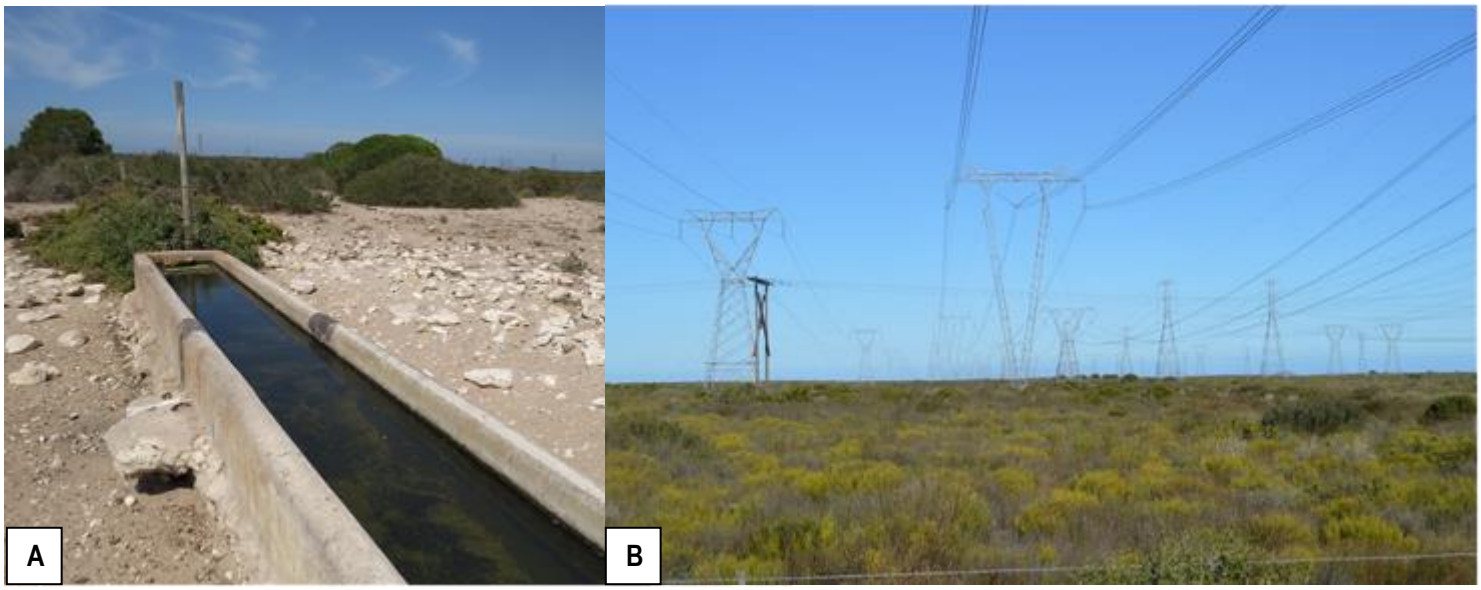
Farmland or cultivated land provides foraging opportunities for avian species that are tolerant of anthropogenic disturbances and are able to utilise this niche. These foraging opportunities are provided by the following measures:

- Through the process of land preparation many insects, seeds, bulbs and other food sources become readily accessible to bird species;
- The agricultural plants that are cultivated are often consumed by birds, or attract insects which are in turn consumed by birds; and
- The use of agricultural lands as foraging sites is likely to fluctuate throughout the year. It is predicted that concentrations of birds will increase during spring when the fields are ploughed, and in late summer / autumn when the crops are harvested and the birds are attracted to feed on the residual grains.

Photograph 4. Agricultural land located within the study area.

Artificial habitats

Artificial habitats are provided by the existing overhead power lines that traverse the study area (**Photograph 5B)**. The pylons are used by various species including raptors (Steppe Buzzard, Jackal Buzzard and Lanner Falcon) from which to hunt and nest. A series of troughs are located within the western section of the study site. These contain water all year round and are used by a variety of avifaunal species as a predictable water source. (**Photograph 5A and 6**).



Photograph 5. A water trough located on the western and central section of the study site (A) and the existing power line traversing through northern and central sections of the study area (B).

Photograph 6. Flocks of birds visiting the water troughs located on the western and central section of the study site (A) including the endemic Cape Spurfowl (B).

3.3 IMPORTANT BIRD AREAS (IBAs)

The Important Bird Areas are identified as areas that are important for the long-term survival of threatened, restricted avian species.

The proposed substation and power line development borders the West Coast National Park and Saldanha Bay Islands IBA (SA099), approximately 1.8 km south of the proposed development site. The extent of this IBA is 30 140 ha and forms part of the Fynbos Biome (**Figure 6**).

This IBA supports 250 bird species and hosts many species. The area includes the Langebaan Lagoon which is a vital wetland for South African wader species and account for 10% of South Africa's coastal wader population. It supports 20 000 waterbirds in summer of which 16 500 are waders and 93% are Palearctic migrants (http://www.birdlife.org.za/conservation/important-bird-areas/iba-directory/item/247-sa105-west-coast-national-park-and-saldanha-bay-islands).

IBA trigger species for this area include the African Penguin (*Spheniscus demersus*) Cape Gannet (*Morus capensis*), Crowned Cormorant (*phalacrocorax coronatus*), Bank Cormorant (*Phalacrocorax neglectus*) Southern Black Korhaan (*Afrotis afra*), Lesser Flamingo (*Phoenicopterus minor*), Secretarybird (*Sagittarius serpentarius*), Black Harrier (*Circus maurus*) and African Marsh Harrier (*Circus ranivorus*). Regionally threatened species include Caspian Tern (*Sterna caspia*), Great White Pelican (*Pelecanus onocrotalus*), Verreauxs' Eagle (*Aquila verreauxii*) and Lanner Falcon (*Falco biarmicus*).

The Berg River Estuary (SA104) is another IBA located 10 km north of the proposed development site (**Figure 6**). It is 24 200 ha in extent and encompasses eight major wetland types in addition to the Berg River channel. Important avian micro-habitats include estuarine mudflats and ephemeral floodplains. This IBA supports 250 bird species of which 50 % (127) are waterbirds and supports a population of 20 000 waterbirds during the summer periods.

Due to the lack of suitable habitat requirements within the study area it is unlikely that the Cape Gannet, Crowned Cormorant, Bank Cormorant and Lesser Flamingo (IBA trigger species) will have resident populations within the study area. However, as the study area is located between two IBAs, species such as the Great White Pelican, Greater Flamingo and Lesser Flamingo may move through the study area on occasion. Trigger species such as the Southern Black Korhaan, Secretarybird, Black Harrier, African Marsh Harrier and Lanner Falcon may utilise some portion of the site at any given time (due to the close proximity to the West Coast National Park) and as a result mitigation measures must be implemented to minimise disturbance and impacts to these species.

According to BirdLife South Africa, one-third of the 112 IBAs located within South Africa are under threat by alien invasive vegetation, habitat modification and fragmentation and agricultural expansion (Marnewick *et al*. 2015). Since the study area is located between two IBAs, it is important to include mitigation measures to ensure the proposed development does not have an adverse effect on the functioning of these IBAs.

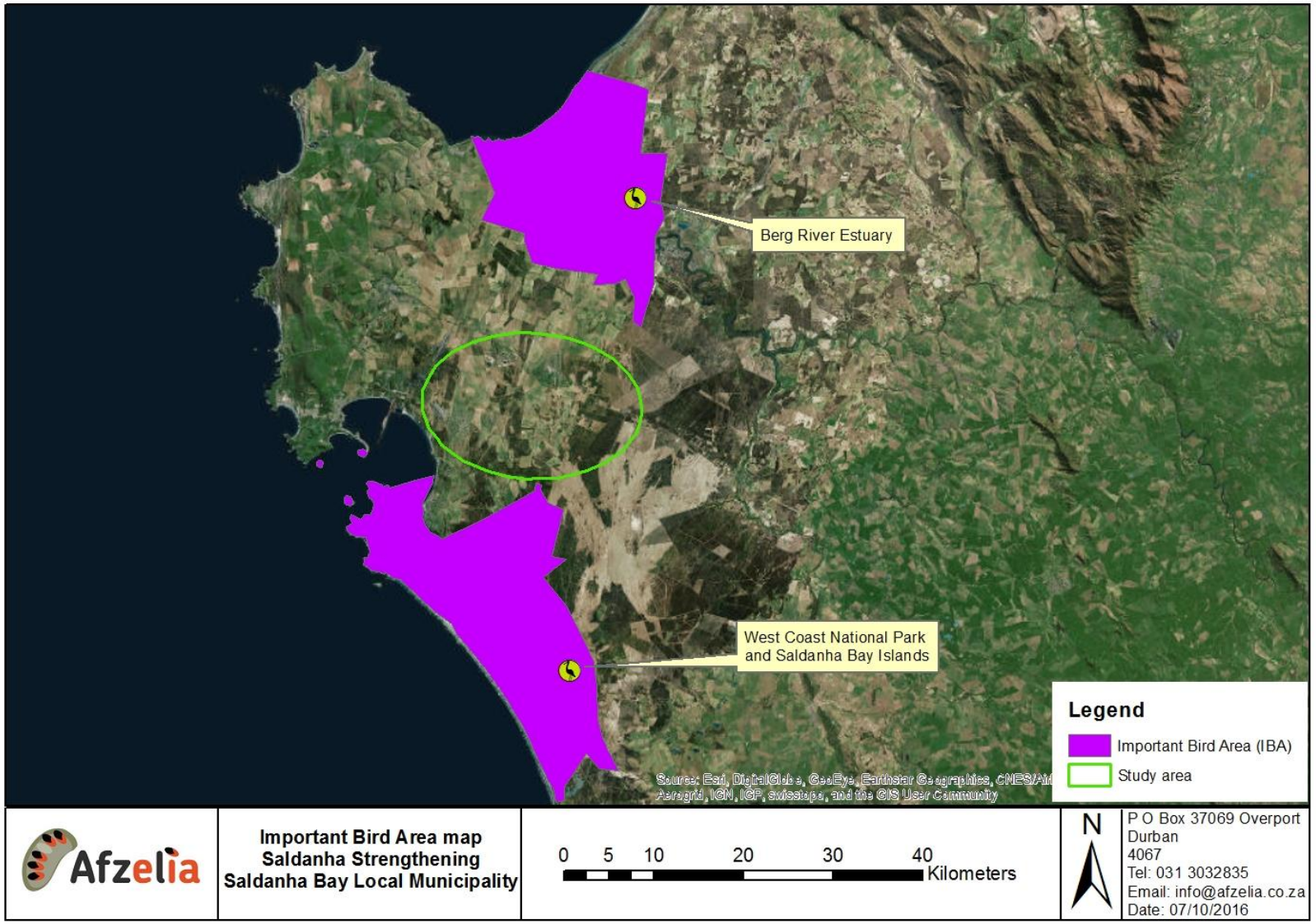


Figure 6. The West Coast National Park and Saldanha Bay Islands and the Berg River Estuary IBAs located outside the study area

4. AVIFAUNA SPECIES COMPOSITION

A total of 264 species were recorded within the study areas relevant pentads (SABAP2), with twenty species (7.57%) classified as Red Data species (Barnes 2014). Furthermore, 19 species are southern African endemics.

During the site visit a total of 51 bird species were recorded within the study area. (**Appendix 1**).

The most commonly recorded species were passerine species including Karoo Prinia (*Prinia maculosa*), Capped Wheatear (*Oenanthe pileata*), Bokmakierie (*Telophorus zeylonus*), Cape Weaver (*Ploceus capensis*) and White-backed Mousebirds (*Colius colius*).

Various species often associated with anthropogenically modified landscapes were also recorded in close proximity to agricultural lands and homesteads including Red-eyed Dove (*Streptopelia semitorquata*), Cape Sparrow (*Passer melanurus*), Pied Crow (*Corvus albus*) and Familiar Chat (*Cercomela familiaris*).

The Strandveld habitat was observed to have the highest avian species richness when compared to the agricultural landscape. The Strandveld habitat located to the southern section of the study area was dominated by Bokmakierie, Grey-winged Francolin, Crowned Lapwing, Cape Canary and Brimstone Canary.

Near Endemic species recorded during the site visit included Bokmakierie (*Telophorus zeylonus*), Pied Starling (*Lamprotornis bicolor*), Jackal Buzzard (*Buteo rufofuscus*), Cape Spurfowl (*Pternistis capensis*), Cape Grassbird (*Sphenoeacus afer*), Cape Weaver (*Ploceus capensis*), Southern Double-collared Sunbird (*Cinnyris chalybeus*) and Grey Tit (*Parus afer*).

The Steppe Buzzard (*Buteo buteo*), Jackal Buzzard (*Buteo rufofuscus*) and Rock Kestrel (*Falco rupicolus*) were the only medium size avian species recorded during the site visit and occurred on the southern and western portions of the study area.

4.1 AVIFAUNAL SPECIES OF CONSERVATION CONCERN

Table 1 provides a list of the Red Data species that could potentially be encountered anywhere within the pentads associated with the study area, where suitable habitat is available.

Table 1. Red Listed bird species recorded within the 3300_1800, 3300_1805, 3300_1810, 3255_1800, 3255_1805, 3255_1810 pentads in which the proposed substations and power line infrastructure are located.

NAME	CONSERVATION STATUS (2014)	HABITAT	LIKELIHOOD OF OCCURRENCE	HABITAT DESTRUCTION	DISTURBANCE	COLLISIONS WITH POWER LINE	ELECTROCUTION
SECRETARY BIRD *Sagittarius serpentarius*	VU	Grassland	Low	X	X	X	X
MARTIAL EAGLE *Polemaetus bellicosus*	EN	Woodland/Savannah	Medium	X	X	X	
LUDWIG'S BUSTARD *Neotis ludwigii*	EN	Savannah	Low			X	
LANNER FALCON *Falco biarmicus*	VU	Woodland/Savannah	Medium-high		X		
GREAT WHITE PELICAN *Pelecanus onocrotalus*	VU	Wetlands, Estuaries and Coastal bays	Medium (Transient)	X		X	X
GREATER FLAMINGO *Phoenicopterus roseus*	NT	Wetlands, lagoons and estuaries	Medium (Transient)			X	X
LESSER FLAMINGO *Phoenicopterus minor*	NT	Wetlands, lagoons and estuaries	Low (Transient)			X	X
AFRICAN-MARSH HARRIER *Circus ranivorus*	EN	Wetlands and farmlands	Medium	X	X		
BLACK HARRIER *Circus maurus*	EN	Fynbos shrubland and agricultural land	High	X	X		X
BLUE CRANE *Anthropoides paradiseus*	NT	Croplands and pastures	High		X	X	X

Name	Conservation Status (2014)	Habitat	Likelihood of Occurrence	Habitat Destruction	Disturbance	Collisions with power line	Electrocution
CHESTNUT-BANDED PLOVER *Charadrius pallidus*	NT	Estuaries and coastal wetlands	Low				
EURASIAN CURLEW *Numenius arquata*	NT	Estuaries and lagoons	Low				
SOUTHERN BLACK KORHAAN *Afrotis afra*	VU	Coastal Fynbos/Karoo scrub	High	X	X	X	

*NT= Near Threatened; VU=Vulnerable; EN= Endangered

4.2 OCCURRENCE OF ENDEMIC SPECIES

Endemism is the ecological status of a species that is unique to a defined geographic location and does not occur anywhere else in the world. Endemic avian species in most cases have a limited and restricted range (Klerk et al. 2002). The restricted range of these species makes them susceptible to population decline due to anthropogenic impacts encroaching on their specific habitats.

Table 2 lists the endemic and near-endemic species (species whose distributions mostly fall within the Western Cape region of the Southern African subregion – South Africa Lesotho, Swaziland). Most of these species are not threatened and occur in other localities within the sub region.

Table 2. Endemic and near-endemic species potentially occurring within the study area (Sinclair and Ryan, 2009).

COMMON NAME	SPECIES NAME	REGIONAL ENDEMIC STATUS
Pied Starling	*Lamprotornis bicolor*	*ESLS
Cape Bulbul	*Pycnonotus capensis*	Endemic
Jackal Buzzard	*Buteo rufofuscus*	Near-Endemic
Cape Spurfowl	*Pternistis capensis*	Near-Endemic
Cape Grassbird	*Sphenoeacus afer*	Near-Endemic
Cape Weaver	*Ploceus capensis*	Near-Endemic
Southern Double-collared Sunbird	*Cinnyris chalybeus*	Near-Endemic
Grey Tit	*Parus afer*	Near-Endemic
Grey-winged Francolin	*Scleroptila africanus*	*ESLS
Karoo Prinia	*Prinia maculosa*	Near-Endemic

*ESLS= Endemic to South Africa, Lesotho and Swaziland.

4.3 PREDICTED PRIORITY SPECIES

Based on the species lists collated using SABAP 2 for the proposed study area, a number of Red Listed species susceptible to collisions and electrocutions with power lines and species that are sensitive to habitat loss were identified. The Eurasian Curlew and Chestnut-banded Plover are not predicted to be impacted by the strengthening project due to their association with estuarine habitats and lack of this habitat within the study area. Ludwig's Bustard is a common nomad and partial migrant in Karoo scrub and arid Savannah. Due to the limited suitable micro-habitat availability within the site coupled with the fact that the study area occurs outside of its core distributional range, resident populations are not predicted within the study area.

Lanner Falcon

The Lanner Falcon (*Falco biarmicus*) (**Figure 7**) has an extensive range and is found in most biomes in South Africa (Harrison et al. 1997). Their distribution is closely associated with mountainous areas and they utilise these areas to breed (cliff nesters). The increasing number of power line towers has provided alternative nesting opportunities in areas where natural alternatives are not available. The use of power lines for nesting by *F. biarmicus* is opportunistic and this species will preferentially nest in natural mountainous areas. Due to the lack of mountainous areas within the study area, there is limited natural nesting habitat for *F. biarmicus* within the proposed study area; however this species may make use of the existing power line infrastructure. Lanner Falcons have been reported utilising pylon infrastructure for nesting, often making use of crow and stork nests (Kemp, 1972). Taking these factors into account it is likely that this species will be present within the study area. No sightings were recorded during the site visit.

Figure 7. Lanner Falcon (*Falco biarmicus*) (*Images extracted from Hockey et al. 2011*).

Martial Eagle

The SABAP2 reporting rate for Martial Eagles (*Polemaetus bellicosus*) (**Figure 8**) within the pentads associated with the study area was low. The availability of nest sites and suitable habitat is often a limiting factor for *P. bellicosus*. This species builds their nests in large trees (ranging from 6-20 metres high). The lack of large trees within the study area would potentially account for the limited sightings of Martial Eagles. However, as is the case with the Lanner Falcon, Martial Eagles have adapted to use power line infrastructure for foraging and breeding (Machange et al. 2015; Van Rooyen 2004). According to Machange et al. 2005, increased sightings of Martial Eagles within the Karoo were attributed to the use of power line infrastructure. There were no sightings of the Martial Eagle during the site visit. It must be noted that a study conducted by Dr. Rob Simmons indicated the presence of Martial Eagle to south of the proposed study area (Birds and Bats Unlimited, Rheboksfontein-Aurora Power Line Alternatives 1A-E Avian Basic Assessment 2015).

Figure 8. Martial Eagle (*Polemaetus bellicosus*) (*Images extracted from Hockey et al. 2011*).

Secretarybird

Secretarybirds (**Figure 9**) roost and nest in trees (optimal heights range from 4-15 metres) and areas with these habitat requirements are important for local populations (Herholdt and Anderson 2006). As the majority of the site has an absence of trees, this may account for the limited sightings of this species. Secretary Birds are also very sensitive to habitat degradation due to anthropogenic land transformation, overgrazing, disturbance and habitat degradation and they generally avoid transformed habitats (Hofmeyr et al. 2014). This species was not recorded during the site visit.

Figure 9. Secretarybird (*Sagittarius serpentarius)* (*Images extracted from Hockey et al. 2011*).

Lesser Flamingo, Greater Flamingo and Great White Pelican

Both the Lesser and the Greater Flamingo occur at wetlands, lagoons, saltpans and estuaries (Hockey et al. 2011) (**Figure 10**). The Great White Pelican occurs in lakes, estuaries and coastal bays. All three species are prone to collisions with overhead power lines, particularly where these lines are in close proximity to foraging or roosting sites where flight elevations are low when in the process of landing or take off. This was confirmed during an avifaunal assessment conducted by Birds and Bats Unlimited Environmental Consultants (2015), where Greater Flamingos were found under the transmission power line adjacent to a large salt pan on Slangkop Dam, Western Cape. Despite the relatively large population size, the Lesser Flamingo has been classified as "Near Threatened" because it has few breeding sites and breeding success is infrequent (Anderson 2008).

Apart from the three endorheic depression systems identified, there are insufficient water bodies and wetland systems within the study area to attract the Greater and Lesser Flamingo and the Great White Pelican.

Neither Flamingo species nor the Great White Pelican were recorded within the study area during the site visit. As the study area is located between two IBAs, these species may move through the study area and as a result, be vulnerable to collisions with overhead power lines. The implementation of mitigation measures stated in this report is vital to lower the significance of this impact.

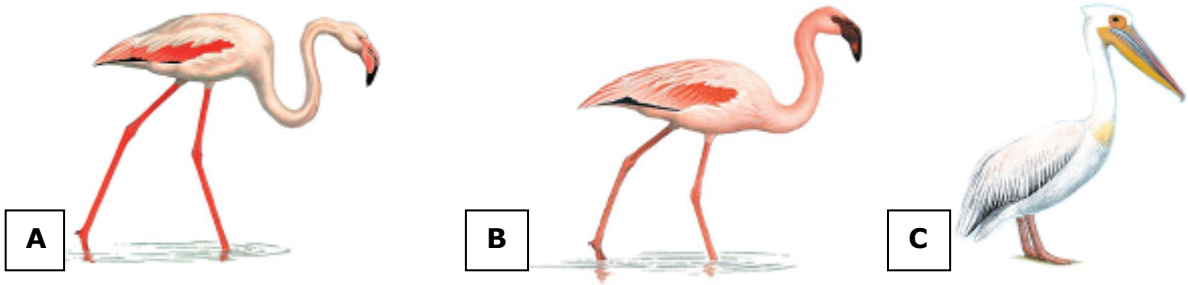


Figure 10. (A) Greater Flamingo (*Phoenicopterus roseus),* (B) Lesser Flamingo (*Phoenicopterus minor*) and (C) the Great White Pelican (*Pelecanus onocrotalus*) (*Images extracted from Hockey et al. 2011*).

Southern Black Korhaan

The Southern Black Korhaan (**Figure 11**) is a relatively small bustard, and closely associated with Fynbos and Karoo habitats in South Africa (de Villiers 2009). This species generally avoids cultivated landscapes as they rely on natural vegetation for cover and protection (de Villiers 2009). Due to their association with the Fynbos Biome and subsequently Strandveld habitats this species may be displaced due to habitat loss and disturbance from agricultural practices occurring within the study area. The Southern Black Korhaan has been recorded within the study area (Strandveld shrublands) but it is unlikely to be affected by collisions with the power lines that would traverse the habitats

along which it exists as this is largely a terrestrial species. A preliminary survey of data on avian mortalities on power lines in the Overberg area indicated that only two Southern Black Korhaan mortalities occurred due to collisions with power lines (Shaw *et al*. 2010). The clearing of vegetation within the substation sites could displace this species due to habitat loss and disturbance.

Figure 11. Southern Black Korhaan (*Afrotis afra)* (*Images extracted from Hockey et al. 2011*).

Black Harrier and African Marsh Harrier

The Black Harrier and African Marsh Harrier (**Figure 12**) are ground nesting species and favour habitats close to water with the Black Harrier preferring damp vegetation close to pans and the Marsh Harrier favouring permanent wetlands (Sinclair and Ryan, 2009).

The Black Harrier has been recorded in agricultural lands and is predicted to be more abundant within the study area than the Marsh Harrier. This was confirmed as the Black Harrier was reported within all pentads associated with the study area. Although this species forages within agricultural landscapes they require untransformed Fynbos habitat for breeding (BirdLife SA; Curtis *et al*. 2004). Approximately 50% of the Black Harrier's core breeding habitat has been lost due to land transformation by urban development, agriculture and invasive alien vegetation within the Fynbos biome (Curtis et al. 2004). Due to the lack of permanent wetlands within the study area, no resident populations of African Marsh Harrier are predicted to occur within the study area.

Figure 12. (A) Black Harrier (*Circus maurus*) and (B) African Marsh Harrier (*Circus ranivorus*) (*Images extracted from Hockey et al. 2011*).

Blue Crane

Blue Cranes were recorded within the northern sections of the study area (Photograph 7; **Figure 13**). This species is vulnerable to collisions with power lines (Allan 1996). The existing power lines traversing the southern section of the study area may account for the limited sightings within its proximity. The core distribution of Blue Cranes in South Africa is located in croplands of the Western Cape and populations are increasing within the Swartland area (Young et al. 2003).

Photograph 7. Blue Cranes observed in the agricultural land within the study area.

The species discussed above could potentially be affected by the strengthening project due to their status and biology. Larger species such as Flamingos, Pelicans, Bustards and Korhaans are susceptible to interactions with power line infrastructure due to their low mobility when in flight, inability to take evasive action and low altitude flight patterns when moving between feeding and breeding sites.

Although this assessment focuses on Red Data bird species, other less threatened species will also potentially be affected by the proposed development. Mitigation measures proposed for Red Data species will therefore also serve to protect the more common species.

Figure 13. Sightings of Blue Crane and Southern Black Korhaan recorded during the site investigation.

5. SENSITIVITY ASSESSMENT

There is a correlation between the presence of Red Listed and endemic species listed above and the availability of various habitats within the study area. These important avian habitats influence the occurrence of species within a landscape providing nesting and foraging opportunities. It is therefore important to identify sensitive avian habitats within the study area in order to ensure that the development does not have a long term negative impact on these avian habitats.

A preliminary sensitivity map was compiled for the study area by making use of the results of the avifaunal micro-habitat assessment and the presence of red listed avian species (**Figure 14**).

A large portion of the study area falls within the transformed anthropogenic landscape and agricultural land which is considered to be of low ecological sensitivity, due to habitat destruction and disturbance. Most of the natural habitat within these agricultural areas is absent. Blue Cranes were noted within the transformed agricultural landscape.

There are also some moderate sensitivity areas located within the study area associated with the relatively intact natural Strandveld vegetation consisting of *Eriocephalus*, *Crysanthemoides* and *Euphorbia* spp. on the southern and western portions of the study area. These areas have small human footprint and this has allowed avifaunal assemblages to be retained. It is important to note that existing power line infrastructure

was noted within this habitat type. This vegetation exists to the north, west and south of the study area. Undisturbed fynbos vegetation is present within the West Coast National Park, 1.8km south of the study area. These natural habitats provide suitable foraging and roosting habitats for avian species. The protection of this habitat will provide an important ecological corridor and refuge for avifaunal species.

The endorheic depressions habitats may hold water after rainfall events and subsequently attract avian species. Power line corridors and substation site alternatives should be sited away from these depressions to minimise impacts on avian species.

Due to the degraded nature of the substation site alternatives and few sensitive habitats adjacent to these site alternatives, avifaunal populations should not be significantly impacted upon by the construction of the proposed substation, provided that mitigation measures are implemented.

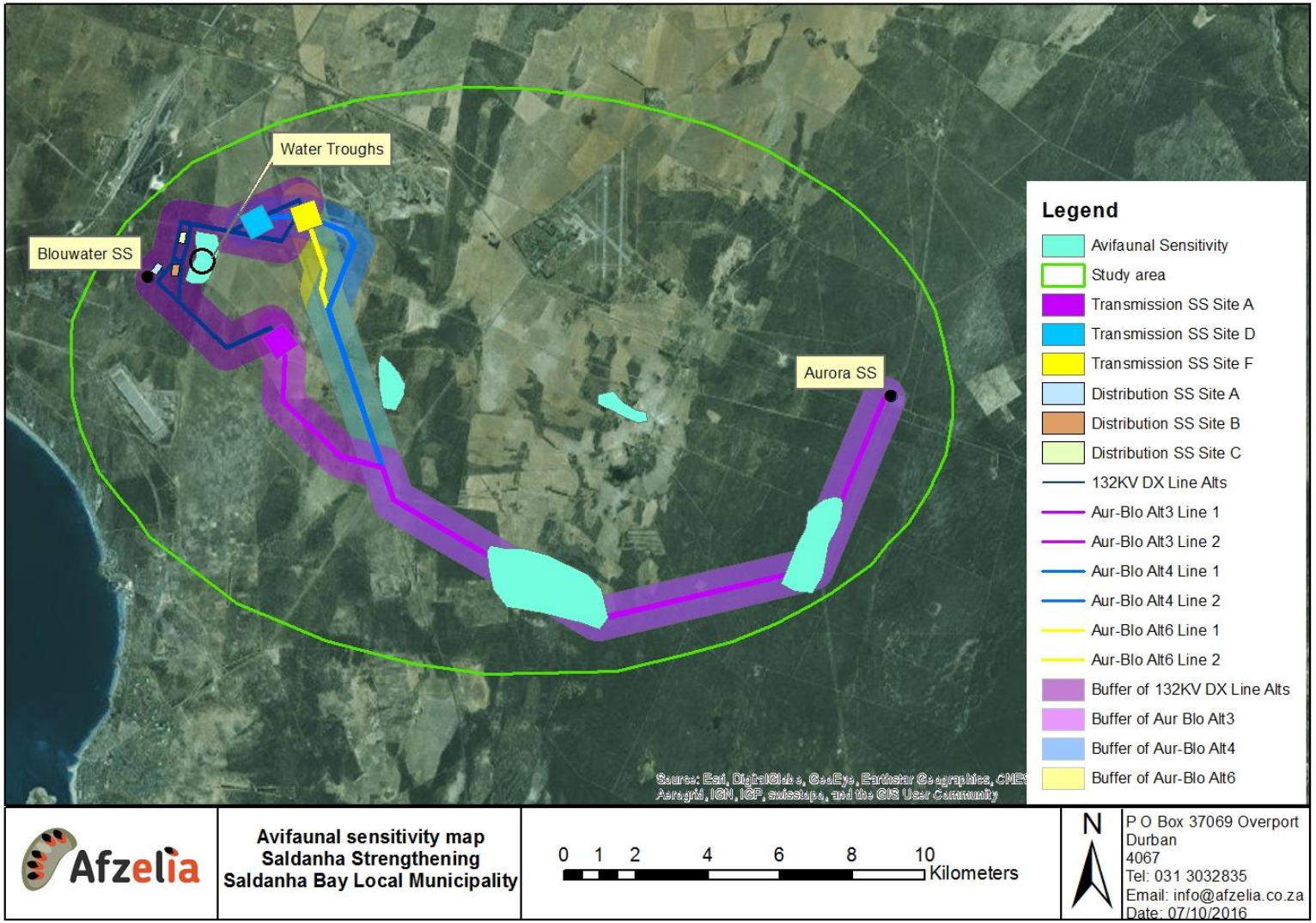


Figure 14. Sensitivity map of the study area

6. COMPARISON OF SITE ALTERNATIVES

Transmission Substation Site Alternatives

These sites are located within close proximity to industrial development and infrastructure including ArcelorMittal South Africa, Saldanha Works to the west (±3km), and the existing Blouwater Substation and associated power lines. All three transmission substation site alternatives are located within close proximity (±1km) of each other, and within an agricultural landscape. These are located next to the R27 road and 4.5km west of Langebaanweg. As a result, the area often experience- high levels of disturbance. No natural vegetation is present within the transmission site alternative areas. The topography of the sites is flat and the soils were sparsely vegetated at the time of the site visit.

Distribution Substation Site Alternatives

All three distribution substation site alternatives are located within close proximity (1km radius) of each other. The topography at all sites is flat and the vegetation is dominated by Strandveld fynbos including *Eriocephalus africanus*, *Asparagus capensis* and *Euphorbia* spp. A series of endorheic depressions and Strandveld avian micro-habitats are located within the surrounds of all of the Distribution Substation site alternatives. Distribution substation site alternative B and C are the closest alternatives to the endorheic depressions. Substation site alternative A is located close to the existing Blouwater substation; as a result, this area has experienced some level of disturbance.

Power Line Corridor Alternative 3

A large portion of this power line corridor runs adjacent to existing power lines exiting the Aurora Substation. The selection of this corridor alternative will lessen the likelihood of new, isolated power lines within the landscape. This will reduce the risks of bird collisions with new stand-alone power lines. The grouping of infrastructure was listed as an important measure in order to mitigate impacts of power line infrastructure of avian populations (Guidelines for mitigating conflict between migratory birds and electricity power grids 2011).

Corridor alternative 3 enters into transmission substation A. This power line corridor alternative traverse through natural Strandveld Fynbos vegetation (for the approximately 15km) and the southern section borders the Thali Thali Game Reserve. It must be noted that existing power line infrastructure was noted within this reserve and corridor alternative 3 is proposed to traverse parallel to the existing power line. The power line then deviates to the north-west and traverses through transformed agricultural land. Strandveld shrublands and agricultural lands are the main avian micro-habitats within close proximity of the proposed power line corridor. Corridor alternative 3 is the shortest line alternative, approximately 19.74km in length.

Power Line Route Alternative 4

Power line corridor 4 follows the same route as alternative 3 for approximately 15.7km and then continues northwards for a further 6km. This alternative is 23.56km in length

and enters into transmission substation D. This power line corridor runs parallel to the regional road (R27) and a largely agricultural habitat. A series of farm roads traverse the area. This is the longest line alternative.

Power Line Route Alternative 6

Power line corridor alternative 6 is 21.6km in length and enters into transmission substation F. This corridor alternative follows the same route as alternative 4 and then deviates for a further 3.5km. This power line corridor runs parallel to the regional road (R27) and a largely agricultural habitat.

7. IMPACT ASSESSMENT

The implications of the proposed substation development and associated power lines to avifauna are as follows:

- An area of approximately 600m x 600m and 120m x 120m of land will be altered by the construction of the proposed substations and considered artificial, and largely unsuitable to avian species.
- During the construction phase, disturbance levels will be significantly higher in the immediate vicinity than previously. This disturbance will consist of machinery and vehicle disturbance as well as other construction activities (Steidl and Powell 2006; Homes et al. 1993).
- During the operational phase, there will be some vehicle activity resulting in disturbance, particularly within the road access corridor (Steidl and Powell 2006; Homes et al. 1993).
- Due to the length of the overhead power lines (Alternative 3 = 19.74km, Alternative 4 = 23.56km and Alternative 6 = 21.6km), this will pose a collision and electrocution risk to avifauna, particularly heavier birds with low manoeuvrability.
- There is a possibility that various species such as Corvids and passerines (attracted to the perching substrates) could be electrocuted on substation infrastructure; however raptor electrocutions are rated as uncommon (Avian Power Line Interaction Committee, 2006).

7.1 SIGNIFICANCE OF IDENTIFIED IMPACTS

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional or national, and a value

between 1 and 5 will be assigned as appropriate (with 1 being local and 5 being national):

- The **duration**, wherein it will be 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 **consequences (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 shall describe the likelihood of the impact actually occurring. Probability will be 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**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to 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** is calculated by combining the criteria in the following formula:

S=(E+D+M)P	
S = Significance weighting	M = Magnitude
E = Extent	P = Probability
D = Duration	

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this 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).

Table 3: Impacts of infrastructure (Substations and Power lines) (with and without mitigation)

Nature: Habitat Destruction due to the construction of the proposed transmission and distribution substations		
During the construction phase as well as maintenance of substations, some habitat destruction and alteration will occur. These activities have an impact on foraging, breeding and roosting ecology of avian species within the area through modification of habitat. **<u>Transmission Substation alternatives</u>** All three transmission substation site alternatives are located within close proximity (±1km) of each other. All transmission substation site alternatives are located within an agricultural landscape. These are located next to the R27 road and 4.5km west of Langebaanweg. As a result, the area often experiences high levels of disturbance. No natural vegetation is present within the development footprint. The topography of the sites is flat and the soils were sparsely vegetated at the time of the site visit. These sites are located in close proximity to industrial development and infrastructure including ArcelorMittal South Africa, Saldanha Works to the west (±3km), and the existing Blouwater Substation and associated power lines. Blue Cranes are predicted to be displaced by the habitat transformation that will take place as a result of the construction of the proposed transmission substations. Although Blue Cranes were identified within this agricultural habitat, this habitat type not unique within the landscape. Therefore, alternative foraging sites are available for this species within the project area. The impact on smaller, non-Red Data species that are potentially breeding in the area will be local in extent, in that it will not have a significant effect on regional or national populations.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	**Moderate (50)**	**Moderate (40)**
Status (positive or negative)	Negative	
Reversibility	Low	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes. However, due to the space requirements, some land and avian micro-habitats will be impacted.	

Distribution Substation Alternatives

All three distribution substation site alternatives are located within close proximity (1km radius) of each other. The topography at all sites is flat and the vegetation is dominated by Strandveld shrublands including *Eriocephalus africanus*, *Asparagus capensis* and *Euphorbia* spp. A series of endorheic depressions and Strandveld avian micro-habitats are located within the surrounds of all of the distribution substation site alternatives. Distribution substation site alternatives B and C are the closest alternatives to the endorheic depressions. Substation site alternative A is located close to the existing Blouwater substation; as a result, this area has experienced some level of disturbance.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	low (4)
Probability	Definite (5)	Definite (5)
Significance	**High (60)**	**Moderate (50)**
Status (positive or negative)	Negative	
Reversibility	Low	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes. However, due to the space requirements, some land and avian micro-habitats will be impacted.	

Mitigation:

- All construction and maintenance activities must be carried out to ensure that the temporal and spatial footprint of the development is kept to a minimum. In particular, care must be taken in the vicinity of avian habitats (Natural Strandveld) and existing roads must be used as far as possible for access during construction and operation.
- The boundaries of the project footprint areas are to be clearly demarcated and all activities must remain within the demarcated footprint area.
- Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO).
- The above measures must be covered in a site specific EMPr and controlled by an ECO.

Cumulative impacts:

Moderate. The Saldanha Strengthening Project is in proximity to numerous existing Eskom power lines and substation infrastructure (Aurora and Blouwater). Furthermore, industrial infrastructure including ArcelorMittal South Africa, Saldanha Works is located to the west of the study area. This project will contribute to the loss of natural habitat within the area.

Residual Risks:
High. The vegetation within the substation footprint will be cleared and surface hardened.

***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 two phases and earth resulting in electrocution. However, very few electrocutions have been recorded on transmission and distribution substations**.** The impact assessment found the impact of electrocution on substation infrastructure to be of low significance once mitigation in the form of bird friendly structures and bird deterrent measures has been put in place. Species likely to be affected are non-threatened species with the majority of threatened species (Secretarybird, Lesser Flamingo and Blue Cranes) avoiding the substation yard.			
		Without mitigation	**With mitigation**
Extent		Local (1)	Local (1)
Duration		Permanent (5)	Permanent (5)
Magnitude		Low (4)	Minor (2)
Probability		Improbable (2)	Highly improbable (1)
Significance		**Low (20)**	**Low (8)**
Status (positive or negative)		Negative	
Reversibility		Low (birds will be injured or killed)	
Irreplaceable loss of resources?		Yes	
Can impacts be mitigated?		Yes	
Mitigation: • All relevant perching surfaces must be fitted with bird guards as deterrents.			
Cumulative impacts: The Saldanha Strengthening Project is in proximity to numerous existing Eskom power lines and substation infrastructure. Aurora substation is located on the northern section of the study areas and Blouwater substation is located on the western edge of the study area. The Saldanha Bay Strengthening project will increase the number of substations within the area and subsequent risk. Due to the impacts associated with substation and power line developments, mitigation measures must be implemented to lower the significance of these impacts.			
Residual Risks: Low. If at any stage the substation is decommissioned the electrocution impact will no longer exist.			

Nature: Habitat Destruction due to the construction of the 400kV power line		
During the construction phase as well as maintenance of the power line some habitat destruction and alteration will occur. These activities have an impact on foraging, breeding and roosting ecology of avian species within the area through modification of habitat. Due to the fact that all three corridor alternatives traverse through the same habitats, namely Strandveld shrublands for 15km and agricultural landscape for the remainder of the lines (Alternative 3 = ±5km, Alternative 4 = ±8.3km, Alternative 6 = ±6.5km) it is not justifiable to assess the habitat destruction impact of each alternative separately. However, care must be taken to minimise this impact within the Strandveld shrubland habitat.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	**Moderate (45)**	**Moderate (35)**
Status (positive or negative)	Negative	
Reversibility	Low	
Irreplaceable loss of resources?	Yes, avian habitats will be lost	
Can impacts be mitigated?	Yes. However, due to the space requirements, some land and avian micro-habitats will be impacted.	
Mitigation: • All construction and maintenance activities must be carried out to ensure that the temporal and spatial footprint of the development is kept to a minimum. In particular, care must be taken in the vicinity of avian habitats (Natural Strandveld shrublands through which all three alternatives traverse for approximately 15km) and existing roads must be used as far as possible for access during construction and operation. • The boundaries of the project footprint areas are to be clearly demarcated and all activities must remain within the demarcated footprint area. • Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO). • The above measures must be covered in a site specific EMPr and controlled by an ECO.		
Residual Risks: Moderate-High. The habitat loss surrounding the power line would persist even if the line is decommissioned, which would result in loss/displacement of avian species. Should the area surrounding each tower be revegetated with Strandveld vegetation the residual risk		

would be low.

Nature: Disturbance and displacement of birds

The disturbance of avifauna during the construction and operation of the substation and power line infrastructure will occur. This is an indirect impact that will affect the movement and distribution of avian species surrounding power line corridors and substation sites, particularly during the construction of the proposed project. The avoidance of these areas by avian species will impact the breeding and foraging characteristics of affected bird species. Species sensitive to disturbance are 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. Avian species with small territories are particularly susceptible.

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 that may be displaced by the proposed substation development include Southern Black Korhaan (*Afrotis afra*), Black Harrier (*Circus maurus*) and Blue Cranes (*Anthropoides paradiseus*). Both *A. afra* and *A. paradiseus* were identified within the study area. Endemic passerine species will be displaced during the construction phase however, this is predicted to be a short term impact and species would return to the area prior to the construction of the power line.

The study area is already subject to varying degrees of disturbance due to agriculture, industrial infrastructure as well as existing power line and substation infrastructure. The proposed development is likely to have a cumulative effect due to the presence of the existing infrastructure. Disturbance and displacement of Red Data species by the proposed substations and power lines is anticipated to be of moderate significance. This is primarily due to the fact that only two Red Data species are likely to be displaced (Blue Crane and Southern Black Korhaan) and these species were identified within the study area. Black Harrier nests have been recorded in the West Coast National Park and this species is unlikely to breed within the vicinity of the substation site alternatives (Bird Life South Africa Important Bird Areas Directory, 2014).

Disturbance during Construction Phase

Transmission and Distribution Substation

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	**Moderate (45)**	**Moderate (35)**
Status (positive or negative)	Negative	
Reversibility	Moderate	

Irreplaceable loss of resources?	Possible disturbance during the breeding season	
Can impacts be mitigated?	Partially	
Power line		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	**Moderate (45)**	**Moderate (35)**
Status (positive or negative)	Negative	
Reversibility	Moderate	
Irreplaceable loss of resources?	Possible disturbance during the breeding season	
Can impacts be mitigated?	Partially	

Mitigation:

- Strict control must be maintained over all activities during construction, in line with an approved construction EMPr.
- The construction equipment camps must be located as close to the construction site as possible and must be located outside of the identified sensitive areas.
- Contractors and working staff must stay within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted.
- Existing roads must be used as far as possible.

Disturbance during Operational Phase		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Moderate (30)**	**Low (24)**
Status (positive or negative)	Negative	
Reversibility	Low	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Partially	

Mitigation:

- Maintenance staff must stay within the development footprint and movement outside these areas especially into avian micro-habitats must be restricted

Cumulative impacts:

Low. The Saldanha Strengthening Project is in proximity to numerous existing Eskom power lines and substation infrastructure (Aurora and Blouwater). Furthermore, industrial infrastructure such as ArcelorMittal South Africa, Saldanha Works is located to the west of the study area. However, this project will contribute to some extent the existing disturbance of avifauna within the area.

Residual Risks:

Moderate. Some disturbance during the construction and operational phase is inevitable. It is likely that some birds will be disturbed and potentially displaced from the area.

***Nature:* Electrocution of birds on overhead power lines (400kV and 132kV)**

Electrocution[1] of birds on associated overhead power lines is a primary cause of mortality for a variety of bird species particularly storks, cranes and raptors in South Africa (Van Rooyen & Ledger 1999). Electrocution risk is influenced by the voltage of the power line coupled with the pole structure.

There is no risk of avian electrocution due to 400kV power lines due to the larger distances between live components. These components can't be bridged by even large birds such as Flamingos and Cranes. There is an electrocution risk for the 132kV power line and as there are limited natural perching substrates within the study area, these structures will likely be used for perching by avian species. The electrocution risk is dependent on the pole structure used and as a result, in order to mitigate this, a steel monopole structure must be used.

The impact assessment found the impact of electrocution to be of low significance once mitigation in the form of bird friendly structures and bird deterrent measures has been put in place.

132kV power line	**Without mitigation**	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Moderate (48)**	**Low (20)**
Status (positive or negative)	Negative	
Reversibility	Low (birds will be injured or killed)	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	

Mitigation:

- A "Bird Friendly" monopole structure, with a bird perch (as per standard Eskom

[1] Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004).

guidelines) should be used for the tower structures.
- 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).

Cumulative impacts:

Low. The Saldanha Strengthening Project is in proximity to numerous existing Eskom power lines and substation infrastructure. The construction of the associated power line will increase the length of power line in the area and subsequent risk.

Residual Risks:

Moderate. The power line will be in the area over a long period of time if not permanent. However, if the power line is removed the impacts associated (avian mortalities) will cease.

Nature: **Collisions with the power line**

Collisions are the biggest single threat posed by overhead power lines to birds in Southern Africa (van Rooyen 2004). Larger bird species such as bustards, storks, cranes, raptors and various water fowl are highly susceptible to power line collisions. These species often collide with the earthing wire as it is not highly visible. These species are mostly heavy-bodied species with limited manoeuvrability and are not sufficiently mobile to take the necessary evasive action to avoid colliding with power lines (Anderson 2001; Van Rooyen 2004; Jenkins and Smallie 2009). This impact is further exacerbated as they tend to fly between foraging bouts within the elevation ranges of both high and low voltage power lines. Many of the collision sensitive species are considered threatened in Southern Africa.

Areas that are regularly used by "collision prone" species for feeding, roosting or areas located along commonly used flight paths increases the risk of collisions. As a result, power line corridor selection is crucial in mitigating the negative impacts of this infrastructure of large avian species.

The Red Data species that are vulnerable to power line collisions are generally long living, slow reproducing species. Furthermore, various species require specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality. Therefore, consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the medium to long term.

Species prone to collisions with overhead power lines that may be impacted by the development include Blue Crane and Southern Black Korhaan as well transient Greater Flamingo and Lesser Flamingo. Both Flamingo species and the Blue Crane were reported as the top 10 species prone to collisions (**Appendix 2**).

Due to the fact that all three corridor alternatives follow the same route for the first

15.7km coupled with the fact that the final portion of all corridors alternatives are in close proximity (1-2km), it is not justifiable to assess the collision impact of each alternative separately.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Moderate (48)**	**Moderate (30)**
Status (positive or negative)	Negative	
Reversibility	Low (birds will be injured or killed)	
Irreplaceable loss of resources?	Yes, Blue Cranes and transient Lesser and Greater Flamingos are at risk.	
Can impacts be mitigated?	Yes, the installation of bird diverters to reduce the impacts.	

Mitigation:

- Mark identified sensitive sections of the line with anti-collision marking devices (diurnal and nocturnal diverters) to increase the visibility of the power line and reduce likelihood of collisions. Marking devices should be spaced 10 m apart (**Appendix 3**). These line marking devices include spiral vibration dampers, strips, Firefly Bird Flight Diverters, bird flappers, aerial marker spheres, ribbons, tapes, flags and aviation balls (Prinsen et al. 2012). EBM Flapper and the Tyco Flight Diverter are approved bird flight diverters which are currently used by Eskom (Distribution Technical Bulletin, 2009).
- Anti-collision devices must be fitted in accordance with Eskom guidelines.
- Once the corridor has been selected and prior to the construction phase, an avifaunal walk down must be conducted to determine the exact portions of the power line necessary for marking with anti-collision devices.

Cumulative impacts:

Moderate-High. The construction of the new power lines will increase the length of power line within the area and subsequent risk of collisions. Blue Crane, Lesser Flamingo and Greater Flamingo are large Red Listed species susceptible to collision mortalities.

Residual Risks:

Moderate. The power line will be in the area over a long period of time if not permanent. However, if the power line is removed the impacts associated (avian mortalities) will cease.

8. PREFERRED ALTERNATIVES

Due to the high levels of habitat transformation (sites cleared and historically cultivated) and disturbance levels coupled with the close proximity of the three site alternatives, all transmission substation site alternatives are acceptable from an avifaunal perspective. The primary impact associated with the transmission substation is disturbance and displacement. Once mitigation measures have been implemented these impacts and they are unlikely to have a significant long term impact on avifaunal populations within the area.

It is recommended that distribution site alternative A is selected as the preferred option as this will minimise impacts to avian communities within the area. If substation site alternatives B or C are selected, stringent mitigation measures will need to be adhered to, to ensure minimal impact to avian species as these sites are the closest to the endorheic depressions.

Power line corridor 3 and 6 are nominated as the preferred alternatives from an avifaunal perspective due to the shorter length of power line required and the consolidation of infrastructure with existing power lines in the area. The main impact associated with the power line infrastructure is attributed to collisions and mitigation measures stated in this report must be implemented fully and correctly.

9. CONCLUSION

Due to the current agricultural, industrial and power line developments present within the study area, the proposed substation and power line development is unlikely to have any long-term significant impacts on avifaunal species within the study area. During the site visit, predominantly common bird species were recorded (Cape Sparrow, Karoo Prinia, Pied Starling and various granivorous species). Blue Cranes and Southern Black Korhaan were the only Red Listed species recorded within the study area.

The construction of the proposed transmission substations at any site alternative is adequate from an avifaunal perspective and a poses a limited threat to the birds occurring in the vicinity of this infrastructure. This is largely due to the homogenous nature of the area, high levels of disturbance due to the agricultural practices. The impact of displacement due to habitat transformation should only affect avian species (both Red-data and Non Red-data) at a local level. The construction of the distribution substation at site alternative A is recommended.

The construction of the two new 400kV power lines within corridor alternative 3 and 6 are considered to be the most favourable from an avifaunal perspective. This is due to the fact that these line alternatives follow existing power line routes and traverse a largely agricultural habitat. Due to the susceptibility of Blue Cranes (identified within the study area) Lesser Flamingo and Greater Flamingo to collisions, it is imperative that anti-collision measures are implemented on the selected line.

Given the relative homogeneity of the habitat within the study area as well as existing levels of disturbance (existing power line and substation infrastructure, roads, urban development, agricultural and stock farming), the proposed project is unlikely to have a significant, long-term impact on the local avifauna, provided that mitigation measures outlined in this report are implemented.

As the study site borders an IBA (1.8km) it is important that mitigation measures stated within the report are implemented and adhered to.

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Appendix 1. List of bird species identified within the study area during the site visit.

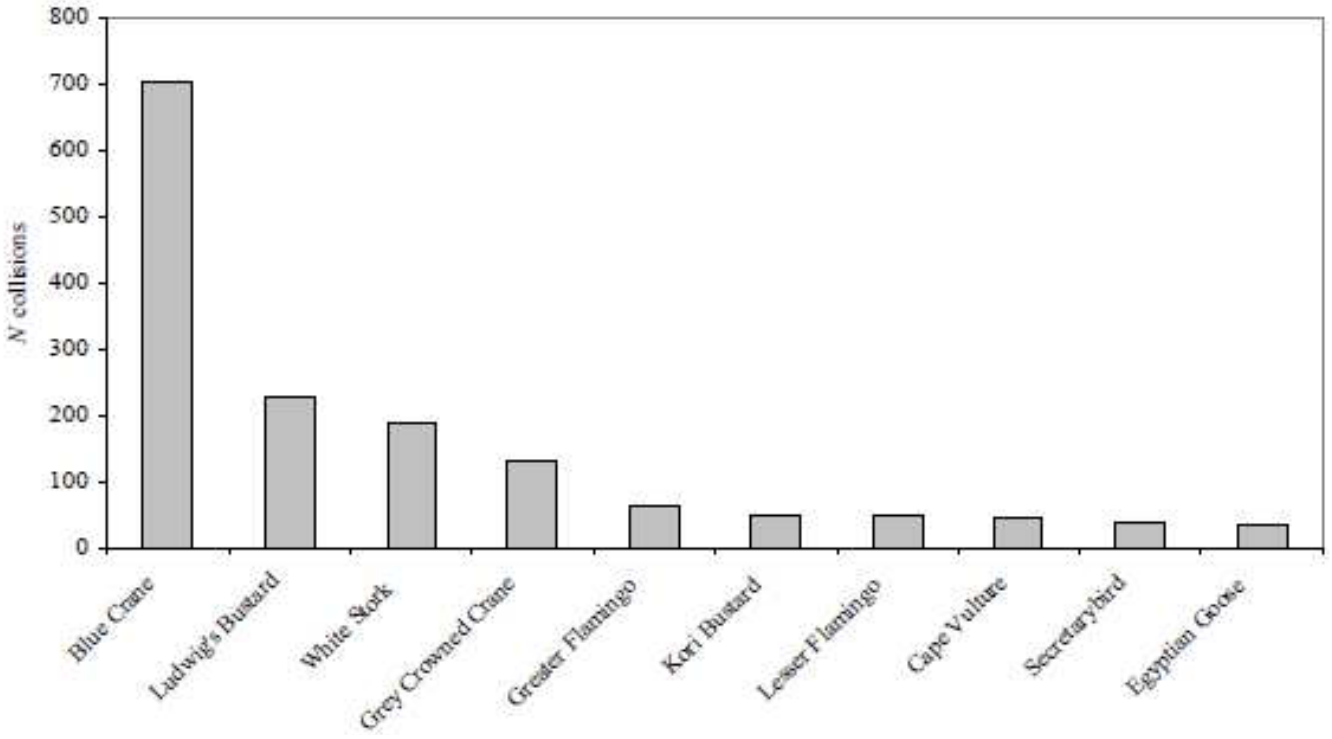
COMMON NAME	SCIENTIFIC NAME	STATUS AND BIOLOGY	HABITAT
Karoo Prinia	*Prinia maculosa*	Near-Endemic	Fynbos, thickets, Karoo scrub
Pied Starling	*Lamprotornis bicolor*	ESLS	Grassland and Karroo scrub
Steppe Buzzard	*Buteo buteo*	Palearctic migrant	Open habitat
Yellow-Billed Kite	*Milvus aegyptius*	Common intra-African migrant	Woodland and open habitat
Western Cattle Egret	*Bubulcus ibis*	Common resident and nomad	Grassland, field and coastlines
Hamerkop	*Scopus umbretta*	Common resident	Lakes, dams and rivers
African Sacred Ibis	*Threskiornis aethiopicus*	Common resident	Wetlands, fields and grasslands
Common Ostrich	*Struthio camelus*	Restricted to reserves	Savannah and semi-desert
Crowned Lapwing	*Vanellus coronatus*	Common resident and local nomad	Short grasslands and fields
Spotted Thick-Knee	*Burhinus capensis*	Common resident and local nomad	Rivers and lake shores
Kelp Gull	*Larus dominicanus*	Common resident	Coastal habitats adjacent wetlands
African Piptit	*Anthus cinnamomeus*	Common resident and local nomad	Open grasslands and fields
Rock Kestrel	*Falco rupicolus*	Common resident and local nomad	Grassland, scrub and open woodland
Black-shouldered Kite	*Elanus caeruleus*	Common resident and local nomad	Savannah, grassland and agricultural areas
Cape Bulbul	*Pycnonotus capensis*	Endemic	Fynbos and coastal scrub
Jackal Buzzard	*Buteo rufofuscus*	Near-Endemic	Karoo scrub, grassland and agricultural land
Familiar Chat	*Cercomela familiaris*	Common resident and local nomad	Mountainous terrain and farmlands
Capped Wheatear	*Oenanthe pileata*	Common resident and local nomad	Grassland and croplands
Cape Spurfowl	*Pternistis capensis*	Near-Endemic	Lowland Fynbos, fields, riparian thickets

COMMON NAME	SCIENTIFIC NAME	STATUS AND BIOLOGY	HABITAT
Helmeted Guineafowl	*Numida meleagris*	Common resident	Grassland, savannah and fields
Cape Grassbird	*Sphenoeacus afer*	Near-Endemic	Fynbos and rank grass (near water)
Blue Crane	*Anthropoides paradiseus*	Resident and local nomad	Grasslands, pastrures and agricultural land and adjacent Karoo habitats
Cape Wagtail	*Motacilla capensis*	Common resident	Open grassland and gardens
Common Fiscal	*Lanius collaris*	Common resident	Open habitats
Bokmakierie	*Telophorus zeylonus*	Common resident, shrublands and Strandveld	Shrublands, Strandveld and scrublands
Blacksmith Lapwing	*Vanellus armatus*	Common resident and nomad	Wetland margins, grasslands and fields
Speckled Pigeon	*Columba guinea*	Common resident	Rocky areas, fields and grasslands
Cape Turtle-dove	*Streptopelia capicola*	Abundant resident and nomad	Wide range of habitats, avoids forests
Laughing Dove	*Streptopelia senegalensis*	Abundant resident and nomad	Wide range of habitats, avoids forests
Cape Weaver	*Ploceus capensis*	Near-Endemic	Grassland and scrub
White-backed Mousebird	*Colius colius*	Common resident	Strandveld, coastal Fynbos and scrub
African Hoopoe	*Upupa africana*	Common resident and nomad	Savannah, woodland, parks and gardens
Red-capped Lark	*Calandrella cinerea*	Common resident, intra-African migrant	Grass areas and croplands
Brown-throated Martin	*Riparia paludicola*	Common resident and Local migrant	Range of habitats, roosts in reeds
Pied Crow	*Corvus albus*	Common	Virtually all habitats
Brimstone Canary	*Crithagra sulphuratus*	Common resident	Mesic thickets and gardens
Common Starling	*Sturnus vulgaris*	Common resident	Towns and farmlands
Streaky-headed Seedeater	*Crithagra gularis*	Common resident	Woodlands, thickets and dense scrub
Southern Double-collared Sunbird	*Cinnyris chalybeus*	Near-Endemic	Coastal scrub, Fynbos and forests
Southern Boubou	*Laniarius ferrugineus*	Common resident	Forest edge, thickets and coastal scrub

COMMON NAME	SCIENTIFIC NAME	STATUS AND BIOLOGY	HABITAT
Neddicky	*Cisticola fulvicapilla*	Common resident	Savannah and mountain Fynbos
Grey-backed Cisticola	*Cisticola subruficapilla*	Common resident	Lowland Fynbos and Karoo scrub
Long-billed Crombec	*Sylvietta rufescens*	Common resident and local nomad	Woodland, savannah, arid scrubland
Cape Robin-Chat	*Cossypha caffra*	Common resident and altitudinal migrant	Thickets, scrub, gardens and forest edge
Karoo Scrub-Robin	*Cercotrichas paena*	Common resident in Karoo scrub and Strandveld	Karoo scrub and Strandveld
Grey Tit	*Parus afer*	Near-Endemic	Fynbos and Karoo scrub
Cape Eagle-Owl	*Bubo capensis*	Uncommon resident	Rocky and mountainous terrain
Namaqua Dove	*Oena capensis*	Common resident and nomad	Arid and semi-arid Savannah
Southern Black Korhaan	*Afrotis afra*	Endemic	Coastal Fynbos and Karoo scrub
Grey-winged Francolin	*Scleroptila africanus*	Near-Endemic	Strandveld, Fynbos and montane grassland
House Sparrow	*Passer domesticus*	Locally common resident	Urban areas, Farmlands
Cape Sparrow	*Passer melanurus*	Common resident in grasslands, fields and gardens	Grassland, fields and gardens
Cape Canary	*Serinus canicollis*	Common resident in Fynbos, grassland and coastal dunes	Fynbos, grassland and coastal dunes

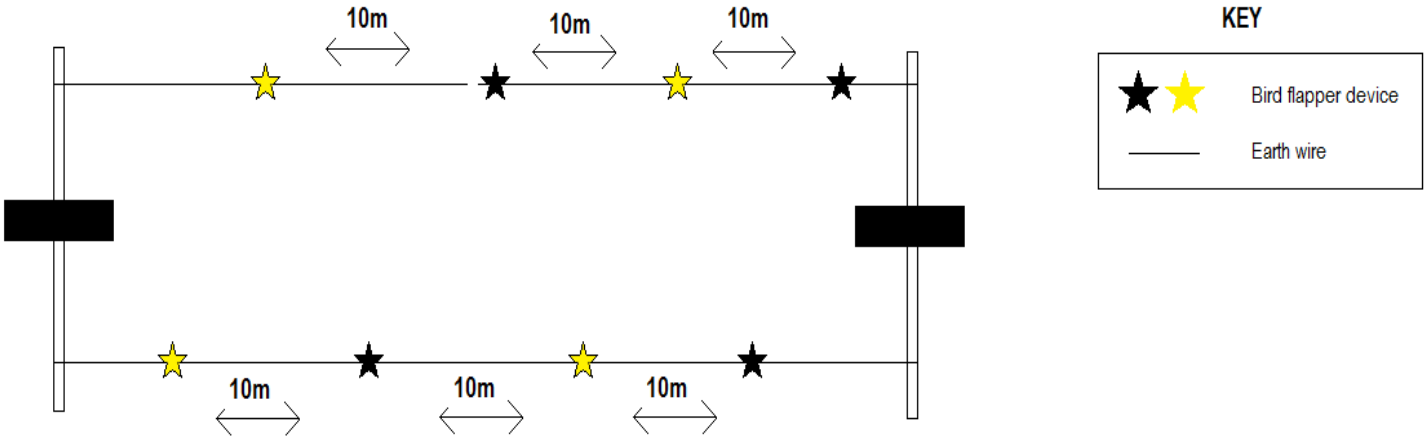
*ESLS- Endemic to South Africa, Lesotho and Swaziland

Appendix 2. Collision prone species in South Africa (Extracted from Jenkins et al. 2010).



Appendix 3. Mitigation measures for reducing avian-power line collisions

Static Helical bird flight diverter and a mobile bird flapper device.



Technique and guideline for marking of the earth wire with bird flapper devices.

Appendix 4. Buffer Zones surrounding the West Coast National Park extracted from the West Coast National Park Management Plan for the period 2013-2013.