PRETORIA STRENGTHENING PROJECT
SPECIALIST AVIFAUNAL ASSESSMENT

SCOPING STUDY
VOLUME 2- PHOEBUS KWAGGA

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PROFFESSIONAL DECLARATION

This study was conducted by Jon Smallie and Luke Strugnell in their capacity as biologists for the Endangered Wildlife Trust (EWT). The EWT are independent consultants to Savannah Environmental (for Eskom Transmission). The EWT has no business, financial, personal or other interest in the activity, application or appeal in respect of which they were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of these specialists performing such work.

Mr. Strugnell conducts all assessments under the supervision of Mr Smallie who is registered with The South African Council for Natural Scientific Professions (400020/06). He has eight years of experience in the field of bird interactions with electrical infrastructure and has conducted avifaunal impact assessments for ten Eskom Transmission projects and approximately thirty Eskom Distribution projects. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

EXECUTIVE SUMMARY

Eskom Transmission Plan to erect new lines and Substations as part of a strengthening program to strengthen electricity supply to Pretoria. The proposed solution, which is known as the **City of Tshwane Electricity Supply Plan Scheme** proposed to build four new substations in the Tshwane area. Three will be built by Eskom and one will be built by Tshwane. These four substations are: Eskom Phoebus substation; Eskom Verwoerdburg substation; Eskom Anderson substation and Tshwane Wildebees substation. Eskom furthermore propose to erect new lines to service these substations.

The Endangered Wildlife Trust (EWT) was contracted by Savannah Environmental to conduct the Avifaunal Specialist study on the above project. A site visit was conducted on the 12th and 13th of May 2009.

This scoping report provides a detailed assessment of the proposed new power lines and the alternatives for each.

The study area is located across two quarter degree squares with 313 and 348 bird species recorded in squares 2528CC and 2528CA respectively. 21 red data species were recorded by the South African Bird Atlas Project (SABAP) with 9 Vulnerable species, 10 Near-Threatened species and two species protected internationally under the Bonn convention.

An assessment of the micro habitat available to avifauna in the study area revealed that the area is predominantly urbanized with informal settlements. There are some small streams but these are heavily degraded. The route also passes over some ridges and open grassland. The species above are all very unlikely to occur on the proposed route, with the exception of the ridge, which may be a flight path for raptors.

No fatal flaws or major impacts have been identified during this scoping study. The route preference is alternative 3 as the most preferred, as it crosses the ridge but in a less sensitive area to alternative 1. Alternative 1 is next most preferred and alternative 2 is least preferred and should be discarded for the EIA phase.

1. INTRODUCTION & BACKGROUND

Eskom Transmission Plan to erect new lines and Substations as part of a strengthening program to strengthen electricity supply to Pretoria. The proposed solution, which is known as the **City of Tshwane Electricity Supply Plan Scheme** proposed to build or upgrade four new substations in the Tshwane area. Three will be built by Eskom and one will be built by Tshwane. These four substations are: Eskom Phoebus substation; Eskom Verwoerdburg substation; Eskom Anderson substation and Tshwane Wildebees substation. Eskom furthermore propose to erect new lines to service these substations.

The Endangered Wildlife Trust (EWT) was contracted by Savannah Environmental to conduct the Avifaunal Specialist study on the above project. A site visit was conducted on the 12th and 13th of May 2009.

In general terms, the impacts that could be associated with a project of this nature include: collision of birds with the overhead cables; electrocution of birds whilst perched on the tower structures; destruction of habitat; disturbance of birds; impact of birds on the power line performance through the streamer and pollution mechanisms and nesting on tower structures.

1.1 Terms of reference

The following terms of reference were utilized for this study:

A scoping study of the identified alternatives for all components of the project must be undertaken. The scoping report must compare the alternatives identified and make a recommendation in terms of the preferred alternative. The scoping report must include:

- A description of the environment that may be affected by the activity and the manner in which it will be affected
- A comparative evaluation of the identified feasible alternatives and nomination of a preferred alternative for consideration in the EIA phase
- Identification of potentially significant impacts to be investigated in the EIA phase and details of the methodology to be used to assess these impacts. This should be detailed enough to include in the Plan of Study for the EIA

1.2 Description of proposed activities

- Construction of 275kV line from Phoebus to Kwagga (30km)

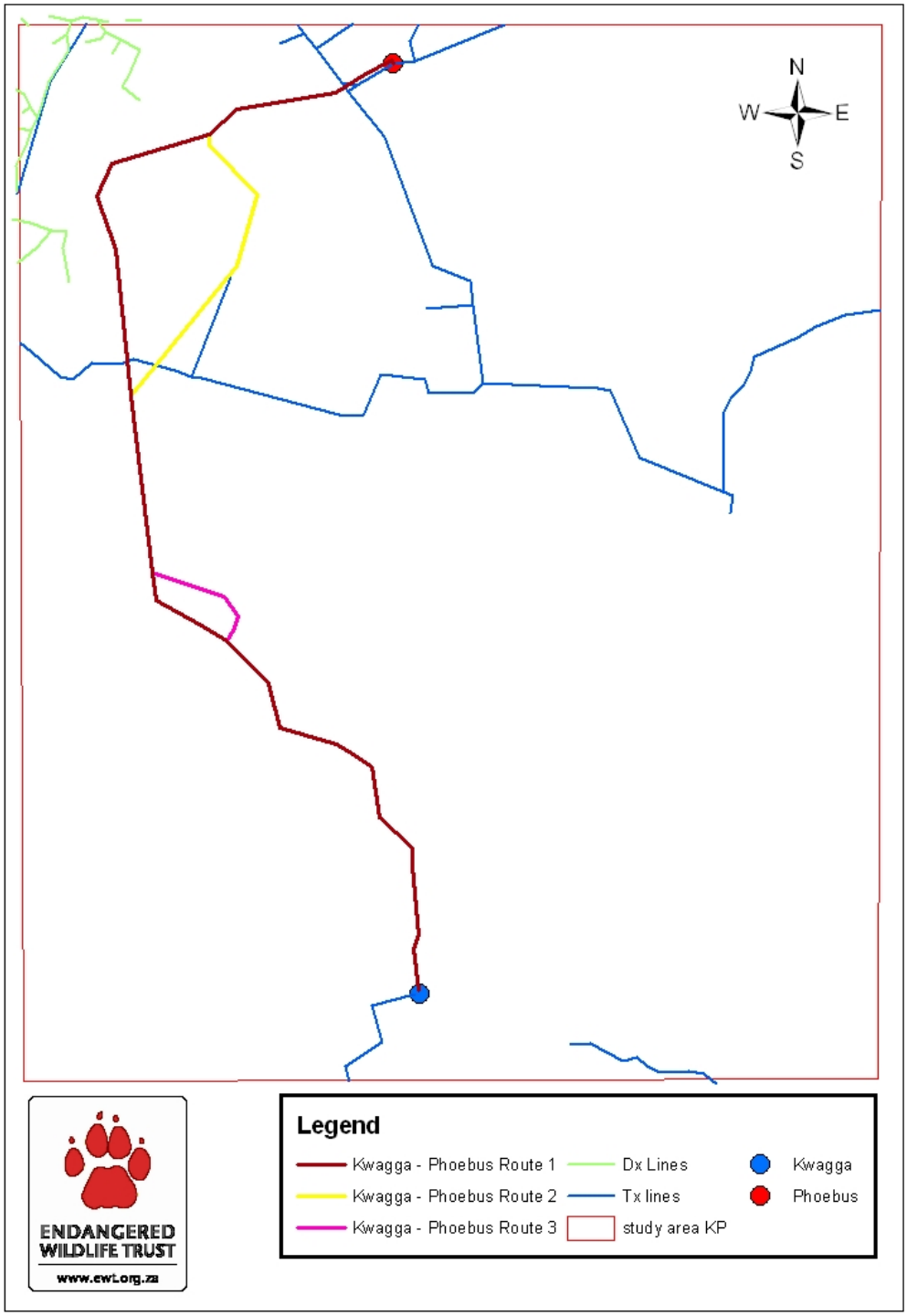

Figure 1. Study area layout showing existing infrastructure and line options (Map-EWT).

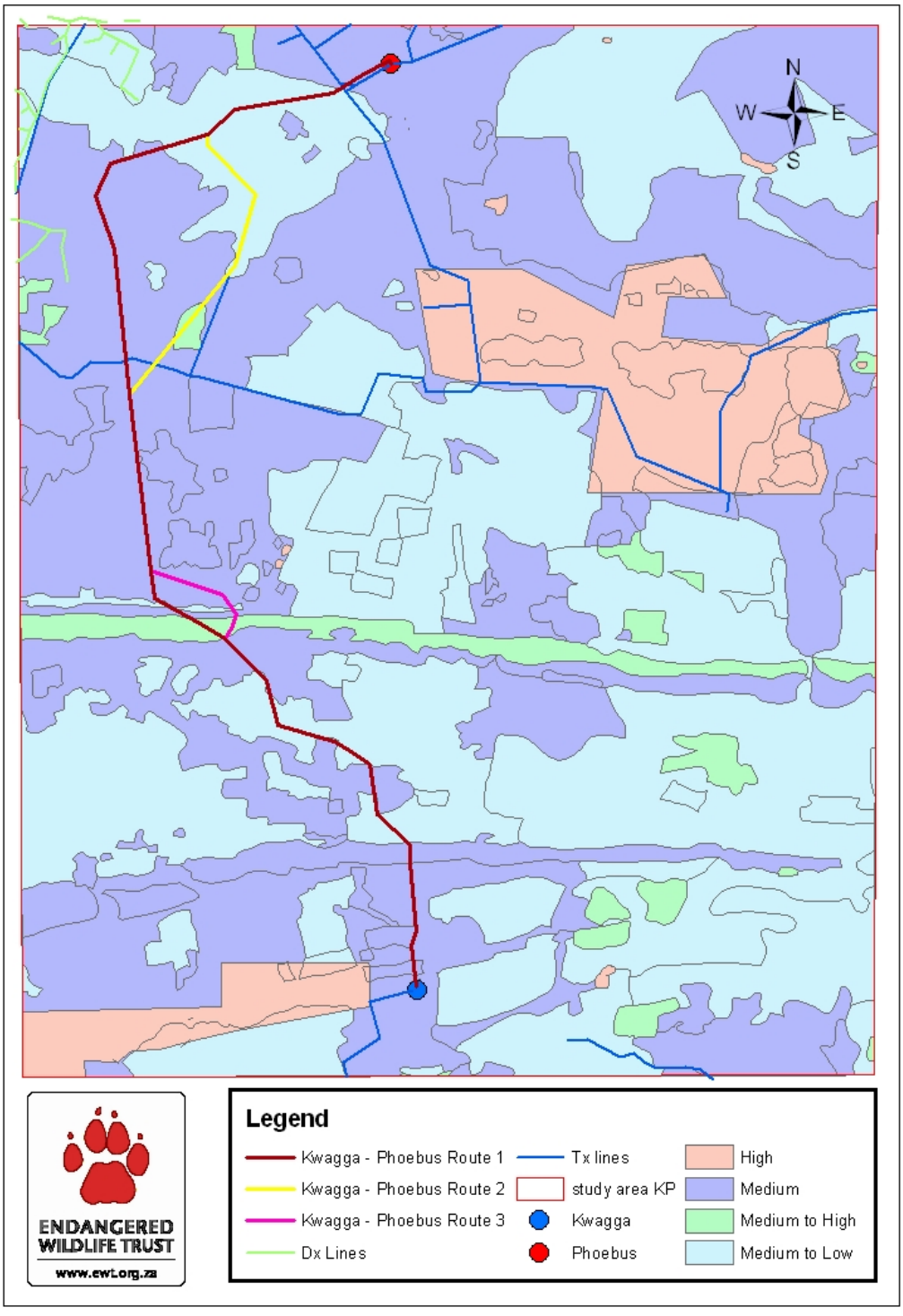

Figure 2- Study area showing Avifaunal sensitive areas as identified in the Pretoria Srategic Environmental Assessment conducted previously by EWT (Map –EWT)

2 GENERAL DESCRIPTION OF AVIAN INTERACTIONS WITH ELECTRICAL INFRASTRUCTURE

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are the electrocution of birds (and other animals) and birds colliding with power lines. Other problems include: electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure; and disturbance and habitat destruction during the construction and maintenance activities associated with electrical infrastructure.

2.1 Electrocution

Electrocution of birds on overhead lines is an emotional issue as well as an important cause of unnatural mortality of raptors and storks. It has attracted plenty of attention in Europe, USA and South Africa (APLIC 1994; van Rooyen and Ledger 1999). However, in the context of overhead lines above 132kV, electrocutions are not of major concern. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Due to the large size of the clearances on most overhead lines above 132kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components.

2.2 Collision

Collision is the biggest single threat posed by transmission lines to birds in southern Africa (van Rooyen 2004). Collision refers to the scenario where a bird collides with the conductors or earth wires of overhead power lines. This occurs because the birds cannot see the cables whilst in flight. Most heavily impacted upon are bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Unfortunately, many of the collision sensitive species are considered threatened (Red Data status) in southern Africa. The Red Data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. These species have not evolved to cope with high adult mortality, with the result that consistently high adult mortalities over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term. It is therefore imperative to reduce any form of unnatural mortality in these species, regardless of how insignificant it might seem at the present moment in time.

2.3 Habitat destruction

During the construction phase and maintenance of power lines and substations, some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the leveling of substation yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude, through the modification of habitat.

2.4 Disturbance

During the construction and maintenance of electrical infrastructure, a certain amount of disturbance results. For shy, sensitive species this can impact on their usual daily activities, particularly whilst breeding. In general terms, one would expect that any species already existing in the study area must surely have adapted to relatively high levels of disturbance.

2.5 Impact of the birds on the proposed power line

There are a number of mechanisms through which birds are able to cause electrical faults on power lines. In the case of a bird streamer induced fault, the fault is caused by the bird releasing a “streamer” of faeces which can constitute an air gap intrusion between the conductor and the earthed structure. The fault appears to flash across the air gap (i.e. between the live conductor and the tower steelwork which is earthed) and *does not* follow an insulator creepage path as observed on pollution faults (See Van Rooyen & Taylor 1999 for an exhaustive analysis of the propagation characteristics of the bird streamer mechanism). Bird species capable of producing large or long streamers are more likely to cause streamer faults. Bird stomach volume is important in this respect. Larger birds such as vultures and eagles are capable of holding larger quantities of food and therefore defecating larger volumes. Bird pollution is a form of pre-deposit pollution. A flashover occurs when an insulator string gets coated with pollutant, which compromises the insulation properties of the string. When the pollutant is wetted, the coating becomes conductive, insulation breakdown occurs and a flashover results. Since this involves a build-up of bird faeces or bird pollution and not a once off event such as a streamer, the size of the bird is less important, although still a factor. Obviously the more an insulator string becomes coated with faeces, the more likely that a fault will occur. Larger birds and congregations of birds are likely to result in heavy pollution of insulator strings. Bird nests may also cause faults through nest material protruding and constituting an air gap intrusion. Crows in particular often incorporate wire and other conductive material into their nests. When nests cause flashovers, the nesting material may catch fire. This in turn can lead to equipment damage or a general veld fire. Apart from the cost of

replacing damaged equipment, the resultant veld fire can lead to claims for damages from landowners.

3 METHODOLOGY

3.1 Information sources used

The following information sources were consulted in order to conduct this study:

- Bird distribution data of the Southern African Bird Atlas Project (SABAP – Harrison *et al,* 1997) was obtained for the two quarter degree squares which cover the study area, from the Avian Demography Unit of the University of Cape Town, as a means to ascertain which species occur within the study area.
- The conservation status of all bird species occurring in the aforementioned quarter degree squares was 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 the study area was obtained from (Mucina and Rutherford, 2006)
- Google Earth was used to examine the study area.
- The Strategic Environmental Assessment for the Pretoria Field Service Area Electrification Master Plan, Diamond, M. 2008

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 SABAP data, see Harrison *et al,* 1997.

3.2 Strategic Environmental Assessment

The Strategic Environmental Assessment (SEA) was compiled in April 2008 for avian sensitivity zones for the Pretoria Field Service Area network master plan. The study area extends from the Midrand area in the south to Pylkom and Klipvoorstad in the north, Ekangala and Bronkhorstspruit in the east and Tantana in the west and includes the current study site.

The study area was classified according to five sensitivity ratings (sensitivity ratings indicated in brackets):

- HIGH SENSITIVITY - conservation areas, CWAC sites, IBA's, wetlands, dams and pans (5)
- MEDIUM-HIGH SENSITIVITY – rivers, grassland (4)
- MEDIUM SENSITIVITY – woodland, thicket and cultivated fields (3)

- MEDIUM-LOW SENSITIVITY - urbanised areas, mines and quarries, dongas, eroded areas (2)
- LOW SENSITIVITY – no areas were classified under this category (1)

The results of this SEA were used to analyse the current study site and proposed alignments.

4. DESCRIPTION OF RECEIVING ENVIRONMENT

4.1. Vegetation and land use

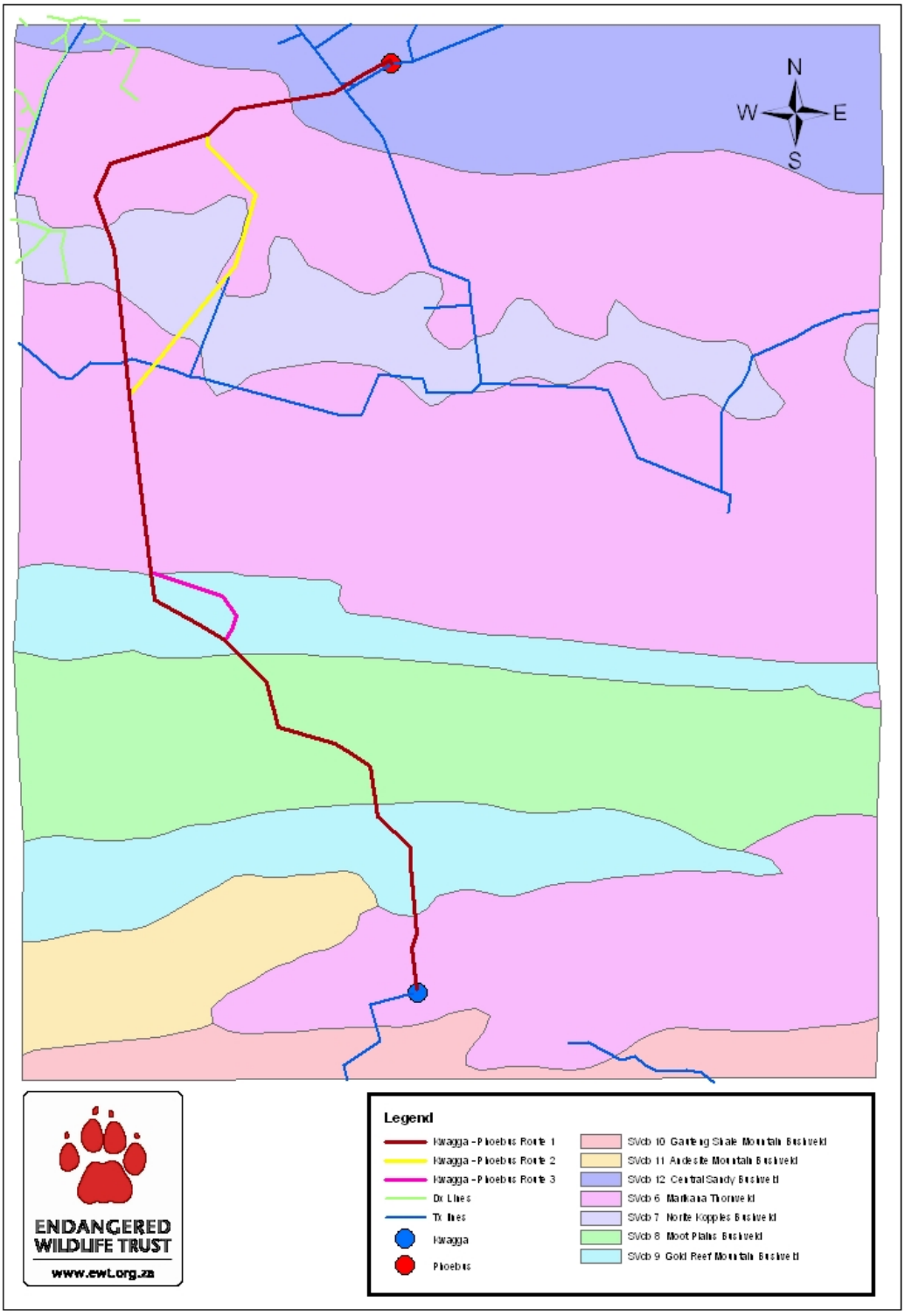

Figure 4- Vegetation classification according to (Mucina and Rutherford, 2006) (Map –EWT)

Since the study area is predominantly urban, a description of the vegetation classification is not very meaningful, since much of the vegetation is already transformed, with the remaining natural vegetation in small patches.

Perhaps more important than the vegetation classification, is an examination of the micro habitats available to birds. These are generally evident at a much smaller spatial scale than the vegetation types, and are determined by a host of factors such as vegetation type, topography, land use and man-made infrastructure.

The micro habitats identified in this study area are described below and have been taken into account in identifying the sensitive areas within this study area.

Grassland Patches: These open areas represent a significant feeding area for many bird species in densely populated areas. Specifically, these open grassland patches typically attract korhaans, storks, and many other power line sensitive species (Secretarybird, Blue Crane and Lanner Falcon). The low reporting rate for these species (TABLE 1 - Harrison *et al* 1997) is evidence of the impact that the surrounding developments are having on the birds that would, under optimum conditions, inhabit these open areas.

Figure 5- Typical grassland patches in the study area with the ridge in the background

Wetlands, rivers and drainage lines: Wetlands are of particular importance for birds in the study area, as the area is largely urbanized, however these are very degraded as can be seen below.

Figure 6- Degraded stream

Stands of Eucalyptus trees: Although stands of Eucalyptus are strictly speaking invader species, these stands have become important refuges for certain species of raptors. In particular, large Eucalyptus trees are used by the migratory Lesser Kestrels for roosting purposes, although no known roost sites exist in the study area.

Figure 7- Stands of exotic trees

Figure 8- Route of lines to Kwagga Substation (visible in the distance)

4.2. Relevant bird populations

Total Cards		574	627		
Total Species		348	313		
Total Breeding Species		116	123		
Name	**Conservation status**	**2528CA**	**2528CC**	**Habitat**	**Likelihood of occurrence**
Cape Vulture	VU	2	0	Mostly mountainous country, or open country with inselbergs and escarpments; less commonly in savanna or desert	Unlikely
Tawny Eagle	VU	0		Woodland and savanna to semi-arid savanna or grassland with scattered Acacia trees	Unlikely
Martial Eagle	VU		0	Woodland, savanna or grassland with clumps of large trees or power pylons for nest sites	Unlikely
African Marsh-Harrier	VU	1	0	Marsh, vlei, grassland (usually near water); may hunt over grassland, cultivated lands and open savanna	Unlikely
Lesser Kestrel	VU	1	1	Open grassveld, mainly on highveld, usually near towns or farms	Unlikely
Blue Crane	VU	1	3	Midland and highland grassveld, edge of karoo, cultivated land, edges of vleis	Unlikely
African Finfoot	VU		0	Quiet reaches of streams, rivers, pans and lakes, fringed with dense trees and bush drooping into water	Highly Unlikely
White-bellied Korhaan	VU		0	Open grassland; sometimes in sparse *Acacia* thornveld	Unlikely
African Grass-Owl	VU		2	Long grass, usually near water, vleis, marshes	Unlikely
Black Stork	NT	1	0	Feeds in or around marshes, dams, rivers and estuaries; breeds in mountainous regions	Unlikely
Marabou Stork	NT	0		Open to semi-arid woodland, bushveld, fishing villages, rubbish tips, lake shores	Possible
Yellow-billed Stork	NT	1	0	Mainly inland waters; rivers, dams, pans, floodplains, marshes; less often estuaries	Unlikely
Greater Flamingo	NT	0		Large bodies of shallow water, both inland and coastal; saline and brackish waters preferred	Unlikely
Secretarybird	NT	0		Semidesert, grassland, savanna, open woodland, farmland, mountain slopes	Unlikely
Ayres Hawk-Eagle	NT	3	0	Dense woodland, forest edge, *Eucalyptus* groves in towns; avoids arid zones	Unlikely
Lanner Falcon	NT	1	1	Mountains or open country from semidesert to woodland and agricultural land; also cities	Unlikely
Greater Painted-snipe	NT	0		Marshes, swamps, edges of lakes, dams, ponds and streams, with marginal vegetation.	Unlikely
Half-collared Kingfisher	NT	0	1	Fast-flowing perennial streams, rivers and estuaries, usually with dense marginal vegetation	Unlikely
Melodious Lark	NT		0	Open climax grassland,sometimes with rocky outcrops, termite mounds or sparse bushes; also cultivated fields	Unlikely
White Stork	Bonn	1	2	Highveld grasslands, mountain meadows, cultivated lands, marshes, karoo	Unlikely
Abdims Stork	Bonn	3	5	Mainly highveld grassland; also semi-arid Kalahari (especially after rain), cultivated lands, inland waters	Unlikely

VU=Vulnerable; NT= Near Threatened; Bonn= Protected under the Bonn Convention

TABLE 1- Red Data species report rates for the two quarter degree squares which cover the study area (Harrison *et al*, 1997)

Report rates are essentially an expression of the number of times a species was recorded in a square, as a percentage of the number of times that square was counted. A report rate of 0 means that the species was recorded in the square, but at a very low frequency. It is important to note that these species could have been recorded anywhere in each square, and not necessarily in the exact study area.

Table 1 shows the recorded red data species In the study area, and their habitat requirements and likelihood of occurrence. Most of these species will probably not occur in the study area due to the large amount of disturbance and habitat degradation. The only exception is the Marabou Stork, which maybe attracted by such conditions. One area where the habitat is still undisturbed would be the ridge and this area will thus be of greater concern.

5 EVALUATION OF IMPACTS

Electrocutions

Electrocutions are not possible on the larger transmission lines such as this line as the relevant clearances between live parts and live and earthed components exceed the wingspan of any bird. Thus this impact will not exist and is not discussed any further.

Collisions

Collisions will be one of the major impacts of the transmission lines. Collisions will mainly impact on the larger slower flying birds, the flamingoes and storks for example. This impact will not be significant as the study area is heavily degraded and the likelihood of finding these species within close proximity to the line will be slight as shown in last column in table 1. Furthermore the report rates of these species are low. This impact will be further studied and quantified during the EIA phase

Habitat destruction

The entire area is disturbed and degraded and as such this is not seen as a significant impact. Should the preferred route be followed this impact should be very low. These impacts, however, will be assessed in further detail in the EIA phase. The one exception is the ridge which is likely to still be in relatively pristine condition, and is unavoidable.

Disturbance

Again this impact is likely to be very low considering the area and the level of disturbance already present. This will however be assessed further during the EIA phase.

Faulting caused by birds

Birds that could cause faulting are in very low abundance in this area and thus this would not be a very significant impact. Although the towers will be higher than the surrounding vegetation and

therefore an attractive roost and perch site for certain species, the disturbance of the area and low abundance of these larger species means this impact would be improbable.

6 COMPARISON OF ALTERNATIVES

Transmission Line Evaluation:

Alternative 1:

- Starts at Phoebus Substation and heads south west for approximately 6.5km
- Heads south crossing the N4 highway
- Then heads south east for approximately 8km
- Runs into Kwagga Substation for 3km in a southerly direction
- Northern section of this route is between informal settlements, which is an advantage for avifauna as sensitive species are unlikely to occur here
- After crossing the N4 this route follows the road for the majority of the route, which is also an advantage for avifauna as the disturbance from the road makes it less likely that sensitive species would frequent the area.
- Crosses a ridge 7km north of Kwagga Substation, which is negative for avifauna as it is a relatively undisturbed area with un-spoilt vegetation, and may serve as a flight path for raptors along the ridge.
- The majority of the route has been classified as medium sensitivity in the SEA with some medium to low areas as well as one medium to high area (the ridge). This is an advantage to avifauna in that most of the route is only medium sensitivity and those areas of higher sensitivity are very small.

Alternative 2:

- Splits off from alternative 1 approximately 4km south west of Phoebus Substation
- Makes an easterly loop and joins back onto alternative 1 just south of the R566 road
- Runs between the informal settlement for the majority of the route, which is an advantage to avifauna as sensitive species are unlikely to occur here
- Follows a stream for the majority of the route, which is negative for avifauna as certain species may occur here.
- The majority of this route has been classified as medium to low and medium sensitivity in the SEA. This route, however, does have an additional area classified as medium to high in the SEA and this is a disadvantage to avifauna.

Alternative 3:

- Splits off from alternative 1 just south of the Brits road
- Makes an easterly loop and joins back onto alternative 1 just south west of the M17 road
- Crosses a ridge and some agricultural land which is negative for avifauna as it may serve as a flight path for raptors along the ridge.

- As this alternative is very small the avifaunal sensitivity as identified in the SEA is the same as alternative 1.

In order to rank these alternatives a table was compiled and the three alternatives given a rating on a scale of 1 to 5, with 1 being the least preferred and 5 being the most highly preferred option.

Alternative	**Preference Rating**
1	3
2	2
3	3

Table 2- Preference rating for the 3 route alternatives

It is clear from the above table that alternative 1 and 3 are the two preferred options although neither are ideal as they both cross the ridge. There is no significant difference between the two as alternative 3 is very short and crosses the ridge in almost the same place, and has the same sensitivity rating in the SEA. Alternative 2 is least preferred and should be discarded for the EIA phase.

7 CONCLUSION

No significant impacts or fatal flaws have been identified at this stage. The routes outlined in this report should be further studied at EIA phase and the impacts assessed in greater detail.

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