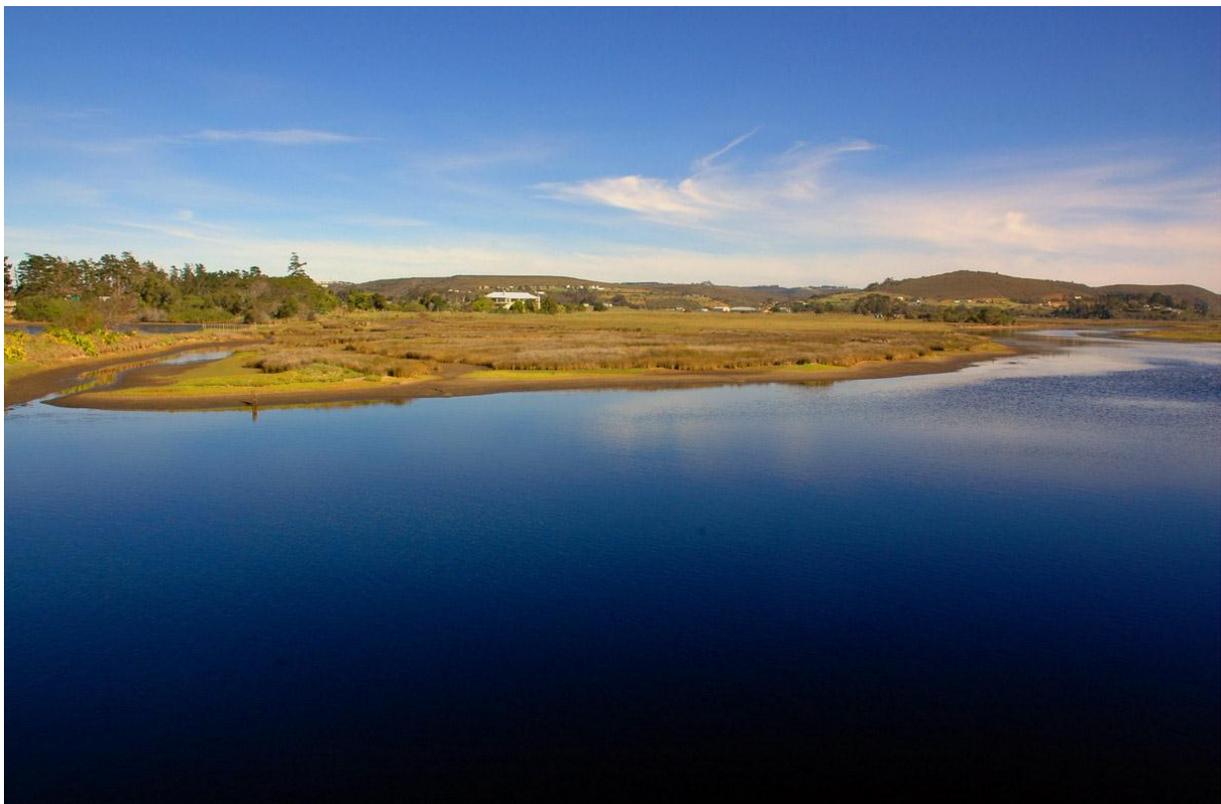

**PROPOSED 66 kV OVERHEAD POWER LINE BETWEEN ESKOM'S
BITOU AND ROBBERG SUBSTATIONS, IN THE PLETTENBERG BAY
AREA, WESTERN CAPE**

AVIAN IMPACT STUDY

Andrew Jenkins, Avisense Consulting, January 2014



Background & objectives

Eskom is planning to build a 66 kV power line in the Plettenberg Bay area of the Western Cape Province, South Africa, between the proposed new Bitou substation and the Robberg substation. SiVEST Environmental Division was appointed to do the Environmental Impact Assessment for this development, and subsequently sub-contracted Dr Andrew Jenkins (*AVISENSE* Consulting cc) to conduct the specialist avifaunal study for this EIA. Dr Jenkins is an experienced ornithologist, with over 20 years of experience in avian research and impact assessment work. He has been involved in many power line EIA and EMP studies in South Africa, and also does scientific research on the avian taxa most affected by power line impacts (raptors, bustards and cranes) in various parts of the country.

The primary objectives of this report are (i) to document the avifauna expected to occur within the impact area of the proposed new 66 kV overhead power line and associated substation/s, including four main proposed routes for the line (and a total of eight variations), (ii) to short-list those priority species that could possibly be adversely affected by the construction of the Bitou substation and the erection of the power line, (iii) to characterise and suggest ways to mitigate these negative impacts, and (iv) to compare impact and mitigation profiles for two proposed locations for the Bitou substation and four proposed routes for the overhead line, and identify the preferred location and route in terms of net negative bird impacts.

The present report is a revision and update of the initial study conducted for this power line in 2007 (Jenkins 2007), the validity of which has expired.

Methods

The study area was visited on February 14-15 2007, and again on January 15 2014, and the avian environments encompassed by the two proposed substation sites, and traversed by the seven proposed routes for the 66 kV power line, were recorded. At the same time, a list of bird species seen on site was compiled, and later integrated into a comprehensive list of species considered likely to occur within the impact area of the development (including a strip extending approximately 250m on either side of all proposed routes for the power line). This most inclusive list was compared with, and adjusted in terms of a 'Southern African Bird Atlas Project' list for the Plettenberg Bay quarter-degree square (3423AB) (in which most of the study area is located), and 'Bird in Reserves Project' lists for the Keurbooms River Nature Reserve (situated immediately north of the study area) and the Robberg Nature Reserve (situated immediately to the south). Both SABAP and BIRP are administered by the Avian Demography Unit, UCT, and the relevant bird data are available on the South African National Biodiversity Institute website at www.birds.sanbi.org. Thereafter, a threats and mitigation table was then compiled, detailing the risk posed by the proposed development to all the endemic and/or threatened species likely to occur in the area, and outlining measures

required to minimise all potentially significant impacts on a short-list of 'priority' species. Lastly, the two substation locations and the seven line route options (1A-D, 2A & B, and 3) were assessed in terms of their relative impact and mitigation profiles, and preferred options for both were identified.

Review of relevant information

Birds and power lines

The construction and maintenance of new power lines, including associated infrastructure such as substations, servitudes and roadways causes both temporary and permanent habitat destruction and disturbance, and the power lines themselves pose a collision risk for overflying birds, and a risk of electrocution for certain species (Van Rooyen 2004, Lehman *et al.* 2007, Jenkins *et al.* 2010).

Construction and maintenance of power lines

Some habitat destruction and alteration inevitably takes place during the construction of power lines, substations and associated roadways. Also, power line service roads or servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, and to prevent vegetation from intruding into the legally prescribed clearance gaps between the ground and the conductors. These activities have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude, and retention of cleared servitudes can have the effect of altering bird community structure along the length of any given power line (e.g. King & Byers 2002).

Collision risk

Overhead power lines pose a collision risk to all birds, but particularly collision prone birds are generally either (i) large species and/or species with high ratios of body weight to wing surface area (wing loading), which confers low manoeuvrability (cranes, bustards, vultures, gamebirds, waterfowl, falcons), (ii) species which fly at high speeds (gamebirds, pigeons and sandgrouse, swifts, falcons), (iii) species which are distracted in flight - predators or species with aerial displays (many raptors, aerial insectivores, some open country passerines), (iv) species which habitually fly in low light conditions, and (v) species with narrow fields of forward binocular vision (Bevanger 1994, 1995, 1998, Janss 2000b, Anderson 2001, Drewitt & Langston 2006, 2008, Jenkins *et al.* 2010, Noguera *et al.* 2010). These traits confer high levels of *susceptibility*, which may be compounded by high levels of *exposure* to man-made obstacles such as overhead power lines and wind turbine areas (Jenkins *et al.* 2010). Exposure is greatest in (i) very aerial species, (ii) species inclined to make regular and/or long distance movements (migrants, any species with widely separated resource areas - food, water, roost and nest sites), (iii) species that regularly fly in flocks (increasing the chances of incurring multiple fatalities in single collision incidents).

Mitigation of collision risk involves the informed selection of low impact alignments for new power lines relative to movements and concentrations of high risk species, and the use of either static or dynamic marking devices to make the lines, and in particular the earthwires, more conspicuous. While various marking devices have been used globally, many remain largely untested in terms of their efficacy in reducing collision incidence, and those that have been fully assessed have all been found to be only partially effective (Drewitt & Langston 2008, Jenkins *et al.* 2010).

Electrocution risk

Avian electrocutions occur when a bird perches or attempts to perch on an 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, Lehman *et al.* 2007). Electrocution risk is strongly influenced by the voltage and design of the power lines erected (generally occurring on lower voltage infrastructure where air gaps are relatively small), and mainly affects larger, perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energized components. Mitigation of electrocution risk involves the use of bird-safe structures (ideally with critical air gaps >2 m), the physical exclusion of birds from high risk areas of live infrastructure, and comprehensive insulation of such areas (van Rooyen 2004, Lehman *et al.* 2007).

Avifauna of the receiving area

The general birdlife of the specific area of the proposed development has not been well described or documented, although at least 50 and 55 bird-lists respectively have been compiled by visitors to the nearby Keurbooms River and Robberg Nature Reserves over the last 10-12 years (see above), and the avifauna of the Tsitsikamma National Park (situated about 30 km north of the site) has been characterised in terms of its value as a national 'Important Bird Area' (Barnes 1998). Also, importantly, the Bitou and Keurbooms Estuaries have been included in the Avian Demography Unit's 'Coordinated Waterbird Counts' (CWAC) project, which involves six-monthly counts of birds at important wetlands across the country, since 1992 (Taylor *et al.* 1999). Otherwise, recent, comprehensive summaries of individual species distributions and biology are available in Hockey *et al.* (2005), and specifically for Red-listed species in Barnes (2000).

The avian environment

The impact area for all proposed routes of the power line comprises eight broad avian habitats:

1. Wetlands, made up largely of the Bitou River and estuary, including saltmarsh and reedbeds on the floodplain, and any man-made farm dams, or smaller watercourses away from the main river catchment.

2. Fynbos fragments, mostly on the hills in the central and southern parts of the study area, including areas of quite tall, mature growth on the steep slopes, and areas of lower, more open or degraded fynbos on the hilltops.
3. Forest fragments, mostly shorter, but very dense, thicket-type growth on the southern aspects of hills in the central and southern parts of the study area, but including taller, true forest in the centre of the largest hillside patches and along sections of the riparian strip.
4. Areas of degraded, mostly alien grassland and pasture.
5. Tracts of cereal croplands immediately south of the Bitou River.
6. Stands of alien acacia and eucalyptus trees, either linear plantations established as windbreaks, woodlots or invasive infestations.

In addition, some species were considered likely to occur only as overhead commuters rather than as taxa using any of the available habitats within the study area.

Avifauna

Two hundred and fifty-nine (259) bird species are considered likely to occur within the impact area of the line (Appendix 1). Of these, 23 are Red-listed species, 31 are endemics, and four are Red-listed endemics (Tables 1 & 2). However, many of these species probably occur only in relatively small numbers, or only as occasional visitors to the area, and any possible impacts on these birds are unlikely to be of particular significance.

In terms of threat, rarity, endemism and the relative conservation importance of local populations, the priority bird species likely to occur in significant numbers within the power line impact area are Knysna Woodpecker, Half-collared Kingfisher, African Grass-Owl, Denham's Bustard, Blue Crane, Black-winged Lapwing, African Marsh Harrier, Forest Buzzard, African Crowned Eagle and Knysna Warbler (Table 1). This report will therefore concentrate on the effects of the proposed power line on these species, and assume that mitigation of these effects will also reduce impacts on other potentially affected species.

The locally endemic and Near-threatened Knysna Woodpecker (Barnes 2000) is likely to occur in relatively good numbers in the forest and thicket areas of the larger watercourses and on the southern slopes of hillsides traversed by the line (Tarboton 2005). The Half-collared Kingfisher (Near-threatened – Barnes 2000) is also likely to be present in relatively good numbers in the upper reaches of the Bitou River and its tributaries, especially where riparian forest vegetation hangs low over the water's edge (Turpie 2005). The marsh and vlei areas of the floodplain possibly hold breeding pairs of both African Grass-Owl and African Marsh Harrier (both Vulnerable – Barnes 2000) (Kemp 2005, Simmons 2005a).

Table 1. List of Red-listed or endemic bird species expected to occur in the area of either of the proposed substation sites, or along the proposed overhead power line routes, with information on perceived threats posed by the line and required mitigation measures. Those species considered to be of highest conservation priority for the purposes of this report are shaded grey.

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
Cape Spurfowl	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Hottentot Buttonquail	Unknown, probably threatened	Western Cape	Low?	Moderate	None	Low	None	Low	None
Kynsna Woodpecker	Near-threatened	Western Cape	High	Moderate	(i) Minimize disturbance footprint and time window	Low	None	Low	None
Ground Woodpecker	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Half-collared Kingfisher	Near-threatened	Not endemic	Moderate	Moderate	(i) Minimize disturbance footprint and time window	Low	None	Low	None
Knysna Tauraco	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
African Grass-Owl	Vulnerable	Not endemic	Moderate?	High	(i) Minimize disturbance footprint and time window	Moderate	(i) Ensure bird-friendly pylon configuration and comprehensive insulation of conductors; (ii) bird-guards fitted where required	Moderate	(i) Fit bird-flappers along entire length of new line

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
Denham's Bustard	Vulnerable	Not endemic	Low-Moderate	High	(i) Minimize disturbance footprint and time window	Low	None	High	(i) Fit bird-flappers along entire length of new line
Southern Black Korhaan	Not threatened	Western Cape	Low	High	None	Low	None	Moderate	None
Blue Crane	Vulnerable	Southern Africa	Moderate	High	(i) Minimize disturbance footprint and time window (ii) Search proposed line for nests immediately before construction	Low	None	High	(i) Fit bird-flappers along entire length of new line
African Finfoot	Vulnerable	Not endemic	Low	Moderate	None	Low	None	Low	None
Greater Painted Snipe	Near-threatened	Not endemic	Low	Moderate	None	Low	None	Low	None
Chestnut-banded Plover	Near-threatened	Not endemic	Low	Moderate	None	Low	None	Low	None
Black-winged Lapwing	Near-threatened	Not endemic	Moderate	Moderate	(i) Minimize disturbance footprint and time window	Low	None	Low	None

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
African Marsh-Harrier	Vulnerable	Not endemic	Moderate	High	(i) Minimize disturbance footprint and time window (ii) Search proposed line for nests immediately before construction	Low	None	Low	None
Black Harrier	Near-threatened	Southern Africa	Low	Low	None	Low	None	Low	None
Forest Buzzard	Not threatened	Southern Africa	Moderate	Moderate	(i) Minimize disturbance footprint and time window	Moderate	(i) Ensure bird-friendly pylon configuration and comprehensive insulation of conductors; (ii) bird-guards fitted where required	Low	None
Jackal Buzzard	Not threatened	Southern Africa	Low	Moderate	None	Moderate	None	Low	None
Martial Eagle	Vulnerable	Not endemic	Low	Low	None	High	None	Low	None

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
African Crowned Eagle	Near-threatened	Not endemic	Low	Moderate	(i) Minimize disturbance footprint and time window	High	(i) Ensure bird-friendly pylon configuration and comprehensive insulation of conductors; (ii) bird-guards fitted where required	Low	None
Secretarybird	Near-threatened	Not endemic	Low	Moderate	None	Low	None	High	None
Lesser Kestrel	Vulnerable	Not endemic	Low	Low	None	Moderate	None	Low	None
Lanner Falcon	Near-threatened	Not endemic	Low	Low	None	Moderate	None	High	(i) Fit bird-flappers along entire length of new line
Peregrine Falcon	Near-threatened	Not endemic	Low	Low	None	Moderate	None	High	(i) Fit bird-flappers along entire length of new line
White-backed Night-Heron	Vulnerable	Not endemic	Low	Moderate	None	Low	None	Low	None
Greater Flamingo	Near-threatened	Not endemic	Low	Moderate	None	Low	None	High	(i) Fit bird-flappers along entire length of new line

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
Lesser Flamingo	Near-threatened	Not endemic	Low	Moderate	None	Low	None	High	(i) Fit bird-flappers along entire length of new line
Black Stork	Near-threatened	Not endemic	Low	Low	None	Low	None	High	None
Southern Tchagra	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Grey Tit	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Cape Bulbul	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Cape Grassbird	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Knysna Warbler	Vulnerable	Western Cape	High	Moderate	(i) Minimize disturbance footprint and time window	Low	None	Low	None
Victorin's Warbler	Not threatened	Western Cape	Moderate?	Moderate	None	Low	None	Low	None
Cape White-eye	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Karoo Prinia	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Large-billed Lark	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Cape Rock Thrush	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Fiscal Flycatcher	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None

Species	Conservation status	Endemism	Importance of local population	Potential threat of disturbance during installation	Required mitigation	Potential threat of electrocution	Required mitigation	Potential threat of collision	Required mitigation
Chorister Robin-Chat	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Karoo Scrub-Robin	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Pied Starling	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Orange-breasted Sunbird	Not threatened	Western Cape	Low	Moderate	None	Low	None	Low	None
Southern Double-collared Sunbird	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Greater Double-collared Sunbird	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Cape Sugarbird	Not threatened	Western Cape	Low	Moderate	None	Low	None	Low	None
Cape Weaver	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Sweet Waxbill	Not threatened	Southern Africa	Low	Moderate	None	Low	None	Low	None
Forest Canary	Not threatened	South Africa	Low	Moderate	None	Low	None	Low	None
Cape Siskin	Not threatened	Western Cape	Low	Moderate	None	Low	None	Low	None

The area is probably peripheral for Denham's Bustard (Vulnerable – Barnes 2000) and Blue Crane (endemic and Vulnerable – Barnes 2000), although both may occur, and possibly breed, in the open fynbos patches on the hilltops, and particularly on the pastures which are widespread within the impact area of the proposed power line (Allan 2005a & b). Black-winged Lapwing (Near-threatened – Barnes 2000) is resident in the area and probably occurs and possibly breeds in open areas of the floodplain and in the pastureland crossed by the line (Turpie *et al.* 2005). Forest Buzzard (endemic) is common and almost certainly breeds in the forest and alien tree patches within and close to the impact zone (Hustler & Dean 2005). African Crowned Eagle (Near-threatened – Barnes 2000) probably visits the well-treed parts of the study area, and a pair could breed in the large emergent trees of the most established, mature forest patches (Simmons 2005b). Knysna Warbler (Vulnerable and localised endemic – Barnes 2000) probably occurs in the dense thicket and scrub along the watercourses and around the fringes of the forest patches (Smith 2005).

Table 3. Numbers of bird species, numbers of endemic or near-endemic species, numbers of Red-listed species, and numbers of 'priority' species in terms of significant negative impacts of the development, supported by each of the six main avian habitat types located within the impact zones of both the proposed sites for the Bitou substation and the four proposed routes for the 66 kV overhead power line. Note that many species occurred in more than one habitat type. The most important habitats in terms of each assessment are shaded grey.

Avian habitat type	Number of bird species supported	Number of endemic bird species supported	Number of Red-listed bird species supported	Number of 'priority' species supported
Wetlands	103	2	12	5
Fynbos	74	20	9	2
Forest	56	11	3	4
Pasture	70	8	10	3
Croplands	59	7	9	2
Alien trees	64	9	2	2

Apart from the individual species of conservation priority, another important consideration in assessing the impact of this proposed development is its effects on valuable avian guilds or communities. In this regard, the Bitou River or Estuary, and its associated floodplain, pans and tributaries, is of particular significance. CWAC counts for this site show that it supports good numbers of wildfowl (in particular Egyptian Goose, South African Shelduck, Yellow-billed Duck, Cape and Red-billed Teal and European Shoveler) and waders (in particular Pied Avocet and Black-winged Stilt) (Taylor *et al.* 1999). Collectively, these populations are locally significant, and many of these fast-flying, highly mobile species are potentially prone to collision with poorly positioned and unmarked overhead lines. The priority of the wetland areas in this impact

assessment study is further emphasized by a comparison of the avifaunas supported by each of the six avian habitats described (Table 2). The wetlands feature the highest diversity of species, the highest number of Red-listed species, and the highest number of impact 'priority' species (Table 2).

Impacts & mitigation

Likely impacts of development

The proposed power line will potentially impact on local avifauna in three ways (Van Rooyen & Ledger 1999, Kruger 1999, Endangered Wildlife Trust 2004 and references therein):

1. Short-term disturbance of breeding (or foraging) areas during the construction of the line.
2. Electrocution of birds perching on the pylon structures supporting the conductors,
3. Collision of flying birds with the suspended cabling of the line.

Generically, physical disturbance is likely to impact most significantly on species which nest on or close to the ground (Half-collared Kingfisher, African Grass-Owl, Denham's Bustard, Blue Crane, Black-winged Lapwing, African Marsh Harrier – Table 1), which may experience either the complete destruction or damaging disturbance of an active nest site placed in or close to the path of the construction process, or to a lesser extent tree-nesting species (e.g. Knysna Woodpecker, Knysna Warbler) nesting within a minimum distance of the proposed route.

The risk of electrocution of birds perching on electricity utility structures is greatest for large birds most capable of spanning the air-gaps between the conductors, and for species which habitually perch on elevated structures (Kruger 1999, Van Rooyen 2000). In this case African Crowned Eagle and Forest Buzzard are probably most at risk (Table 1).

Heavy, large-winged birds, and particularly those that regularly commute over long distances and in flocks, are those most likely to frequently collide with overhead lines (Van Rooyen 1999, Van Rooyen & Ledger 1999). In this case, Denham's Bustard and Blue Crane are the priority species most at risk, although the majority of common wetland species likely to aggregate on or around the Bitou River floodplain and estuary are also potentially and significantly at risk (Table 1). Further to this, collision risk is site specific, with certain topographic and landscape features associated with high incidences of collision by collision-prone species (Endangered Wildlife Trust 2004). In particular, power lines passing over or near to wetlands or watercourses, or across valleys that might otherwise focus or channel large bird activity and flight paths, are thought to be problematic.

Collision risk is arguably the most serious, long-term negative impact of this line, and is the most difficult impact to mitigate, given that predicting where collisions are likely to occur is far from an exact science, and methods to reduce collision frequencies at problem stretches of line using visual markers are far from perfected.

Disturbance impacts should be minimized in two ways (Table 1), both of which apply equally to all the proposed routes:

1. Both the temporal and spatial disturbance footprints of the construction process should be as compressed as possible – i.e. the process should be completed as quickly as possible, and the area of ground directly affected by the process should be as small as possible.
2. An expert observer should work along the proposed route immediately before construction activities start to ensure that no nests, particularly those of ‘priority’ species, are situated on or very close to the line.

The risks of electrocution should be minimized in two ways (Tables 1 & 4), both of which apply equally to all the proposed routes:

1. The pylon structures used to support the conductors must be of a bird-friendly configuration, with sufficient gaps between the conducting elements and the metalwork, and with perching surfaces spaced adequately away from the conductors to prevent even the largest birds (African Crowned Eagle) from spanning these gaps.
2. Bird-guards should be fitted wherever birds might perch above the conductors to reduce bird-streamer related faulting.

Table 4. Comparative pre- and post-mitigation significance ratings for the anticipated construction impacts on birds of the proposed Robberg-Bitou 66 kV power line.

NATURE	<i>Disturbance of waterbirds, large terrestrial birds and raptors.</i>			
ROUTE ALTERNATIVE	1	2	3	4
EXTENT (GEOGRAPHICAL)	Localised	Localised	Localised	Localised
DURATION	Short	Short	Short	Short
PROBABILITY	High	High	High	High
REVERSIBILITY	High	High		High
IRREPLACEABLE LOSS OF RESOURCES	Unlikely	Unlikely	Unlikely	Unlikely
CUMULATIVE IMPACTS	None	None	None	None
SIGNIFICANCE RATING – PRE MITIGATION	Low-Medium	Low-Medium	Low	Low
MITIGATION MEASURES	<ul style="list-style-type: none"> • <i>Minimizing the disturbance impacts associated with the construction of the line by abbreviating construction time, scheduling construction activities around avian breeding and tide related feeding and roosting schedules where necessary, lowering levels of associated noise.</i> • <i>Routing the line away from the wider sections of open wetland.</i> 			
RESIDUAL SIGNIFICANCE	Low	Low	Negligible	Negligible

Table 5. Comparative pre- and post-mitigation significance ratings for the anticipated operational impacts on birds of the proposed Robberg-Bitou 66 kV power line.

NATURE	<i>Disturbance of waterbirds, large terrestrial birds and raptors.</i>			
ROUTE ALTERNATIVE	1	2	3	4
EXTENT (GEOGRAPHICAL)	Localised	Localised	Localised	Localised
DURATION	Long	Long	Long	Long
PROBABILITY	Moderate	Moderate	Moderate	Moderate
REVERSIBILITY	High	High	High	High
IRREPLACEABLE LOSS OF RESOURCES	Unlikely	Unlikely	Unlikely	Unlikely
CUMULATIVE IMPACTS	None	None	None	None
SIGNIFICANCE RATING – PRE MITIGATION	Low	Low	Low	Low
MITIGATION MEASURES	<ul style="list-style-type: none"> Minimizing the disturbance impacts associated with maintenance activities on the line by scheduling these around avian breeding and tide related feeding and roosting schedules where necessary, lowering levels of associated noise. 			
RESIDUAL SIGNIFICANCE	Negligible	Negligible	Negligible	Negligible
NATURE	<i>Collision and/or electrocution mortality of waterbirds, large terrestrial birds and raptors on new power infrastructure.</i>			
ROUTE ALTERNATIVE	1	2	3	4
EXTENT (GEOGRAPHICAL)	Regional	Regional	Regional	Regional
DURATION	Permanent	Permanent	Permanent	Permanent
PROBABILITY	Moderate	Moderate	Low	Low
REVERSIBILITY	Low	Low	Low	Low
IRREPLACEABLE LOSS OF RESOURCES	Possible	Possible	Possible	Unlikely
CUMULATIVE IMPACTS	Additive to other power lines in area	Additive to other power lines in area	Additive to other power lines in area	Additive to other power lines in area
SIGNIFICANCE RATING – PRE MITIGATION	Medium	Medium	Low-Medium	Low
MITIGATION MEASURES	<ul style="list-style-type: none"> Routing the line away from the wider sections of open wetland . Ensuring that all new lines are marked with bird flight diverters along their entire length, using industry standard markers and marker fitting protocols. Ensuring that all new power infrastructure is adequately insulated and bird friendly in configuration. 			
RESIDUAL SIGNIFICANCE	Low-Medium	Low-Medium	Low	Negligible

Collision impacts should be minimized in two ways (Tables 1 & 5):

1. Ensuring that all new lines are marked with bird flight diverters along their entire length (Jenkins *et al.* 2010), using industry standard markers and marker fitting protocols (e.g. Van Rooyen 2004). Note that current understanding of power line collision risk in birds precludes any guarantee of successfully distinguishing high risk from medium or low risk sections of a new line (Bevanger 1994, Jenkins *et al.* 2010, Barrientos *et al.* 2011). The relatively low cost of marking the entire length of a new line during construction, especially quite a short length of line in an area frequented by collision prone birds, more than offsets the risk of not marking the line, causing unnecessary mortality of birds, and then incurring the much greater cost of retro-fitting the line post-construction. In situations where new lines run in parallel with existing, unmarked power lines, this approach has the added benefit of reducing the collision risk posed by the older line.
2. Once erected, the line should be surveyed at least twice for signs of avian collisions over the next 12 months.

Table 6. Approximate lengths of (i) each of the six main avian habitat types, (ii) existing, nearby parallel overhead lines, and (iii) existing and proposed nearby parallel roadways, traversed by or aligned with each of the eight proposed routes for the 66 kV overhead power line. In each case, the route was measured from the most distal of the two substation options.

Habitat type	Route 1A	Route 1B	Route 1C	Route 1D	Route 2A	Route 2B	Route 3	Route 4
km wetlands	1.0	1.0	1.0	1.0	1.0	1.0	1.1	0.9
km contiguous wetland	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.5
km fynbos	1.8	1.6	2.5	2.3	3.3	3.1	1.6	1.4
km forest	0.4	0.5	0.6	0.6	0.6	0.6	0.3	0.3
km pasture	3.9	3.9	3.7	3.7	2.4	2.4	2.7	0.6
km croplands	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.1
km alien trees	0.8	0.8	0.8	0.8	0.1	0.1	0.8	3.1
km parallel lines	4.4	4.4	4.0	4.0	2.4	2.4	3.6	4.6
km parallel roads	1.8	1.8	1.8	1.8	2.7	2.7	1.4	5.0

Substation site and line route selection

Because the possible locations for the Bitou substation are both positioned close to and north of the Bitou River, along the R340, and in areas of open pasture, neither presents a greater or lesser threat to the local avifauna, and the selection of either Site A or B is considered to be entirely subservient to the choice of line route.

Significant, long-term impacts on avifauna of the power line itself largely concern collision risk (assuming that the construction footprint is minimized and bird-friendly pylon structures are used throughout). Therefore, in the final analysis, route selection should be done primarily in terms of the distance of line crossing open wetland areas, where the maximum number of Red-listed and collision-prone species is likely to occur, and the high rates of avian traffic associated with the river, estuary and floodplain, and the general topography, both exacerbate the risk of aerial collision.

With these considerations in mind, **Route 4** is undoubtedly the preferable option. It crosses the Bitou River floodplain at a fairly narrow point, with <500m of contiguous, open wetland exposed to the line at that point (Table 6), as opposed to about 600-1000m for all the other options. Routes 1 & 2 also position the line close to a pan situated just to the west of where these routes turn south off the R340. Numbers of waterbirds flying into and out of this pan area are likely to be particularly exposed to collision with an overhead line traversing its immediate eastern fringe. Route 4 runs along the N2 for well over half its length, running parallel with existing power and telecoms infrastructure and within the heavily disturbed road reserve. It also crosses the least amount of natural Fynbos and forest habitat, which support the highest diversity of endemic species, and the second highest diversity of 'priority' species respectively. Note that Route 4 does run close and parallel to the sewage treatment plant settling ponds just southwest of where it deviates away from the N2. These ponds support quite substantial numbers of waterfowl, and the line could pose a threat to these collision-prone species. This section of the line should be particularly closely monitored post-construction. If Route 4 is selected, it would make sense to position the substation at **Site C**, to reduce the length of line required to run parallel to the R340 before crossing the Bitou River.

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Appendix 1. Annotated list of bird species seen (shaded grey) or expected to occur in the area along the various proposed overhead power line routes.
denotes regional endemic species, * denotes red-listed species.

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Cape Spurfowl#	<i>Pternistis capensis</i>	Uncommon	Resident		X		X			
Red-necked Spurfowl	<i>Pternistis afer</i>	Common	Resident			X	X			
Common Quail	<i>Coturnix coturnix</i>	Common	Seasonal migrant		X		X	X		
Helmeted Guineafowl	<i>Numida meleagris</i>	Common	Resident				X	X	X	
White-backed Duck	<i>Thalassornis leuconotis</i>	Uncommon	Visitor	X						
Maccoa Duck	<i>Oxyura maccoa</i>	Uncommon	Visitor	X						
Egyptian Goose	<i>Alopochen aegyptiaca</i>	Common	Resident	X			X	X	X	
South African Shellduck	<i>Tadorna cana</i>	Uncommon	Visitor	X						
Spur-winged Goose	<i>Plectropterus gambensis</i>	Common	Resident	X				X		
Cape Teal	<i>Anas capensis</i>	Uncommon	Visitor	X						
African Black Duck	<i>Anas sparsa</i>	Uncommon	Visitor	X						
Mallard	<i>Anas platyrhynchos</i>	Uncommon	Livestock / resident	X						
Yellow-billed Duck	<i>Anas undulata</i>	Common	Visitor	X						
Cape Shoveler	<i>Anas smithii</i>	Uncommon	Visitor	X						
Red-billed Teal	<i>Anas erythrorhyncha</i>	Uncommon	Visitor	X						
Hottentot Teal	<i>Anas hottentota</i>	Uncommon	Visitor	X						
Southern Pochard	<i>Netta erythroptalma</i>	Uncommon	Visitor	X						
Hottentot Buttonquail#	<i>Turnix hottentottus</i>	Rare	Resident		X					
Scaly-throated Honeyguide	<i>Indicator variegatus</i>	Rare	Resident			X				
Greater Honeyguide	<i>Indicator indicator</i>	Uncommon	Resident						X	
Lesser Honeyguide	<i>Indicator minor</i>	Uncommon	Seasonal migrant			X			X	

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Kynsna Woodpecker*#	<i>Campethera notata</i>	Uncommon	Resident			X				
Ground Woodpecker#	<i>Geocalaptes olivaceus</i>	Uncommon	Resident		X					
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>	Uncommon	Resident			X			X	
Olive Woodpecker	<i>Dendropicos griseocephalus</i>	Common	Resident			X				
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>	Uncommon	Resident						X	
African Hoopoe	<i>Upupa africana</i>	Common	Resident						X	
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	Common	Resident			X				
Narina Trogon	<i>Apaloderma narina</i>	Uncommon	Resident			X				
Half-collared Kingfisher*	<i>Alcedo semitorquata</i>	Uncommon	Resident	X						
Malachite Kingfisher	<i>Alcedo cristata</i>	Uncommon	Visitor	X						
Brown-Hooded Kingfisher	<i>Halcyon albiventris</i>	Uncommon	Resident			X			X	
Giant Kingfisher	<i>Megaceryle maximus</i>	Uncommon	Visitor	X						
Pied Kingfisher	<i>Ceryle rudis</i>	Uncommon	Visitor	X						
European Bee-eater	<i>Merops apiaster</i>	Uncommon	Seasonal migrant							X
Speckled Mousebird	<i>Colius striatus</i>	Common	Resident		X	X			X	
Red-faced Mousebird	<i>Urocolius indicus</i>	Uncommon	Resident		X				X	
Jacobin Cuckoo	<i>Clamator jacobinus</i>	Uncommon	Seasonal migrant		X	X			X	
Red-chested Cuckoo	<i>Cuculus solitarius</i>	Uncommon	Seasonal migrant		X	X			X	
Black Cuckoo	<i>Cuculus clamosus</i>	Uncommon	Seasonal migrant			X			X	
Common Cuckoo	<i>Cuculus canorus</i>	Rare	Seasonal migrant		X	X			X	
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	Common	Seasonal migrant		X	X			X	
African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	Uncommon	Seasonal migrant			X				
Diderick Cuckoo	<i>Chrysococcyx caprius</i>	Uncommon	Seasonal migrant		X	X			X	

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Burchell's Coucal	<i>Centropus burchellii</i>	Uncommon	Resident	X		X				
Alpine Swift	<i>Tachymarptus melba</i>	Common	Visitor							X
Common Swift	<i>Apus apus</i>	Uncommon	Seasonal migrant							X
African Black Swift	<i>Apus barbatus</i>	Common	Visitor							X
Little Swift	<i>Apus affinis</i>	Uncommon	Resident							X
Horus Swift	<i>Apus horus</i>	Uncommon	Visitor							X
White-rumped Swift	<i>Apus caffer</i>	Common	Seasonal migrant							X
Knysna Turaco#	<i>Tauraco corythaix</i>	Common	Resident			X				
Barn Owl	<i>Tyto alba</i>	Uncommon	Resident		X		X	X	X	
African Grass-Owl*	<i>Tyto capensis</i>	Rare	Resident	X						
Spotted Eagle-Owl	<i>Bubo africanus</i>	Uncommon	Resident		X		X	X	X	
African Wood-Owl	<i>Strix woodfordii</i>	Uncommon	Resident			X			X	
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>	Common	Resident		X				X	
Rock Dove	<i>Columba livia</i>	Common	Resident				X	X		
Speckled Pigeon	<i>Columba guinea</i>	Common	Resident				X	X		
African Olive-Pigeon	<i>Columba arquatrix</i>	Uncommon	Resident			X			X	
Lemon Dove	<i>Aplopelia larvata</i>	Uncommon	Resident			X				
Laughing Dove	<i>Streptopelia senegalensis</i>	Common	Resident				X	X		
Cape Turtle-Dove	<i>Streptopelia capicola</i>	Common	Resident		X		X	X		
Red-eyed Dove	<i>Streptopelia semitorquata</i>	Common	Resident		X		X	X	X	
Tambourine Dove	<i>Turtur tympanistria</i>	Uncommon	Resident			X				
Namaqua Dove	<i>Oena capensis</i>	Uncommon	Visitor				X	X		
Denham's Bustard*	<i>Neotis denhami</i>	Rare	Visitor		X		X	X		
Southern Black Korhaan#	<i>Afrotis afra</i>	Uncommon	Visitor		X		X	X		

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Blue Crane**	<i>Anthropoides paradiseus</i>	Uncommon	Visitor	X			X	X		
African Finfoot*	<i>Podica senegalensis</i>	Rare	Resident	X						
Buff-spotted Flufftail	<i>Sarothrura elegans</i>	Uncommon	Resident			X				
Red-chested Flufftail	<i>Sarothrura rufa</i>	Uncommon	Resident	X						
African Rail	<i>Rallus caerulescens</i>	Uncommon	Resident	X						
Black Crake	<i>Amaurornis flavirostris</i>	Uncommon	Resident	X						
Baillon's Crake	<i>Porzana pusilla</i>	Rare	Resident	X						
African Purple Swamphen	<i>Porphyrio madagascariensis</i>	Uncommon	Resident	X						
Common Moorhen	<i>Gallinula chloropus</i>	Common	Resident	X						
Red-knobbed Coot	<i>Fulica cristata</i>	Common	Resident	X						
African Snipe	<i>Gallinago nigripennis</i>	Uncommon	Resident	X						
Bar-tailed Godwit	<i>Limosa lapponica</i>	Uncommon	Seasonal migrant	X						
Common Whimbrel	<i>Numenius phaeopus</i>	Common	Seasonal migrant	X						
Eurasian Curlew	<i>Numenius arquata</i>	Uncommon	Seasonal migrant	X						
Marsh Sandpiper	<i>Tringa stagnatilis</i>	Uncommon	Visitor	X						
Common Greenshank	<i>Tringa nebularia</i>	Common	Seasonal migrant							
Wood Sandpiper	<i>Tringa glareola</i>	Uncommon	Visitor	X						
Common Sandpiper	<i>Actitis hypoleucos</i>	Uncommon	Visitor	X						
Ruddy Turnstone	<i>Arenaria interpres</i>	Uncommon	Seasonal migrant	X						
Little Stint	<i>Calidris minuta</i>	Common	Seasonal migrant	X						
Curlew Sandpiper	<i>Calidris ferruginea</i>	Common	Seasonal migrant	X						
Ruff	<i>Philomachus pugnax</i>	Common	Seasonal migrant	X						
Greater Painted Snipe*	<i>Rostratula benghalensis</i>	Rare	Resident	X						

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Water Thick-knee	<i>Burhinus vermiculatus</i>	Common	Resident	X						
Spotted Thick-knee	<i>Burhinus capensis</i>	Common	Resident	X			X	X		
Black-winged Stilt	<i>Himantopus himantopus</i>	Uncommon	Visitor	X						
Pied Avocet	<i>Recurvirostra avosetta</i>	Uncommon	Visitor	X						
Grey Plover	<i>Pluvialis squatarola</i>	Common	Seasonal migrant	X						
Common Ringed Plover	<i>Charadrius hiaticula</i>	Common	Seasonal migrant	X						
Kittlitz's Plover	<i>Charadrius pecuarius</i>	Uncommon	Visitor	X						
Three-banded Plover	<i>Charadrius tricollaris</i>	Uncommon	Resident	X						
Chestnut-banded Plover*	<i>Charadrius pallidus</i>	Rare	Visitor	X						
White-fronted Plover	<i>Charadrius marginatus</i>	Common	Resident	X						
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Rare	Seasonal migrant	X						
Blacksmith Lapwing	<i>Vanellus armatus</i>	Common	Resident	X			X			
Crowned Lapwing	<i>Vanellus coronatus</i>	Common	Resident	X			X	X		
Black-winged Lapwing*	<i>Vanellus melanopterus</i>	Uncommon	Resident		X		X			
Kelp Gull	<i>Larus dominicanus</i>	Uncommon	Visitor	X			X	X		
Grey-headed Gull	<i>Larus cirrocephalus</i>	Uncommon	Visitor	X						
Caspian Tern*	<i>Sterna caspia</i>	Common	Visitor	X						
Swift Tern	<i>Sterna bergii</i>	Common	Visitor	X						
Sandwich Tern	<i>Sterna sandicensis</i>	Common	Seasonal migrant	X						
Common Tern	<i>Sterna hirundo</i>	Common	Seasonal migrant	X						
Antarctic Tern	<i>Sterna vittata</i>	Uncommon	Seasonal migrant	X						
Little Tern	<i>Sterna albifrons</i>	Uncommon	Seasonal migrant	X						
Whiskered Tern	<i>Chlidonias hybrida</i>	Uncommon	Visitor	X						
White-winged Tern	<i>Chlidonias leucopterus</i>	Uncommon	Seasonal migrant	X						

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Osprey	<i>Pandion haliaetus</i>	Uncommon	Seasonal migrant	X						
African Cuckoo Hawk	<i>Aviceda cuculoides</i>	Rare	Visitor			X			X	
Black-shouldered Kite	<i>Elanus caeruleus</i>	Common	Resident				X	X	X	
Yellow-billed Kite	<i>Milvus parasitus</i>	Common	Seasonal migrant							X
African Fish-Eagle	<i>Haliaeetus vocifer</i>	Uncommon	Visitor	X			X	X		
Palm-nut Vulture	<i>Gypohierax angolensis</i>	Rare	Visitor							
African Marsh-Harrier*	<i>Circus ranivorus</i>	Uncommon	Resident	X	X		X	X		
Black Harrier*#	<i>Circus maurus</i>	Rare	Visitor		X		X	X		
African Harrier-Hawk	<i>Polyboroides typus</i>	Uncommon	Resident			X			X	
African Goshawk	<i>Accipiter tachiro</i>	Common	Resident			X			X	X
Little Sparrowhawk	<i>Accipiter minullus</i>	Uncommon	Resident			X			X	
Rufous-chested Sparrowhawk	<i>Accipiter rufiventris</i>	Uncommon	Visitor		X				X	X
Black Sparrowhawk	<i>Accipiter melanoleucus</i>	Uncommon	Resident				X	X	X	X
Steppe Buzzard	<i>Buteo vulpinus</i>	Common	Seasonal migrant		X		X	X	X	
Forest Buzzard#	<i>Buteo trizonatus</i>	Common	Resident			X			X	
Jackal Buzzard#	<i>Buteo rufofuscus</i>	Common	Resident		X		X	X	X	
Verreaux's Eagle	<i>Aquila verreauxii</i>	Rare	Visitor							X
Booted Eagle	<i>Aquila pennatus</i>	Uncommon	Seasonal migrant				X	X		X
Martial Eagle*	<i>Polemaetus bellicosus</i>	Uncommon	Visitor		X		X	X		X
African Crowned Eagle*	<i>Stephanoaetus coronatus</i>	Uncommon	Resident			X			X	
Secretarybird*	<i>Sagittarius serpentarius</i>	Uncommon	Visitor		X		X	X		
Lesser Kestrel*	<i>Falco naumanni</i>	Uncommon	Seasonal migrant		X		X	X	X	
Rock Kestrel	<i>Falco rupicolus</i>	Common	Resident		X		X	X		

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
Eurasian Hobby	<i>Falco subbuteo</i>	Rare	Seasonal migrant			X			X	X
Lanner Falcon*	<i>Falco biarmicus</i>	Uncommon	Visitor		X		X	X		X
Peregrine Falcon*	<i>Falco peregrinus</i>	Uncommon	Visitor		X		X	X		X
Little Grebe	<i>Tachybaptus ruficollis</i>	Uncommon	Visitor	X						
African Darter	<i>Anhinga rufa</i>	Common	Resident							
Reed Cormorant	<i>Phalacrocorax africanus</i>	Common	Resident	X						
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	Common	Resident	X						
Little Egret	<i>Egretta garzetta</i>	Common	Visitor	X						
Yellow-billed Egret	<i>Egretta intermedia</i>	Uncommon	Visitor	X						
Great Egret	<i>Egretta alba</i>	Uncommon	Visitor	X						
Grey Heron	<i>Ardea cinerea</i>	Common	Resident	X						
Black-headed Heron	<i>Ardea melanocephala</i>	Common	Resident	X			X	X	X	
Purple Heron	<i>Ardea purpurea</i>	Uncommon	Resident	X						
Cattle Egret	<i>Bubulcus ibis</i>	Common	Resident	X			X		X	
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	Common	Resident	X						
White-backed Night-Heron*	<i>Gorsachius leuconotis</i>	Rare	Resident	X						
Little Bittern	<i>Ixobrychus minutus</i>	Uncommon	Resident/seasonal migrant	X						
Hamerkop	<i>Scopus umbretta</i>	Uncommon	Resident	X					X	
Greater Flamingo*	<i>Phoenicopterus ruber</i>	Uncommon	Visitor	X						
Lesser Flamingo*	<i>Phoenicopterus minor</i>	Uncommon	Visitor	X						
Glossy Ibis	<i>Plegadis falcinellus</i>	Uncommon	Resident	X						
Hadeda Ibis	<i>Bostrychia hagedash</i>	Common	Resident	X			X		X	
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	Common	Visitor	X			X			

SPECIES	SCIENTIFIC NAME	STATUS	RESIDENCY	HABITAT TYPE						
				Estuary, river, floodplain and wetlands	Fynbos hillsides	Forest, riparian forest and thicket	Degraded/alien grassland or pasture	Grain croplands	Alien trees	Overhead
African Spoonbill	<i>Platalea alba</i>	Uncommon	Visitor	X						
Black Stork*	<i>Ciconia nigra</i>	Rare	Visitor	X						X
White Stork	<i>Ciconia ciconia</i>	Common	Seasonal migrant				X	X		X
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	Uncommon	Seasonal migrant							
Black-headed Oriole	<i>Oriolus larvatus</i>	Common	Resident			X			X	
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	Uncommon	Resident		X				X	
Blue-mantled Crested-Flycatcher	<i>Trochocercus cyanomelas</i>	Uncommon	Resident			X				
African Paradise Flycatcher	<i>Tersiphone viridis</i>	Common	Seasonal migrant			X			X	
Black-backed Puffback	<i>Dryoscopus cubla</i>	Uncommon	Resident			X				
Southern Tchagra#	<i>Tchagra tchagra</i>	Uncommon	Resident		X				X	
Southern Boubou	<i>Laniarius ferrugineus</i>	Uncommon	Resident		X				X	
Bokmakierie	<i>Telophorus zeylonus</i>	Common	Resident		X				X	
Olive Bush-Shrike	<i>Telephorus olivaceus</i>	Uncommon	Resident			X				
Cape Batis	<i>Batis capensis</i>	Uncommon	Resident						X	
Cape Crow	<i>Corvus capensis</i>	Common	Resident				X	X	X	
Pied Crow	<i>Corvus albus</i>	Common	Resident				X	X	X	
White-necked Raven	<i>Corvus albicollis</i>	Common	Visitor		X		X	X		X
Common Fiscal	<i>Lanius collaris</i>	Common	Resident		X		X		X	
Grey Cuckooshrike	<i>Coracina caesia</i>	Uncommon	Resident			X				
Black Cuckooshrike	<i>Campephaga flava</i>	Uncommon	Resident			X				
Cape Penduline-Tit	<i>Anthoscopus minutus</i>	Uncommon	Resident		X					
Grey Tit#	<i>Parus afer</i>	Uncommon	Resident		X					
Brown-throated Martin	<i>Riparia paludicola</i>	Uncommon	Visitor	X						

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Banded Martin	<i>Riparia cincta</i>	Uncommon	Seasonal migrant							X
Barn Swallow	<i>Hirundo rustica</i>	Common	Seasonal migrant	X						X
White-throated Swallow	<i>Hirundo albigularis</i>	Common	Seasonal migrant	X						X
Pearl-breasted Swallow	<i>Hirundo dimidiata</i>	Uncommon	Visitor							X
Greater Striped Swallow	<i>Hirundo cucullata</i>	Common	Seasonal migrant	X						X
Lesser Striped Swallow	<i>Hirundo abyssinica</i>	Uncommon	Seasonal migrant							X
Rock Martin	<i>Hirundo fuligula</i>	Common	Visitor							X
Black Saw-wing	<i>Psalidoprocne holomalaena</i>	Common	Resident			X			X	
Sombre Greenbul	<i>Andropadus importunus</i>	Common	Resident		X					
Cape Bulbul#	<i>Pycnonotus capensis</i>	Uncommon	Resident		X					
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	Uncommon	Resident			X				
Cape Grassbird#	<i>Sphenoeacus afer</i>	Uncommon	Resident		X					
Long-billed Crombec	<i>Sylvietta rufescens</i>	Uncommon	Resident		X					
Little Rush-Warbler	<i>Bradypterus baboecala</i>	Uncommon	Resident	X						
Knysna Warbler*#	<i>Bradypterus sylvaticus</i>	Uncommon	Resident			X				
Victorin's Warbler#	<i>Cryptillas victorini</i>	Rare	Resident		X					
African Reed-Warbler	<i>Acrocephalus baeticatus</i>	Uncommon	Resident	X						
Lesser Swamp-Warbler	<i>Acrocephalus gracilirostris</i>	Uncommon	Resident	X						
Yellow-throated Woodland-Warbler	<i>Phylloscopus ruficapilla</i>	Common	Resident			X				
Chestnut-vented Tit-Babbler	<i>Parisoma subcaeruleum</i>	Uncommon	Resident		X					
Cape White-eye#	<i>Zosterops virens</i>	Common	Resident		X				X	
Grey-backed Cisticola	<i>Cisticola subruficapilla</i>	Common	Resident		X					

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Levaillant's Cisticola	<i>Cisticola tinniens</i>	Uncommon	Resident	X						
Neddicky	<i>Cisticola fulvicapilla</i>	Uncommon	Resident		X					
Zitting Cisticola	<i>Cisticola juncidis</i>	Common	Resident				X	X		
Cloud Cisticola	<i>Cisticola textrix</i>	Uncommon	Resident				X	X		
Karoo Prinia#	<i>Prinia maculosa</i>	Common	Resident		X		X	X		
Bar-throated Apalis	<i>Apalis thoracica</i>	Uncommon	Resident		X				X	
Green-backed Camaroptera	<i>Camaroptera brachyura</i>	Uncommon	Resident			X				
Large-billed Lark#	<i>Galerida magnirostris</i>	Uncommon	Visitor				X	X		
Red-capped Lark	<i>Calandrella cinerea</i>	Common	Resident				X	X		
Cape Rock Thrush#	<i>Monticola rupestris</i>	Uncommon	Resident		X					
Olive Thrush	<i>Turdus olivaceus</i>	Uncommon	Resident			X			X	
Fiscal Flycatcher#	<i>Sigelus silens</i>	Uncommon	Resident		X	X			X	
Spotted Flycatcher	<i>Muscicapa striata</i>	Common	Seasonal migrant			X				
African Dusky Flycatcher	<i>Muscicapa adusta</i>	Common	Seasonal migrant			X			X	
Cape Robin-Chat	<i>Cossypha caffra</i>	Uncommon	Resident		X	X			X	
Chorister Robin-Chat#	<i>Cossypha dichroa</i>	Common	Resident			X				
Karoo Scrub-Robin#	<i>Cercotrichas coryphoeus</i>	Common	Resident		X					
African Stonechat	<i>Saxicola torquatus</i>	Common	Resident		X		X	X		
Familiar Chat	<i>Cercomela familiaris</i>	Common	Resident				X			
Red-winged Starling	<i>Onychognathus morio</i>	Common	Resident							
Black-bellied Starling	<i>Lamprotornis corruscus</i>	Common	Resident			X				
Pied Starling#	<i>Spreo bicolor</i>	Common	Resident				X	X		
Wattled Starling	<i>Creatophora cinerea</i>	Uncommon	Visitor				X	X		
Common Starling	<i>Sturnus vulgaris</i>	Common	Resident							

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Orange-breasted Sunbird#	<i>Anthobaphes violacea</i>	Common	Resident		X					
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	Common	Resident			X				
Malachite Sunbird	<i>Nectarinia famosa</i>	Uncommon	Visitor		X					
Southern Double-collared Sunbird#	<i>Cinnyris chalybeus</i>	Uncommon	Resident		X	X			X	
Greater Double-collared Sunbird#	<i>Cinnyris afer</i>	Common	Resident		X	X			X	
Cape Sugarbird#	<i>Promerops cafer</i>	Uncommon	Resident		X					
Cape Weaver#	<i>Ploceus capensis</i>	Common	Resident	X	X		X	X	X	
Southern Masked-Weaver	<i>Ploceus velatus</i>	Uncommon	Resident	X	X		X	X	X	
Southern Red Bishop	<i>Euplectes orix</i>	Common	Resident	X	X		X	X		
Yellow Bishop	<i>Euplectes capensis</i>	Common	Resident	X	X		X			
Swee Waxbill#	<i>Coccygia melanotis</i>	Common	Resident			X				
Common Waxbill	<i>Estrilda astrild</i>	Common	Resident	X			X	X		
Pin-tailed Whydah	<i>Vidua macroura</i>	Uncommon	Resident	X			X	X		
House Sparrow	<i>Passer domesticus</i>	Common	Resident				X	X		
Cape Sparrow	<i>Passer melanurus</i>	Uncommon	Resident		X		X	X		
African Pied Wagtail	<i>Motacilla aguimp</i>	Uncommon	Visitor	X						
Cape Wagtail	<i>Motacilla capensis</i>	Common	Resident	X			X		X	
Cape Longclaw	<i>Macronyx capensis</i>	Common	Resident		X		X			
African Pipit	<i>Anthus cinnamomeus</i>	Common	Resident		X		X	X		
Plain-backed Pipit	<i>Anthus leucophrys</i>	Uncommon	Resident		X		X	X		
Long-billed Pipit	<i>Anthus similis</i>	Uncommon	Resident		X		X	X		
Cape Canary	<i>Serinus canicollis</i>	Common	Resident		X		X	X	X	

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Forest Canary#	<i>Crithagra scotops</i>	Common	Resident			X				
Yellow Canary	<i>Crithagra flaviventris</i>	Uncommon	Visitor		X			X		
Brimstone Canary	<i>Crithagra sulphuratus</i>	Common	Resident		X	X				
White-throated Canary	<i>Crithagra albogularis</i>	Uncommon	Resident		X		X	X	X	
Streaky-headed Seedeater	<i>Crithagra gularis</i>	Uncommon	Resident				X	X		
Cape Siskin#	<i>Crithagra totta</i>	Uncommon	Resident		X					
Cape Bunting	<i>Emberiza capensis</i>	Uncommon	Resident		X		X			