

**AVIAN IMPACT ASSESSMENT
FOR
BLANKO-DROERIVIER
400 KV TRANSMISSION POWER LINE
AND
SUBSTATION UPGRADES**



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OVERVIEW

Blanco to Droerivier

Alternative 1 is approximately 178Km long. The route is aligned parallel to the existing Droerivier--Proteus 400Kv power line. From the proposed Blanco Substation the route goes through the first big mountain which a section of approximately one kilometre of land declared as the Ruitersbos Nature Reserve. There are already two existing power lines crossing over the nature reserve which is the reason why it is proposed to go through the nature reserve. There is a second nature reserve called the Groot Swartberg Nature Reserve which option 1 will also have to go through.

The Groot Swartberg nature Reserve is approximately 14Km North West of De Rust. The nature reserve going over the Swartberg Mountain for over 200Km. The Northern section of the nature reserve between the R407 Road and the Droerivier Substation is fairly flat when compared to the Southern section. The proposed route runs on the Eastern side along the N12 toward Droerivier Substation.

Alternative 2 Exits Blanco Substation along the same route as option 1. On the intersection of the N9 and the N12 roads the option 2 route is aligned along the N9 road to cover both the Northern and Southern sections of the road. Option 2 route continues to pass closer to the Uniondale town. It traverses Easterly along the N9 road to minimise the impact on the nature reserves.

There is a portion along the N9 road which is not demarcated as a nature reserve and this route aims at utilizing that portion to pass through. This portion is between the Swartberg East Mountain catchment area on the West and the Baviaanskloof Nature Reserve on the East. The section between the R407 road and Droerivier Substation on this route is undisturbed lands.

Biomes and Veld types for scoping area

There are four Biome types in the study area that the transmission powerlines traverse through namely :-

Forest Fynbos
Savanna Succulent Karoo

There are four Veld types in the study area that the transmission power

lines traverse through namely :-

Forest with grass Veld
Fynbos
Savanna valley bushveld
Succulent and desert Karoo

Forest type :- Montane
Veld types :- Mixedveld
 Sourveld
 Sweetveld

Precipitation for the scoping area :- < 200mm to > 800mm per Annum

KLEIN KAROO

The Klein Karoo is sharply defined by mountain ranges to the West, North and South, known as Swartberg (North) Langeberg – Outeniqua (South) . Nama Karoo vegetation of the semi-arid Karoo region largely comprises low shrubs and grasses.

Peak rainfall occurs in summer, trees and alien species are mainly restricted to water courses especially in the South Eastern Karoo. The Nama Karoo has higher proportions of grass and tree cover in comparison to the Succulent Karoo.

Many avian species show clear differences in relative abundance between the Succulent Karoo and the Nama Karoo vegetation types, for example the Karoo Lark and Thickbilled Lark show clear preference for the Succulent Karoo and the Red Lark, Slaters Lark are restricted to the Nama Karoo, this also applies to the Ludwig's Bustard and the Larklike Bunting.

Rainfall in Nama Karoo is mainly in summer while Succulent Karoo receives rain in winter, this provides opportunities for the migration of avian species between the Nama Karoo and Succulent Karoo to take advantage of the enhanced conditions associated with rainfall.

FYNBOS

Fynbos is dominated by low shrubs and has two major vegetation divisions Fynbos proper and Renosterbos.

Renosterveld has now been largely replaced by Agricultural crop fields and planted pastures.

This biome is characterized by a high level of diversity and endemism in its botanical composition.

The endemic avifauna consists of, Cape Rockjumper, Cape Sugarbird and Cape Siskin. The Black Harrier, endemic to Southern Africa is likely to have most of its breeding grounds in the Fynbos but is associated with Forest-edge habitats.

The Fynbos also shares some Avian species with the Karoo such as the Greybacked Cisticola and the Karoo Prinia.

The introduction of alien trees and the establishment of crop fields, and planted pastures in the Fynbos has resulted in numerous Avian species colonizing or increasing in abundance in these areas.

SAVANNA

Savanna is open grasslands with scattered bushes or trees.

Savanna is the largest Biome in South Africa covering 34 % of the country about (435000 sq.km.)

It is a mixture of grasses and trees or shrubs. Shrubland, Bushveld and Woodland are types of Savanna

Savanna stretches from the Kalahari in the North West across to the Lowveld in the North East and South wards to the low lands of Kwa-Zulu Natal and the Eastern Cape, it is found from sea level to about 2000m above sea level.

Fires are frequent, most plants can re-sprout after fire. More than 5700 plant species grow in the Savanna Biome.

Many grassland birds, several of which are endemic to South Africa show a clear preference for Sour over Sweet and Mixed grasslands

Some of these are essentially absent from the latter two grassland types



FOREST

Forest is the smallest Biome in South Africa covering about 0.1% of the country (1062km)

Forests are found at sea level to above 2000m. They grow in areas with high rainfall and no frost.

Forests consist of trees that form a closed canopy with layers of plants beneath the canopy.

The largest and most famous forests in South Africa are Knysna and Tsitsikama forest of the Southern Cape.

Birds include Knysna Lourie, Pigeons, and Eagles.

Today many indigenous forests have been replaced by plantations of alien trees (e.g. Pine trees) the harvesting of indigenous forest trees is strictly controlled.

Southern Afro temperate Forest (the Southern Cape Forest) is a kind of tall, shady, multilayered indigenous South African Forest.

This is the main Forest type in the South Western part of South Africa extending from the Cape Peninsula in the West to Port Elizabeth in the East. It usually occurs in small Forest pockets and is home to avian species such as the Knysna Lourie and Forest Buzzard. The Forest is mostly surrounded by Fynbos vegetation.



ALTERNATIVES

Alternative 1 Blanco --- Droerivier

Geography:

Biome's Succulent Karoo, Nama Karoo, Fynbos, Forest, Plantations, Dams, Rivers and Mountainous Terrain.

This route is aligned parallel to the existing Droerivier -- Proteus 400Kv transmission power line.

From the proposed Blanco Substation, the route goes through the first big mountain which has a section of approximately one kilometre of land declared as the Ruitersbos Nature Reserve.

There are already two existing transmission power lines traversing over the nature reserve which is the reason why it is proposed to go through the nature reserve.

There is a second nature reserve called the Groot Swartberg Nature Reserve which the route will also have to go through. The Groot Swartberg Nature Reserve is approximately 14Km North West of De Rust. The nature reserve is stretching over the Swartberg Mountain for over 200Km.

The Northern section of the nature reserve between R407 Road and the Droerivier Substation is fairly flat when compared to the Southern section. The proposed route runs on the eastern side along the N12 toward Droerivier Substation. There are several streams running along the route, none of them are posing construction challenges.

This route is the most direct from Blanco Substation to Droerivier Substation. It is predominately fruit, hop, and ostrich farming from the Blanco substation to the Swartberg, from then on to Droerivier it is predominately game and sheep farming.

During the field trip the land owners reported that there had been considerable amounts of collisions occurring on the existing trans-mission power lines, particularly where the lines were in close proximity to the dams. Species involved were Blue Crane, Egyptian Geese, Eagle-Owl, Kori and Ludwig's Bustard. The existing transmission power lines crossing the properties were not fitted with Bird Flight Diverters.

The Red Data Species that have been reported on this route.

White Stork:	Conservation status; Rare.
Black Stork:	Conservation status; Indeterminate.
Martial Eagle;	Conservation status; Vulnerable.
Kori Bustard	Conservation status; Vulnerable.
Stanley's Bustard	Conservation status; Vulnerable.
Ludwig's Bustard	Conservation status; Vulnerable.

Alternative 1 Blanco --- Droerivier

Co-ordinates for Bird Flight Diverters recommended along this route.

Dam	from	33°52' 57.81" S	22°20' 28.50" E
	to	33°52' 30.34" S	22°20' 28.97" E
River	from	33°50' 32.47" S	22°20' 37.28" E
	to	33°48' 09.32" S	22°20' 23.57" E
Dams	from	33°47' 35.13" S	22°20' 35.40" E
	to	33°47' 06.18" S	22°20' 43.69" E

From an avian point of view this route would be preferred as it would follow existing transmission power lines. The route is also the shortest of the two options and would therefore have less impact on the Avian species.



Alternative 2 Blanco --- Droerivier

Geography:

Biomes Succulent Karoo, Nama Karoo, Fynbos, Forest, Plantations, Dams, Rivers and Mountainous Terrain.

This route exits Blanco substation using the same route as the option 1 route. On the intersection of the N9 and the N12 roads, the route 2 turns easterly to go along the N9 road as compared to the route 1 that continues northerly along the N12 road.

The route 2 is aligned along the N9 road to cover both the Northern and Southern sections of the road.

Route 2 alignment continues to pass closer to the Uniondale town.

Route 2 continues easterly along the N9 road to minimize the impact on the nature reserves, there is a portion along the N9 road which is not demarcated as a nature

reserve and this route aims at utilizing that portion to pass through. This portion is between the Swatberg-east Mountain catchment area on the West and the Baviaanskloof Nature Reserve on the East.

The section between Willowmore town and Droerivier Substation on this route is mainly sheep and game farming.

This therefore means that even though the route is traversing mainly in the middle of the properties, farming activities should not be affected. This route is the longest route from Blanco Substation to Droerivier Substation. It is predominately fruit, hop, and ostrich farming from the Blanco substation to the intersection of the N9 and N12, from then on to Willowmore it is predominately game, sheep farming with some mixed and vegetable farming.

During the field trip the land owners reported that there has been a considerable increase in the amount of predatory birds breeding in the area such as Black Eagle, Martial Eagle, Fish Eagle along with Barn and Eagle Owls. This caused considerable concern that a new transmission power line could have an adverse affect on the increasing number of breeding birds, especially during the construction phase when considerable amount of disturbance would occur.

There were also reports that some Koraan and Bustard had been found to have collided with existing transmission power lines in the area.

The Red Data species that have been reported on this route.

Kori Bustard :	Conservation Status ; Vulnerable.
Stanley's Bustard :	Conservation Status ; Vulnerable.
Ludwig's Bustard:	Conservation Status ; Vulnerable.
Martial Eagle;	Conservation status; Vulnerable.
Greater Flamingo:	Conservation status; Indeterminate.
Lesser Flamingo:	Conservation status; Indeterminate.

Co-ordinates for Bird Flight Diverters recommended along this route.

	from	33°49' 25.01" S	22°23' 29.88" E
Dam	to	33°49' 30.48" S	22°23' 23.53" E
	from	33°49' 38.57" S	22°25' 00.86" E
Dams	to	33°49' 48.48" S	22°27' 55.47" E
	from	33°49' 24.67" S	22°31' 11.53" E
Dams	to	33°48' 47.74" S	22°34' 27.19" E
	from	33°47' 15.53" S	22°40' 50.03" E
Dams	to	33°46' 42.85" S	22°43' 31.33" E

From an avian point of view this route would not be recommended due to the fact that it is the longest of the two options and could cause a greater impact to the avian

population, taking in to account the increase of breeding predatory birds such as the Martial Eagle and Eagle Owls.

Transmission power line avian impacts

- 1) Collisions with associated power line infrastructure.
- 2) Electrocutation on associated power line infrastructure.
- 3) Nesting on associated power line infrastructure.
- 4) Disturbance through construction and maintenance activities of new power line.
- 5) Direct interaction in which the bird comes into physical contact with the power line infrastructure.
- 6) Indirect interaction include, disturbance or habitat destruction as a direct result of construction and maintenance which could have a negative impact.
- 7) The design of the transmission line and associated pylons also has a bearing on the risks to certain avian species.
The earthing conductors is one of the biggest risks as it is thinner than the transmission conductors and therefore not as visible to birds in flight. Bird excreta on the infrastructure can also have a negative impact on the transmission lines causing possible power interruptions.
- 8) Electrocutation of birds on pylons will depend on the particular design of the pylon to be utilized for the project, the risks to the birds is determined by the phase to phase and phase to earth clearances.
- 9) Nesting and roosting of birds on pylon structures can have a positive impact on avifauna, but it could also have a negative affect by causing electrical faults due to added weight, shorts due to excreta and possible fire risks from nesting material.

Avian species that are most consistently affected by over head transmission lines are water birds that congregate at wetlands and commute between them in flocks, examples being large and / or fast flying species examples such as ducks, geese, flamingos, storks, herons and waders, that have a high collision rate. Game birds and rails have less exposure but are still highly susceptible. Canes, storks, bustards korhaans which are large heavy bodied, flocking and low flying are also highly susceptible to collisions with over head transmission power lines.



Casualties Of Power Line Collisions Found During Field Trips.

Predatory birds can also be at risk along with species that tend to fly at dawn and dusk such as eagles and owls.

Routing transmission power lines over or close to water bodies is problematic as is valley heads and ridge tops.

Over head transmission lines should be kept as low as possible, spans as short as possible, transmission lines of a similar height and structure with common sources and destinations should be run in close parallel in affectively a common servitude. Transmission lines with different heights and configurations should be kept well apart.

Visible markers that are sufficiently large placed at regular intervals 5--10 meters on the earthing conductors are likely to reduce collisions by approximately 50 to 80 % . (A.R.Jenkins et al). Routing transmission power lines over or close to water bodies can be problematic as are valley heads and ridge tops.

Points to be considered with the erection of over head transmission lines are line placement, to take into consideration migratory patterns and high density areas of the avian species.

Line placement taking into account environmental factors such as flight paths, topography, line configuration that reduces vertical spread of lines, use of the same right of way to increase the visibility of lines and the use of line marking with Bird Flight Diverters.

10% Blue Crane are electrocuted on Transmission Power Lines per year 1/2 the world population found in the Western Cape. (EWT).

Marking transmission lines to make them more visible to birds in flight can be achieved by using (BFD's) Bird flight diverters although there are a wide variety of types and size of bird flight diverters only a fraction have been properly field tested, but nearly all of the devices tested have yielded at least moderate reduction in collision frequency.

Evidence available suggests that any bird flight diverter that appears to thicken the line at that point by at least 20cm over a length of 10-20cm placed every 5 to 10 meters on the earth wires is likely to reduce the general collision rates.

Unfortunately there is no legitimate way to compare the results because of the wide variety of species and conditions involved.

IMPACTS

Impacts associated with the collision of avian species on new transmission power lines is likely to be of moderate significance.

This should be mitigated by marking the transmission power lines in the areas that are recommended, by installing bird flight diverters at co-ordinates given in this report.

Habitat destruction and disturbance of the avian species should be of moderate significance, this can be mitigated by ensuring that construction of the transmission power line is monitored during construction to ensure that the impact is kept to a minimum.

Disturbance of the avian species is unavoidable, but with the correct approach to the construction and maintenance of the transmission power line it can be kept to a minimum. Once construction is completed the avian populations should return to normal activities.

The disturbance of the avian habitat and biomes should only be during the construction phase, and make a full recovery once it has been completed and the sites rehabilitated back to normal.

Construction will inevitably disturb the breeding and non-breeding avian species on the proposed transmission power line routes.

These avian species will move off during construction to find new nesting sites and similar habitat elsewhere and should return after the construction phase is completed.

Dams and wetlands attract large numbers of water fowl, waders along with flamingo and stork, population numbers are subject to seasonal changes in population and the abundance of the nutrients which are providing food for the local and migrating species.

During the construction phase the disturbance should be kept to minimum by routing the transmission power lines away from these sensitive areas as far as it is practical to do so.

Game reserves and game lodges attract a large amount of visitors and foreign currency to the area. Taking this in to consideration it would be advisable to consult the owners in regard to the installation of bird flight diverters being attached to the transmission power lines that cross their property to ascertain if the avian impact risks are greater than the aesthetic impact, this would be dependant on the route that is taken and the requirements of the owners. Where there are the need for bird flight diverters being attached to the transmission power lines that cross their property consultation with the owners in regard to their positioning should be agreed on by both parties.

ASSESSMENT TABLES

Avifaunal Impact Assessment: Habitat Destruction		
<p>Nature: During the construction phase and maintenance of substations and power lines, some habitat destruction and alteration will occur due to the clearing of servitudes and vegetation at the substation site. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation intrusion and to minimise the risk of fire under the lines. These activities have an impact on foraging, breeding and roosting ecology of avian species within the area through modification of habitat. Avian species that are most consistently affected by over head transmission lines are water birds that congregate at wetlands and commute between them in flocks, examples being large and / or fast flying species examples such as ducks, geese, flamingos, storks, herons and waders, that have a high collision rate. Game birds and rails have less exposure but are still highly susceptible. Canes, storks, bustards which are large heavy bodied, flocking and low flying are also highly susceptible to collisions with over head transmission power lines. From an avian point of view <u>Alternative 2 would not be recommended due to the fact that it is the longest</u> of the two options and could cause a greater impact to the avian population, taking in to account the increase of breeding predatory birds such as the Martial Eagle and Eagle Owls. (Avifauna Report, Rodney Chrisford, 2015)</p>		
CONSTRUCTION PHASE		
Rating of Impacts	Without mitigation	With mitigation
Probability	Definite (5)	Highly Probable (4)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	60 (high)	40 (moderate)
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Probable (3)	Improbable (2)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	36 (moderate)	20 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not result in destruction of any habitats within the study area.	

Mitigation:

- Owners of Game Reserves to be consulted to estimate if and where there is a need for bird flight diverters being attached to the transmission power lines that cross their properties (Avifauna Report, Rodney Chrisford, 2015).
- All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development should be kept to a minimum. In particular, care must be taken in the vicinity of the drainage lines and existing roads must be used as much as possible for access during construction.
- The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.
- Wetland areas where water birds frequent to be treated as sensitive areas, best to be avoided.
- Bird markers to be placed every 50m on the line where it occurs in the vicinity of water bodies (Avifauna Report, Rodney Chrisford, 2015).
- Provide adequate briefing for site personnel.
- 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 EMP and controlled by an ECO.

Cumulative impacts: Expected to be moderate. Portions of the habitat is relatively unique within the landscape. Some Red Data species could be displaced temporarily by the habitat transformation that will take place as a result of the construction and operation of the proposed development.

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Avifaunal Impact Assessment: Disturbance of birds

Nature: Species residing within this landscape often experience varying degrees of disturbance. As a result, disturbance of birds by the proposed substation and power line is anticipated to be of low significance as birds will move away from the area temporarily. Species sensitive to disturbance and ground-nesting species resident within the development footprint will be particularly susceptible. Game reserves and game lodges attract a large amount of visitors and foreign currency to the area. Taking this in to consideration it would be advisable to consult the owners in regard to the installation of bird flight diverters being attached to the transmission power lines that cross their property to ascertain if the avian impact risks are greater than the aesthetic impact, this would be dependent on the route that is taken and the requirements of the owners. The level of disturbance of birds would be similar for both alternatives, but due to the additional length of Alternative 2, the impact may be more than for Alternative 1.

CONSTRUCTION PHASE

Rating of Impacts	Without mitigation	With mitigation
Probability	Definite (5)	Highly Probable (4)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to Local Area (2)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	50 (moderate)	28 (low)
Status (positive or negative)	Negative	Negative

OPERATIONAL PHASE

Probability	Probable (3)	Improbable (2)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	36 (moderate)	20 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not add to the disturbance of bird life.	
Mitigation:		
<ul style="list-style-type: none"> • Owners of Game Reserves to be consulted to estimate if and where there is a need for bird flight diverters being attached to the transmission power lines that cross their properties (Avifauna Report, Rodney Chrisford, 2015). • All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development should be kept to a minimum. In particular, care must be taken in the vicinity of the drainage lines and existing roads must be used as much as possible for access during construction. • The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area. • Wetland areas where water birds frequent to be treated as sensitive areas, best to be avoided. • Bird markers to be placed every 50m on the line where it occurs in the vicinity of water bodies (Avifauna Report, Rodney Chrisford, 2015). • Strict control must be maintained over all activities during construction, in line with an approved Construction EMPr. • During Construction, if any of the Red Data species identified in this report are observed to be roosting and/or breeding in the vicinity, the ECO must be notified. • Contractors and working staff should stay within the development footprint and movement outside these areas including avian micro-habitats must be restricted. Water bodies are of particular importance and best avoided by personnel. • Driving must take place on existing roads and a speed limit of 30km/h must be implemented on all roads running through the study area during all phases. 		
Cumulative impacts: Impact on birds is expected to be of moderate significance. Species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during both the construction and operational (maintenance) phases.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.		

Avifaunal Impact Assessment: Electrocution of birds on power line

Nature: Electrocution of birds on associated overhead power lines is an important cause of mortality for a variety of bird species particularly storks, cranes and raptors in South Africa. The design of the transmission line and associated pylons also has a bearing on the risks to certain

avian species. The earthing conductors create one of the biggest risks as it is thinner than the transmission conductors and therefore not as visible to birds in flight. Bird excreta on the infrastructure can also have a negative impact on the transmission lines causing possible power interruptions. Electrocutation of birds on pylons will depend on the particular design of the pylon to be utilized for the project, the risks to the birds is determined by the phase to phase and phase to earth clearances (Avifauna Report, Rodney Chrisford, 2015)..

Nesting and roosting of birds on pylon structures can have a positive impact on avifauna, but it could also have a negative affect by causing electrical faults due to added weight, shorts due to excreta and possible fire risks from nesting material. Avian species that are most consistently affected by over head transmission lines are water birds that congregate at wetlands and commute between them in flocks, examples being large and / or fast flying species examples such as ducks, geese, flamingos, storks, herons and waders that have a high collision rate. Game birds and rails have less exposure but are still highly susceptible. Canes, storks, bustards korhaans which are large heavy bodied, flocking and low flying are also highly susceptible to collisions with over head transmission power lines (Avifauna Report, Rodney Chrisford, 2015). The potential for this impact is similar for both alternatives, but due to the additional length of Alternative 2, the impact may be more than for Alternative 1.

OPERATIONAL PHASE		
Rating of Impacts	Without mitigation	With mitigation
Probability	Probable (3)	Improbable (2)
Duration	Long term (4)	Long term (4)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	Moderate (6)	Low (4)
Significance	36 (moderate)	20 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not result in an increase in the electrocution of birds.	
Mitigation:		
<ul style="list-style-type: none"> All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents. Installation of artificial bird space perches and nesting platforms, at a safe distance from energised. Bird markers to be installed in areas of water bodies and where property owners have indicated the occurrence of breeding pairs or bird colonies (Avifauna Report, Rodney Chrisford, 2015). 		
Cumulative impacts: The impact assessment found the impact of electrocution to be of moderate significance after the mitigation in the form of bird friendly structures.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.		

Avifaunal Impact Assessment : Summary of collisions of birds with the power line Routes A1 and A2

Nature: Collisions are the biggest single threat posed by transmission power lines to birds in Southern Africa. The Red Data species that are vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. The potential of collisions of birds exists equally for both alternatives, but due to the additional length of Alternative 2, the impact may be more than for Alternative 1.

OPERATIONAL PHASE

Significance	Without mitigation	With mitigation
Collisions with Route A1	39 (moderate)	20 (low)
Collisions with Route A2	52 (moderate)	30 (moderate)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not change the status quo of bird collisions in the area.	

Mitigation:

- Mark sections of line in high sensitivity areas 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 in areas where the line is located in close proximity of water bodies, and where large winged birds are known to breed.
- Marking devices include spiral vibration dampers, strips, Firefly Bird Flight Diverters, bird flappers, aerial marker spheres, ribbons, tapes, flags and aviation balls.
- Construction of the power line in close proximity to other existing lines will reduce the cumulative impacts and collision risk.

Cumulative impacts: 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.

Residual Risks: Low risk anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

COMPLETE LIST OF THE AVIAN SPECIES THAT HAVE BEEN RECORDED IN THE SCOPING AREA FOR THE GOURIKWA - BLANCO - DROERIVIER 400KV TRANSMISSION POWER LINES AND SUBSTATION UPGRADES

The following species list is shown in family groups for easy identification the left hand number is the Roberts number (Maclean 1993b)

NON--PASSERINES

Family; Podicipediformes:

GREBES

- 006 Great Crested Grebe
- 007 Black necked Grebe
- 008 Dabchick

Family; Anhingidae:

DARTERS

- 060 Darter

Family; Ardeidae:

HERONS, EGRETS, BITTERNES

- 062 Grey Heron
- 063 Blackheaded Heron
- 065 Purple Heron
- 066 Great White Heron
- 067 Little Egret

Family:Phalacrocoracidae:

CORMORANTS

- 055 Whitebreasted Cormorant
- 058 Reed Cormorant

- 068 Yellowbilled Egret
- 071 Cattle Egret
- 076 Blackcrowned Night heron
- 078 Little Bittern
- 080 Bittern

Family; Scopidae:

HAMERKOP

- 081 Hamerkop

Family; Plataleidae:

IBISES, SPOONBILLS

- 091 Sacred Ibis
- 093 Glossy Ibis
- 094 Hadeda Ibis
- 095 African Spoonbill

Family; Ciconiidae:

STORKS

- 083 White Stork
- 084 Black Stork

Family; Phoenicopteridae:

FLAMINGOS

- 096 Greater Flamingo
- 097 Lesser Flamingo

Family; Anatidae:

DUCKS, GEESE, SWANS

- 100 Fulvous Duck
- 101 Whitebacked Duck
- 102 Egyptian Goose
- 103 South African Shelduck
- 104 Yellowbilled Duck
- 105 African Black Duck
- 106 Cape Teal

- 107 Hottentot Teal
- 108 Redbilled Teal
- 112 Cape Shoveller
- 113 Southern Pochard
- 116 Spurwinged Goose
- 117 Maccos Duck

Family; Sagittariidae:

SECRETARYBIRD

118 Secretarybird

Family; Accipitridae:

VULTURES, KITES, HAWKS, EAGLES, BUZZARDS, HARRIERS

122 Cape Vulture	155 Redbreasted Sparrowhawk
127 Blackshouldered Kite	157 Littlesparrow Hawk
131 Black Eagle	158 Blacksparrow Hawk
136 Booted Eagle	160 African Goshawk
140 Martial Eagle	162 Pale Chanting Goshawk
148 African Fish Eagle	165 African Marsh Harrier
149 Steppe Buzzard	168 Black Harrier
150 Forest Buzzard	169 Gymnogone
152 Jackal Buzzard	

Family; Pandionidae:

OSPREY

170 Osprey

Family; Falconidae:

FALCONS, KESTRELS

171 Peregrine Falcon
172 Lanner Falcon
173 Hobby Falcon
181 Rock Kestrel
182 Greater Kestrel
183 Lesser Kestrel

Family; Phasianidae:

FRANCOLINS, QUAIL

190 Greywing Francolin
192 Redwing Francolin
195 Cape Francolin
198 Rednecked Francolin
200 Common Quail

Family; Numididae:

GUINEAFOWL

203 Helmeted Guineafowl

Family; Turnicidae:

BUTTONQUAILS

206 Blackrumped Buttonquail

Family; Gruidae:

CRANES

208 Blue Crane

Family; Rallidae:

RAILS, CRAKES, FLUFFTAILS, GALLINULES, MOORHENS, COOTS

213 Black Crake	221 Striped Flufftail
215 Billions Crake	223 Purple Gallinule
217 Redchested Flufftail	226 Moorhen
218 Buffspotted Flufftail	228 Redknobed Coot

Family; Otididae:

BUSTARDS, KORHAANS

230 Kori Bustard	235 Karoo Korhaan
231 Stanley's Bustard	239 Black Korhaan
232 Ludwig's Bustard	

**Family; Charadriidae:
PLOVERS**

248 Kittlitz's Plover
249 Threebanded Plover

255 Crowned Plover
258 Blacksmith Plover

**Family; Scolopacidae:
TURNSTONES, SANPIPERS, STINTS, SNIPE, CURLEWS**

264 Common Sandpiper
265 Green Sandpiper
266 Wood Sandpiper
269 Marsh Sandpiper
270 Greenshank

272 Curlew Sandpiper
274 Little Stint
284 Ruff
286 Ethiopian Snipe

**Family; Recurvirostridae:
AVOCETS, STILTS**

294 Avocet
295 Blackwinged Stilt

**Family; Burhinidae:
DIKKOPS**

297 Spotted Dikkop
298 Water Dikkop

**Family; Glareolidae:
COURSERS, PRATINCOLES**

299 Burchell's Courser

**Family; Laridae:
SKUAS, GULLS, TERNS**

315; Greyheaded Gull
338; Whiskered Tern
339; Whitewinged Tern

**Family; Pteroclididae:
SANDGROUSE**

344 Namaqua Sandgrouse

**Family; Columbidae:
PIGEONS, DOVES**

349 Rock Pigeon
350 Rameron Pigeon
352 Redeyed Dove
354 Cape Turtle Dove

355 Laughing Dove
356 Namaqua Dove
360 Cinnamon Dove

**Family; Cuculidae:
CUCKOOS, COUCALS**

374 European Cuckoo
377 Redched Cuckoo
378 Black Cuckoo
382 Jacobin Cuckoo

385 Klaas's Cuckoo
386 Diederik Cuckoo
391 Whitebrowed Coucal

**Family; Tytonidae:
BARN, GRASS, OWLS**

392 Barn Owl
393 Grass

Family; Strigidae:
TYPICAL OWLS

394 Wood Owl
395 Marsh Owl

400 Cape Eagle Owl
401 Spotted Eagle Owl

Family; Caprimulgidae:
NIGHTJARS

404 European Nightjar
405 Fierynecked Nightjar

Family; Apodidae:
SWIFTS

411 European Swift
412 Black Swift
415 Whiterumped Swift

416 Horus Swift
417 Little Swift
418 Alpine Swift

Family; Coliidae:
MOUSEBIRDS

424 Speckled Mousebird
425 Whitebacked Mousebird
426 Redfaced Mousebird

Family; Trogonidae:
TROGONS

427 Narina Trogon

Family; Halcyonidae:
KINGFISHERS

428 Pied Kingfisher
429 Giant Kingfisher
430 Halfcollared Kingfisher
431 Malachite Kingfisher
435 Brownhooded Kingfisher

Family; Meropidae:
BEE-EATERS

438 European Bee-eater

Family; Upupidae:
HOOPOE

451 Hoopoe

Family; Phoeniculidae:
WOODHOOPES

452 Redbilled Woodhoopoe

Family; Capitonidae:
BARBETS, TINKER BARBETS

464 Blackcollared Barbet
465 Pied Barbet

Family; Indicatoridae:
HONEYGUIDES

474 Greater Honeyguide

Family; Picidae:
WOODPECKERS

480 Ground Woodpecker
486 Cardinal Woodpecker
488 Olive Woodpecker

PASSERINES

Family; Alaudidae:

LARKS

495 Clapper Lark
500 Longbilled Lark
506 Spikeheeled Lark

507 Redcapped Lark
512 Thickbilled Lark
516 Greybacked Finchlark

Family; Hirundinidae:

SWALLOWS, MARTINS

518 European Swallow
520 Whitethroated Swallow
523 Pearlbreasted Swallow
526 Greater Striped Swallow

529 Rock Martin
530 House Martin
533 Brownthroated Martin
534 Banded Martin

Family; Campephagidae:

CUCKOOSHRIKES

538 Black Cuckooshrike
540 Grey Cuckooshrike

Family; Dicruridae:

DRONGOS

541 Forktailed Drongo

Family; Oriolidae:

ORIOLES

545 Blackheaded Oriole

Family; Corvidae:

CROWS, RAVENS

547 Black Crow
548 Pied Crow
550 Whitenecked Raven

Family; Paridae:

TITS

551 Southern Grey Tit
554 Southern Black Tit

Family; Remizidae:

PENDULINE TITS

557 Cape Penduline Tit

Family; Pycnonotidae:

BULBULS

566 Cape Bulbul
569 Terrestrial Bulbul

572 Sombre Bulbul

Family; Turdidae:

THRUSHES, CHATS, ROBINS, ROCKJUMPERS

577 Olive Thrush
581 Cape Rock Thrush
582 Sentinel Rock Thrush
586 Mountain Chat
587 Capped Wheatear
589 Familiar Chat
592 Karoo Chat
593 Mocking Chat

595 Anteating Chat
596 Stone Chat
598 Chorister Robin
601 Cape Robin
611 Cape Rockjumper
613 Whitebrowed Robin
614 Karoo Robin

Family; Sylviidae:

WARBLERS, APALISES, CROMBECS, EREMOMELAS, CISTICOLAS, PRINIAS

621 Titbabbler	651 Longbilled Crombec
631 African Marsh Warbler	664 Fantailed Cisticola
633 European Marsh Warbler	666 Cloud Cisticola
635 Cape Reed Warbler	669 Greybacked Cisticola
638 African Sedge Warbler	677 Levaillant's Cisticola
643 Willow Warbler	681 Neddicky
644 Yellowthroated Warbler	686 Karoo Prinia
645 Barthroated Apalis	688 Roufouseared Warbler

Family; Muscicapidae:

FLYCATHERS, BATISES

689 Spotted Flycatcher	700 Cape Batis
690 Dusky Flycatcher	710 Paradise Flycatcher
698 Fiscal Flycatcher	

Family; Motacillidae:

WAGTAILS, PIPITS, LONGCLAWS

713 Cape Wagtail	718 Plainbacked Pipit
716 Grassveld Pipit	727 Orangethroated Longclaw
717 Longbilled Pipit	

Family; Laniidae:

SHRIKES

732 Fiscal Shrike

Family; Malaconotidae:

BOUBOUS, TCHAGRAS, BUSH SHRIKES

740 Puffback	746 Bokmakierie
742 Southern Tchagra	750 Olive Bush Shrike

Family; Sturnidae:

STARLINGS, MYNAS

757 European Starling	764 Glossy Starling
759 Pied Starling	768 Blackbellied Starling
760 Wattled Starling	769 Redwinged Starling

Family; Promeropidae:

SUGARBIRDS

773 Cape Sugarbird

Family; Nectariniidae:

SUNBIRDS

775 Malachite Sunbird	792 Black Sunbird
783 Lesser Doublecollared Sunbird	793 Collard Sunbird
785 Greater Doublecollared Sunbird	

Family; Zosteropidae:

WHITE-EYES

796 Cape White-eye

Family; Polceidae:

SPARROWS, WEAVERS, BISHOPS, WIDOWS, QUELEAS

801 House Sparrow

813 Cape Weaver

803 Cape Sparrow

814 Masked Weaver

804 Southern Greyheaded Sparrow

824 Red Bishop

805 Yellowthroated Sparrow

827 Yellowrumped Widow

810 Spectacled Weaver

832 Longtailed Widow

811 Spottedbacked Weaver

Family; Estrildidae:

TWINSPTS, FIREFINCHES, WAXBILLS, MANNIKINS

846 Common Waxbill

856 Redheaded Finch

850 Swee Waxbill

857 Bronze Mannikin

852 Quail Finch

Family; Viduidae:

WHYDAHs, WIDOWFINCHES

860 Pintailed Whydah

Family; Fringillidae:

CANARIES, BUNTINGS

872 Cape Canary

881 Streakyheaded Canary

874 Cape Siskin

884 Goldenbreasted Bunting

877 Bully Canary

885 Cape Bunting

878 Yellow Canary

887 Larklike Bunting

879 Whitethroated Canary

THE TOTAL NUMBER OF SPECIES (264).

MIGRANT SPECIES RECORDED IN SCOPING AREA

078	Little Bittern	non breeding	un common
083	White Stork	non breeding	
149	Steppe Buzzard	non breeding	
173	Hobby Falcon	non breeding	un common
183	Lesser Kestrel	non breeding	
264	Common Sandpiper	non breeding	
265	Green Sandpiper	non breeding	un common
266	Wood Sandpiper	non breeding	un common
269	Marsh Sandpiper	non breeding	
270	Greenshank	non breeding	
272	Curlew Sandpiper	non breeding	
274	Little Stint	non breeding	
284	Ruff	non breeding	
339	Whitewinged Tern	non breeding	un common
374	European Tern	non breeding	un common
377	Redchested Cuckoo	breeding	un common
378	Black Cuckoo	breeding	un common
382	Jacobin Cuckoo	breeding	un common
385	Klaas's Cuckoo	breeding	
386	Diederik Cuckoo	breeding	
404	European Nightjar	non breeding	un common
411	European Swift	non breeding	un common
412	Black Swift	breeding	
415	Whiterumped Swift	breeding	
416	Horus Swift	breeding	un common
417	Little Swift	breeding	
418	Alpine Swift	breeding	
438	European Bee-eater	breeding	
518	European Swallow	non breeding	
520	Whitethroated Swallow	breeding	
523	Pearlbreasted Swallow	breeding	
526	Greater Striped Swallow	breeding	
530	House Martin	non breeding	
534	Banded Martin	breeding	un common
587	Capped Wheatear	breeding	
631	African Marsh Warbler	breeding	un common
633	European Marsh Warbler	non breeding	un common
643	Willow Warbler	non breeding	
689	Spotted Flycatcher	non breeding	
710	Paradise Flycatcher	breeding	

40 Species

GAME BIRDS

Spurwinged goose
Egyptian goose
Duck
Guinea fowl

Francolin
Partridge
Pigeon
Quail

08 Species

RED DATA SPECIES

078 Little Bittern	reporting rate < 2.0 %
083 White Stork	reporting rate < 2.0 to >15.3 %
084 Black Stork	reporting rate < 2.0 to >5.5 - 11.7%
096 Greater Flamingo	reporting rate < 2.0 %
097 Lesser Flamingo	reporting rate < 2.0 %
171 Peregrine Falcon	reporting rate < 2.0 to 3.9 -3.8 %
206 Blackrumped Buttonquail	reporting rate < 1.0 %
215 Ballian's Crake	reporting rate < 1.0 %
230 Kori Bustard	reporting rate < 2.0 to 2.0 - 14.2 %
231 Stanley's Bustard	reporting rate < 2.0 to 6.0 -13.2 %
232 Ludwig's Bustard	reporting rate < 2.0 to 2.0 - 12.4 %
530 House Martin	reporting rate < 2.0 to 2.0 - 4.7 %

12 Species

RED DATA SPECIES STATUS

206 Black Rumped Button Quail endangered

The nominate race occurs in the Southern and South Western Cape as far East as Port Elizabeth.

It is one of the most threatened species in South Africa.

230 Kori Bustard vulnerable

The threats faced by the Kori Bustard are the following :-

Habitat destruction due to crop farming, human encroachment, encroachment due to over stocking, hunting, poisoning, stray dogs and most relative to this impact assessment is their flight, not being very agile in flight they are very susceptible to colliding with the transmission lines.

231 Stanley's Bustard vulnerable

The threats faced by the Stanleys Bustard are the following :-

This species seems to be on the decline due to lose of habitat caused by afforestation, crop farming and high human encroachment, snaring, poisoning, and relative to this assessment colliding with over head lines.

232 Ludwig's Bustard vulnerable

The threats faced by the Ludwig's Bustard are the following :-

Habitat destruction, crop farming, human encroachment and relative to this assessment collisions with over head lines.

078 Little Bittern rare

The threats faced by the Little Bittern are the following :-

Habitat destruction in particular reedbeds and suitable wetlands, also the pollution of suitable habitats, relative to this assesment is it's flight pattern, legs dangling and tends to suddenly bank before alighting which could be detrimental if close to over head lines.

083 White Stork rare

The threats faced by the White Stork are the following :-

Habitat destruction, pesticide contamination, human encroachment and relative to this assessment, prone to collisions with over head transmission power lines.

171 Peregrine Falcon rare

The threats faced by the Peregrine Falcoln are the following :-

Destruction of woodlands,expansion of agriculture.

RED DATA SPECIES STATUS

084 Black Stork indeterminate

The threats faced by the Black Stork are the following :-
Habitat destruction, wetland degradation, flow of rivers, afforestation, threat's from fish farms and relative to this assessment prone to collisions with over head lines.

096 Greater Flamingo I indeterminate

The threats faced by the Greater Flamingo are the following :-Pollutants, obstructions across waterbodies, developments at and around wetlands, low flying aircraft, and relative to this assessment collisions with over head transmission power lines.

097 Lesser Flamingo indeterminate

The threats faced by the Lesser Flamingo are the following :-
Pollutants, degregation of wetlands and water ways, changes in the management of the pans and sewage works, and relative to this assessment collisions with over head lines.

215 Ballions Crake indeterminate

The threats faced by the Ballions Crake are the following :-
Destruction of suitable wetland habitats, disturbance around breeding areas, poisoning of aquatic insects, molluscs and its habitat.

530 House Martin indeterminate

The threats faced by the House Martin are the following :-

No specific threats to the House Martin in South Africa, breeding is sporadic.





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Fritz Van Oudtshoorn Briza Publications	Grasses of Southern Africa
N M Tainton Unsiversity of Natal Press	Veld Management in S.A.
SADC South African Development Community	
IUCN The world Conservation Union SARDC South African Research & Documentation Centre	
Duard Barnard Impact Books CC	Environmental law for all
R F Fuggle-M A Rabie	Environmental Management In South Africa
CWAC Co ordinated Waterbird Counts	
Sanford D Schemnitz	Wildlife Management Techniques
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Gordon Lindsay Maclean	Roberts Birds Of South Africa
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