ESKOM TRANSMISSION

PROPOSED GAMMA SUBSTATION

AVIFAUNAL SPECIALIST STUDY

Report prepared for:

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EXECUTIVE SUMMARY

Eskom Transmission plan to build a new substation east of Victoria West in the Northern Cape, on the farms Uit Vlugt Fontein 233 and Schietkuil 3. ACER (Africa) were appointed to conduct the necessary Environmental Impact Assessment, and subsequently appointed the Endangered Wildlife Trust (EWT) to conduct the avifaunal specialist study.

The quarter degree square within which the proposed substation site falls (3123CB) consists of 51% "nama karoo" and 49% "grassy karoo" according to Harrison *et al* (1997). A total of 80 bird species, three of which are considered "near threatened" (Barnes 2000) were recorded in 3123CB by the Southern African Bird Atlas Project (Harrison *et al* 1997). A number of other bird species, both Red Data and non Red Data, have been recorded in the broader area and could potentially also occur on the site, in spite of not being recorded by the atlas project.

The potential impacts of the proposed substation on the birds of the area are: destruction of habitat, disturbance, electrocution of birds on substation infrastructure, collision of birds with communication tower, impact of birds on the operation of substation. None of these impacts are considered to be of high significance. All construction activities should be undertaken according to generally accepted environmental best practice, with care taken to destroy as little as possible natural vegetation, and to minimise unnecessary disturbance on site. Construction camps should be placed well away from the koppies and the drainage line and dam on Uit Vlugt Fontein if possible. Movements of off duty staff should be strictly managed at all times to minimise impact on local avifauna. Once operational, the substation should be monitored in order to detect any bird electrocutions, bird impacts on the substation, and bird collisions with the communications tower. If necessary, mitigation measures for these impacts can be recommended reactively. The anticipated low significance of these impacts does not warrant implementing mitigation measures proactively.

1 INTRODUCTION

1.1 Background

Eskom Transmission plan to build a new substation east of Victoria West in the Northern Cape on the farms Uit Vlugt Fontein 233 and Schietkuil 3. This substation forms part of the planned 765kV backbone through South Africa. Although a Record of Decision (ROD) has previously been obtained for the substation, the site for the substation has changed, thereby requiring a new ROD. The main consultants, ACER (Africa), were appointed to conduct an Environmental Impact Assessment for the proposed project, in accordance with the relevant environmental legislation. The Endangered Wildlife Trust (EWT) was subsequently appointed by ACER to conduct the specialist avifaunal impact assessment.

An initial site visit was conducted during February 2007 (by helicopter), followed by a more detailed investigation of the study area during May 2007.

Whilst overhead power line infrastructure is known to impact significantly on various bird species, both directly through causing mortality of birds, and indirectly through disturbance of birds and destruction of habitats, direct interaction between birds and substations is much less significant. The most important impact of the proposed substation on birds is likely to be indirect, through disturbance and habitat destruction.

This study will identify these impacts and their significance, and recommend suitable mitigation measures if possible.

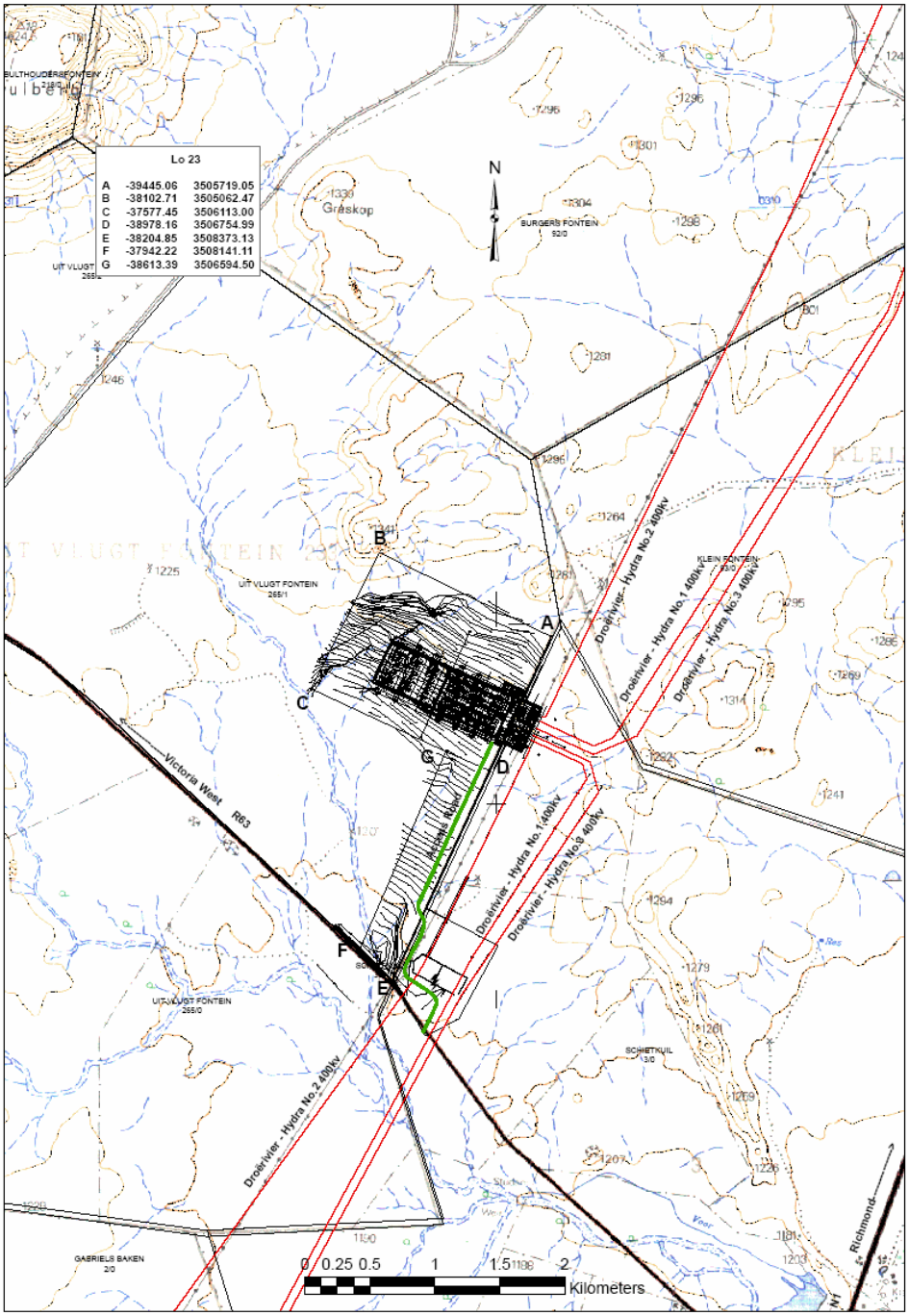
1.2 Terms of reference

The terms of reference for the avifaunal study, as supplied by ACER (Africa) were as follows:

- A description of the current state of avi-fauna in the study area, outlining important characteristics which may be influenced by the proposed infrastructure or which may influence the proposed infrastructure during construction and operation
- The identification of Red Data species potentially affected by the proposed substation
- The identification of potential impacts (positive or negative, including cumulative impacts if relevant) of the proposed development on avi-fauna during construction and operation.
- Particular attention must be paid to wetlands (requiring close interaction with the wetland specialist) and potential impacts on birds of prey and the endangered Blue Crane
- The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be

implemented during design, construction and operation of the proposed infrastructure).

FIGURE 1. The location of the proposed Gamma Substation, just north of the R63 to Victoria West. (Map supplied by ACER Africa).



- The formulation of a simple system to monitor impacts, and their management, based on key indicators
- In addition, the specialist is required to identify any other aspects related to avifauna in the study area that should be incorporated into this EIA.

1.3 Study approach

1.3.1 Sources of information

The study made use of the following data sources:

- Bird distribution data of the Southern African Bird Atlas Project (SABAP – Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown, 1997) obtained from the Avian Demography Unit of the University of Cape Town, in order to ascertain which species occur in the study area ie 3123CB.
- The conservation status of all bird species occurring in the aforementioned degree squares was then determined with the use of The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland (Barnes, 2000).
- A classification of the vegetation types in 3123CB was obtained from Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown (1997).
- Information on the micro-habitat level was obtained through visiting the area and obtaining a first hand perspective.
- Electronic 1:50 000 maps obtained from the Surveyor General
- The study area was investigated remotely using Google Earth to provide a different perspective to that obtained during site visits.
- In predicting the impacts of the proposed substation on birds, a combination of science, field experience and common sense is required. More specifically the methodology used to predict impacts in the current study was as follows:

1.3.2 Methodology

- The various data sets discussed below under "sources of information" were collected.
- This data was examined to determine the location and abundance of sensitive Red Data species as well as non-Red Data species in the study area.
- The proposed substation site was visited to obtain a first-hand perspective of the proposed routes and birdlife and to determine which bird micro-habitats are present and relevant to the study. This involved an initial site visit involving flying over the area with the helicopter, and a second site visit on the ground.
- The impacts of the proposed substation on birds were predicted on the basis of experience in gathering and analysing data on wildlife impacts with power lines throughout southern Africa since 1996 (see

van Rooyen & Ledger 1999 for an overview of methodology), supplemented with first hand data.

1.3.3 Limitations & assumptions

This study made the assumption that the above sources of information are reliable. The following factors may potentially detract from the accuracy of the predicted results:

- The SABAP data covers the period 1986-1997. Bird distribution patterns fluctuate continuously according to availability of food and nesting substrate. (For a full discussion of potential inaccuracies in ASAB data, see Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown, 1997).

General comment: Predictions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can not be reduced to formulas that will hold true under all circumstances. However, impacts can be predicted with a fair amount of certainty, based on experience gained by the authors through the investigation of existing electrical infrastructure.

2 DESCRIPTION OF AFFECTED ENVIRONMENT

2.1 Topography and vegetation

The topography of the study area is relatively flat, partially the reason for its suitability for a substation of this nature. The site is positioned between several smallish kopjes or ridges in the north and east, and a small drainage line in the west and south. There is a slight down slope from the base of the kopjes towards the drainage line.

TABLE 1 and the vegetation description below make extensive use of the work of Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown (1997). The vegetation composition of the quarter degree square covering the site (3123CB) can be seen in TABLE 1 (Harrison *et al* 1997). It is generally accepted within ornithological circles that vegetation structure is more important in determining bird distribution, than the actual species themselves (in Harrison *et al* 1997). The vegetation description below will therefore probably differ from botanical descriptions in that it concentrates on factors relevant to birds, rather than exhaustively listing plant species. Harrison *et al* (1997) present a vegetation classification intermediate between Rutherford and Westfall's 7 biomes (1986) and Acocks' 70 veld types (1953). It is important to note that no new boundaries were created, use was made only of previously published data.

The square 3123CB is composed of Nama karoo (51%) and Grassy Karoo (49%) (Harrison *et al* 1997). It is important to note that the classification shown in TABLE 1 is for the entire quarter degree square, not only for the proposed substation site.

The following is a description of the vegetation types found in the study area, and their relevance to bird species.

2.1.1 Nama karoo

The Nama Karoo vegetation type largely consists of low shrubs and grasses. Trees such as *Acacia karoo* and the exotic mesquite *Prosopis glandulosa* are largely restricted to the watercourses, where they often form dense stands. The Nama Karoo has a much higher proportion of grasses and trees than the Succulent Karoo.

The Karoo (both Succulent and Nama Karoo biomes) supports a high diversity of bird species that are endemic to southern Africa. This is due to the availability of two distinct habitat types in the karoo ie the open areas which support ground dwelling species such as Ludwig's Bustard and Blue Crane, and the watercourses with their taller trees which support species that would normally be found in Arid Woodland – such as the Kori Bustard.

2.1.2 Grassy karoo

Grassy Karoo is basically a transition between the Nama Karoo and Grassland biomes. It is primarily composed of dwarf shrubs, with more grasses and trees than the Nama Karoo. The bird species present in this vegetation type are typical of both Grassland and Karoo biomes, for example the Karoo Korhaan. Several grassland species which have declined due to the loss of grassland habitat, have found refuge in the Grassy Karoo. A prime example of such a species is the Blue Crane, which is present in the broader area despite not being recorded in 3123CB (TABLE 2).

2.2 Micro habitats available to birds on the proposed site

The proposed site is positioned on a slight mid slope consisting of natural karoo vegetation. This micro habitat could support a number of bird species, but is not preferred micro habitat for any Red Data species recorded in the area.

2.3 Relevant bird populations

The primary data source used in determining the distribution and abundance of bird species in the study area was the SABAP Data (Harrison *et al* 1997). TABLE 3 below shows a list of the Red Data bird species recorded in the study area and their report rates (Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown, 1997). Report rates are

essentially an expression (%) of the number of times a species was seen in a square divided by the number of times that square was counted.

Many other Red Data species have been recorded in the broader area, and could occur on the proposed site, despite not being recorded in 3123CB during the atlas period. Examples of these species are: Ludwig's Bustard, Secretarybird, Martial Eagle, Tawny Eagle, Karoo Lark.

TABLE 1. Vegetation composition (%) of the quarter degree squares in the study area (Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown, 1997).

Biome	**Vegetation type**	**3123CB**
Karoo biome	Nama karoo	51
Karoo biome	Grassy karoo	49

It must be noted that many "non Red Data" bird species also occur in the study area and will be impacted on by the substation. Examples of such species are: korhaans, larks, Karoo Robin, pipits, Black-shouldered Kite, Jackal Buzzard, Pale Chanting Goshawk, Rock Kestrel.

Although this impact assessment focuses on Red Data species, the impact on non Red Data species is also assessed, albeit with less emphasis.

TABLE 2. Report rates of Red Data bird species in 3123CB (Harrison *et al* 1997). Report rates are essentially expressions of the number of times a species was recorded as a percentage of the number of times that square was counted ie # cards below.

Species	**Cons. status**	**3123CB**
Total species		80
# cards submitted		10
Black Stork	NT	10
Secretarybird	NT	10
Lanner Falcon	NT	10

cards = the number of counts that were carried out in that quarter degree square.
Total species = the total number of bird species recorded in that quarter degree square
NT = Near-threatened

3 DESCRIPTION OF PROPOSED ACTIVITIES

3.1 Description of the proposed substation and aspects relevant to avi-fauna

The substation itself will make up an area of approximately 60 hectares in total. In this area, the entire surface will be cleared, levelled and covered by a combination of gravel concrete and building infrastructure. In addition, an access road corridor will be built from the R63 which will take

up 80 hectares in total. This road will consist of a tar surface approximately 6m wide and 1.8km long, and presumably a 'road reserve'.

The implications for avifauna are as follows:

- Natural habitat covering an area of approximately 60 hectares, plus a portion of the 80 hectare road access corridor will be totally altered and rendered artificial, and hence almost totally unsuitable to birds. It appears that the access road does not cross the drainage line described above. If this is not the case, the road and its reserve could affect vegetation and hydrology of this drainage line.
- A communication tower will be built at the substation. This potentially poses a collision risk to birds, both through the tower itself and the stay wires supporting it.
- During construction, disturbance levels will be significantly higher in the immediate vicinity than previously. This will consist of machinery, vehicle and other activities.
- During the operational phase, there will be some vehicle activity and hence some disturbance, particularly within the road access corridor.
- Since the substation will ultimately accommodate five incoming and five outgoing lines, there will be construction activities in the vicinity on an ongoing basis for several years.
- Substation infrastructure provides perching and nesting substrate for certain bird species, in particular crows and smaller species such as sparrows, and swallows.
- There is a possibility that species such as crows, and owls could be electrocuted on substation infrastructure.

4 DESCRIPTION OF TYPICAL BIRD INTERACTIONS WITH SUBSTATION INFRASTRUCTURE

4.1 Habitat destruction

During the construction phase of substations, habitat destruction and alteration inevitably takes place on the site. This happens with the construction of access roads, the clearing of the site itself and any associated infrastructure. The substation yard itself has to maintained free of any natural vegetation, to minimise the risk of fire amongst other reasons. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the substation through modification of habitat.

4.2 Disturbance

Similarly, the above mentioned construction and maintenance activities impact on bird through disturbance, particularly during breeding activities.

The potential exists for the impact of disturbance to influence a greater area than the site itself. Of particular concern in this respect is the management and positioning of construction camps for staff.

4.3 Electrocution of birds on substation infrastructure

Since there is live hardware in the substation yard, potential exists for birds to bridge the gap between two phases or a phase and earth, thereby becoming electrocuted. Very few, if any, electrocutions have been reported to the EWT on transmission substations. Species likely to be affected are crows, possibly owls, and other species that are tolerant of disturbance. Small raptors such as Lanner Falcons are sometimes attracted into substation yards in pursuit of species nesting there such as sparrows.

4.4 Collision of birds with communications tower

Tall towers with guy wires are a well known source of avian mortality (Erickson *et al* 2001). In the USA, communication towers have been responsible for mass nocturnal mortality events of migrant birds, with up to 10 000 birds killed in a single night (Evans 1998). The single biggest attractant seems to be the lighting on the towers, with taller, better lit towers responsible for more fatalities. It is speculated that the birds are attracted to the lighted towers, become disoriented and fly around them in a spiral, colliding with the tower, the guy wires, other birds, or falling to the ground in exhaustion (Erickson *et al* 2001). No studies have been conducted on bird fatalities at communication or similar masts in this country, but fatalities are known to have occurred, for example Cape Vultures at the large communications tower on top of Kransberg in the Marekele National Park, which is situated directly above a large Cape Vulture breeding colony (Pat Benson pers.comm).

The situation at the proposed substation is likely to be substantially different from that in the USA. The communication tower is likely to be significantly lower, and the proposed site is not a point of congregation of large numbers of any species, for migration or any other reason.

4.5 Impact of birds on quality of supply

Birds such as sparrows, swallows, and crows are known to utilise substation yards for nesting and roosting. The potential exists then for faults to be caused by nesting material (often includes wire in the case of crows) and bird pollution build up on certain hardware. Extensive bird pollution in the yard is also a nuisance factor for substation operation.

5 IDENTIFICATION OF RISK SOURCES

TABLE 3 shows the impacts mentioned above, assessed according to a set of criteria supplied by ACER (Africa).

All five impacts are adjudged to be of low significance. Mitigation of habitat destruction and disturbance will not easily make a significant difference to these impacts, but can avoid unnecessary levels of the impacts. As a general principle, all construction and maintenance activities for the substation should be undertaken according to generally accepted environmental best practice. Care should be taken not to disturb or degrade the area any more than is absolutely necessary. If any breeding pairs of birds are identified close to the site, the EWT should be notified. Guidelines as to how to manage the situation will then be developed. The construction camp should not be placed near to the drainage line or dam on the property Iut Vlugt Fontein if at all possible. Placement of the camp close to the koppies should also be avoided if possible. This will minimise the impact of disturbance on these micro habitats and the bird species utilising them. Strict control of off duty staff should be maintained at all times. Mitigation of the impacts of electrocution, collision with the tower, and impact on quality of supply, will only need to be implemented if necessary once the substation is operational. Once operational, the substation should be monitored in order to detect any bird electrocutions, bird impacts on the substation, and bird collisions with the communications tower. If necessary, mitigation measures for these impacts can be recommended reactively. The anticipated low significance of these impacts does not warrant implementing mitigation measures from the start.

TABLE 3. Assessment of identified impacts according to criteria supplied by ACER (Africa)

Nature	**Extent**	**Duration**	**Intensity**	**Frequency**	**Probability**	**Significance**	**Confidence**
Habitat destruction	Immediate area of construction	Permanent	Low	Continuous	Definite	Low since the site is not particularly attractive or unique habitat in this landscape. Small species such as larks will be most affected as they have relatively small territories, which may be completely destroyed. Mitigation measures will not affect this impact to any great extent. According to FIGURE 1, the road will not need to cross the drainage line. If this layout is changed, and the drainage line is crossed this will result in destruction of vegetation along this drainage line	High
Disturbance	Small area – radius of 2km	Short term	Medium	During construction	Definite	Low since birds can and will move away from the area temporarily and the site is not particularly attractive or unique as bird habitat. Mitigation measures will not affect this impact to any great extent	High
Electrocution of birds on	Immediate area	Permanent	Low	Intermittent	Improbable	Low significance. Species likely to be affected in	High

substation infrastructure						this way, are crows and other non threatened species. Most Red Data species are sensitive to disturbance and will not enter the yard.	
Collision of birds with communication tower	Immediate area of construction	Permanent	Low	Intermittent	Improbable	Low – since this impact typically occurs with birds at high densities such as during migration. Such congregations of birds at the proposed site is unlikely.	High
Impact on quality of supply	Immediate area	Permanent	Low	Intermittent	Improbable	Low – mitigation will not be possible initially, situation will need to be monitored	High

6 REFERENCES

Acocks, J.P.H. 1953. *Veld types of South Africa*. Memoirs of the Botanical Society of South Africa 28, pp 1-192.

Barnes, K.N. (ed.) 2000. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. BirdLife South Africa: Johannesburg.

Erickson, W.P., Johnson, G.D., Strickland, M.D., Young, D.P., Sernka, K.J., Good, R.E. 2001. Avian collisions with wind turbines: a summary of existing studies and comparison to other sources of avian collision mortality in the United States. National Wind Co-ordinating Committee Resource Document.

Evans, B. 1998. Telecommunications towers affect avian community. Wave-Guide Information, Tower-Related Bird Kill Rates.

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V & Brown, C.J. (eds). 1997. *The atlas of southern African birds*. Vol. 1&2. BirdLife South Africa: Johannesburg.

Low, A.B. & Robelo, A.G. (eds). 1996. *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs and Tourism: Pretoria.

Rutherford, M.C. and R.H. Westfall. 1986. *Biomes of southern Africa – an objective categorization*. Memoirs of the Botanical Survey of South Africa 54, pp 1-98.