# BIRD IMPACT ASSESSMENT STUDY

## Eskom Distribution Northern Region

### BULGE - DORSET 132kV POWER LINE


## JULY 2011

**Prepared by:**

Chris van Rooyen Consulting
30 Roosevelt Street
Robindale
Randburg
2194
South Africa
Tel. International: +27824549570
Tel. Local: 0824549570
Fax: 0866405205
Email: vanrooyen.chris@gmail.com

## EXECUTIVE SUMMARY

Eskom Northern Region Distribution is planning on constructing a new, 132kV Bulge-Dorset distribution power line between Bulgerivier and Visgat near Vaalwater in Limpopo. The line will run in a west-east direction between the authorised Bulgerivier Substation and the authorised Dorset Substation and will be approximately 52km long. This study deals only with the proposed power line.

The terms of reference for the bird impact assessment study are as follows:

- Describe the affected environment.
- Indicate how birdlife will be affected.
- Discuss gaps in baseline data.
- List and describe the expected impacts.
- Assess and evaluate the potential impacts.
- Recommend mitigation measures if need be.

The habitat surrounding the proposed power line comprises mostly undisturbed woodland, with limited existing impacts which consist mostly of a number of reticulation lines, fences and dirt roads. As a result it supports a number of power line sensitive species, particularly raptor species currently Red Data listed (see TABLE 2). The impact of the proposed line on the natural habitat (and therefore potentially on power line sensitive Red Data species) would be limited if it is placed next to existing linear impacts, particularly dirt roads, as is the case with alternative 1 and 2. Alternative 3 and 4 have a few sections where it deviates from existing dirt roads, which will have a bigger impact on the natural woodland vegetation. If alternative 2 is selected, the impact of the clearing of vegetation for the new line would be slightly less than if the line was partially constructed in undisturbed woodland, as would be the case with alternatives 3 and 4, and to a much lesser extent with alternative 1. The impact on smaller, non-Red Data species that are potentially breeding in the area that will be cleared for the new power line will be local in extent, in that it will not affect regional or national populations in any significant way.

The proposed construction of the new power line should have a **LOW** habitat transformation impact from an avifaunal perspective, especially if **alternative 2** is used. If **alternative 1** is used, the impact would be **MEDIUM-LOW**, as it would involve more extensive clearing of undisturbed woodland. With **alternative 3 and 4**, the impact will be **MEDIUM,** as it would require more extensive clearing of woodland than the other.

The majority of species listed in Table 2 are all vulnerable to collisions with power lines. In the case of water-associated birds such as the Black Stork, Yellow-billed Stork and African Marsh-Harrier the drainage lines, and specifically the pools in the larger rivers such as the Mokolo and Malmanies, which are in the study area, might potentially hold some attraction to these species. The new line will cross these drainage lines and might be a potential cause of collisions for these species and other, non-Red Data species such as certain species of ducks, waders and possibly Hamerkops *Scopus umbretta*. Species such as Kori Bustard and Secretarybird are known to be vulnerable to collisions with power lines, and the risk would be higher where the proposed alignments cross open habitat, especially old lands. The collision risk should therefore be regarded as **MEDIUM-HIGH** along some sections of the proposed power line alignments (see APPENDIX B).

A mono-pole steel pole will be used for the new 132kV line. Clearance between phases on the same side of the pole structure is normally around 2.2m for this type of design, and the clearance on strain structures is 1.8m. This clearance should be sufficient to prevent phase – phase electrocutions of birds on the towers. The length of the stand-off insulators is likely to be about 1.5 metres. This is relevant as birds such as vultures are able to touch both the conductor and the earthed pole simultaneously potentially resulting in a phase – earth electrocution. This is particularly likely when more than one bird sits on the same pole.

Although not recorded in large numbers, it is likely that White-backed and Cape Vultures forage in the area (Cape Vultures have been recorded in 2427BA by SABAP1, and White-backed Vulture were recorded in 2427BB by SABAP1 and during the helicopter fly-over). There are cattle and game in the area surrounding area, and should a carcass be available to the birds, they might attempt to roost on the poles. The risk of phase-earth electrocution is therefore evaluated to be **MEDIUM**. It should be mentioned that the pole design holds no inherent electrocution risk for other large **non-gregarious** species such as eagles, as they almost never perch together in large numbers next to each other.

## CONCLUSIONS

The construction of the proposed 132kV Bulge-Dorset power line should pose a limited threat to the birds. The power line poses a **medium-high** collision risk, mostly to water associated species, and those species attracted to open habitats, particularly old lands. The line will pose a **medium** electrocution risk, in particular to vultures. The proposed construction of the new power line should have a **low** habitat transformation impact from an avifaunal perspective, especially if **alternative 2** is used. If **alternative 1** is used, the impact would be **medium-low**, as it would involve more extensive clearing of undisturbed woodland. With **alternative 3 and 4**, the impact will be **medium,** as it would require more extensive clearing of woodland than the other.

## RECOMMENDATIONS

- Power line: The span that crosses drainage lines and old lands should be marked with Bird Flight Diverters on the earth wire of the line, five metres apart, alternating black and white (see APPENDIX B Sensitivity map for the area to be marked with Bird Flight Diverters). APPENDIX C indicates the preferred Bird Flight Diverters to be used.
- Poles: The poles should be fitted with bird perches on top of the poles to draw birds, particularly vultures, away from the potentially risky insulators (see Figure 3 below).

## 1. INTRODUCTION & BACKGROUND

Eskom Northern Region Distribution is planning on constructing a new, 132kV Bulge-Dorset distribution power line between Bulgerivier and Visgat near Vaalwater in Limpopo. The line will run in a west-east direction between the authorised Bulgerivier Substation and the authorised Dorset Substation and will be approximately 52km long. This study deals only with the proposed power line.

Texture Environmental Consultants was appointed by Eskom to compile the Environmental Impact Assessment (EIA) for the construction of the new power line and substation. Chris van Rooyen Consulting was appointed by Texture to assess the potential impacts of the proposed power line on birds.

Figures 1-4 below indicate where the proposed alternatives for the new power line, as well as the new Bulgerivier and Dorset Substations, will be situated.

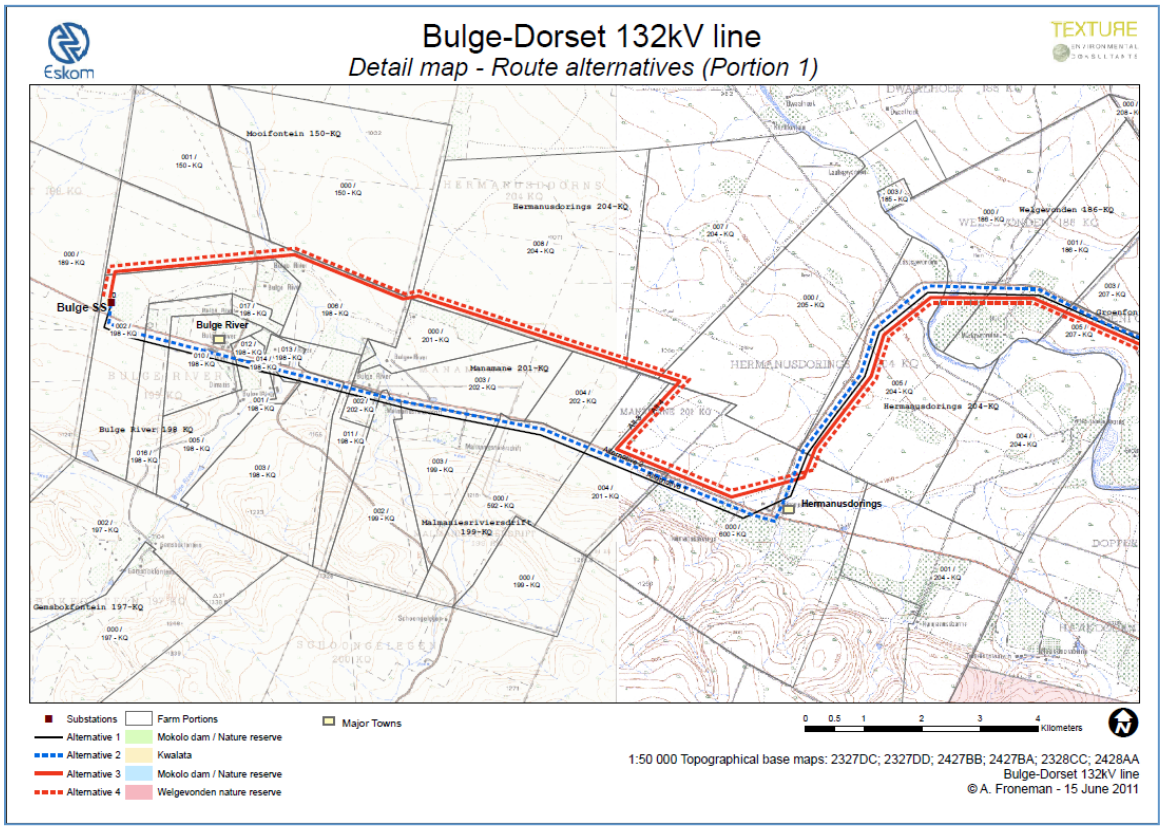

Figure 1: Portion 1 of the proposed alignments

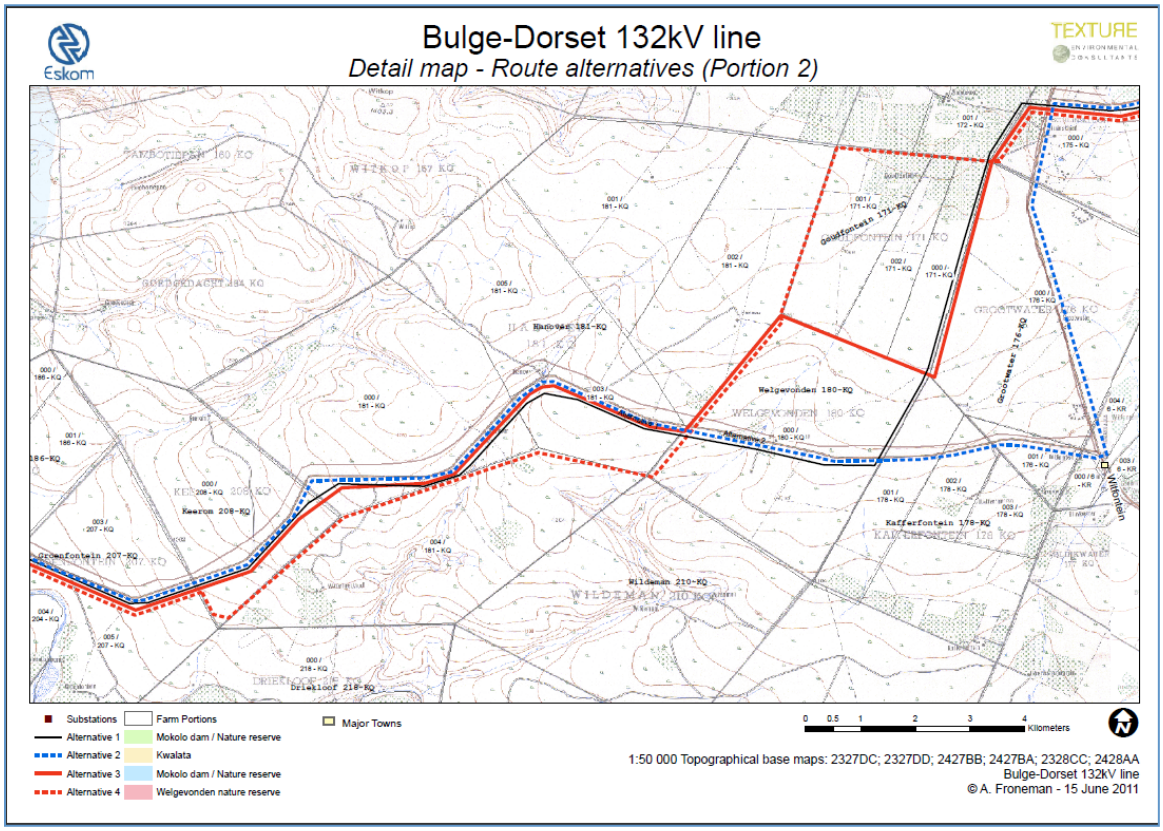


Figure 2: Portion 2 of the proposed alignments

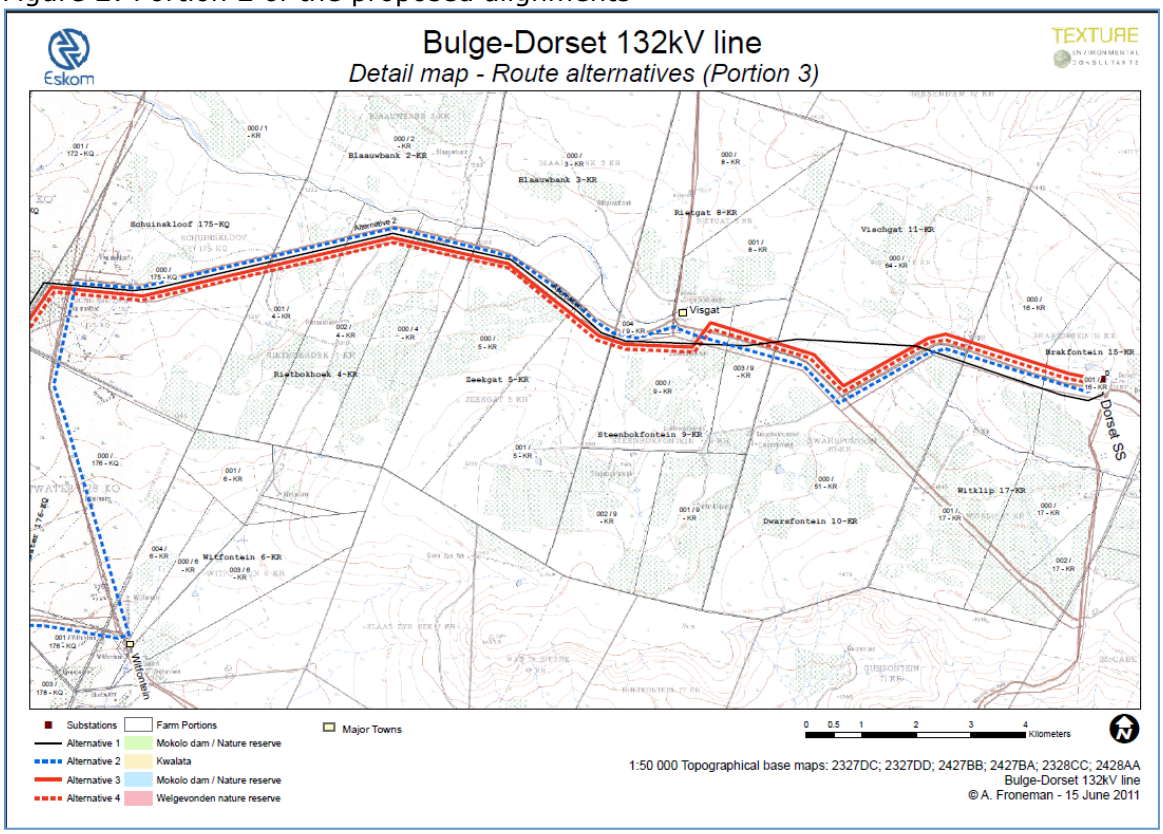


Figure 3: Portion 3 of the proposed alignments

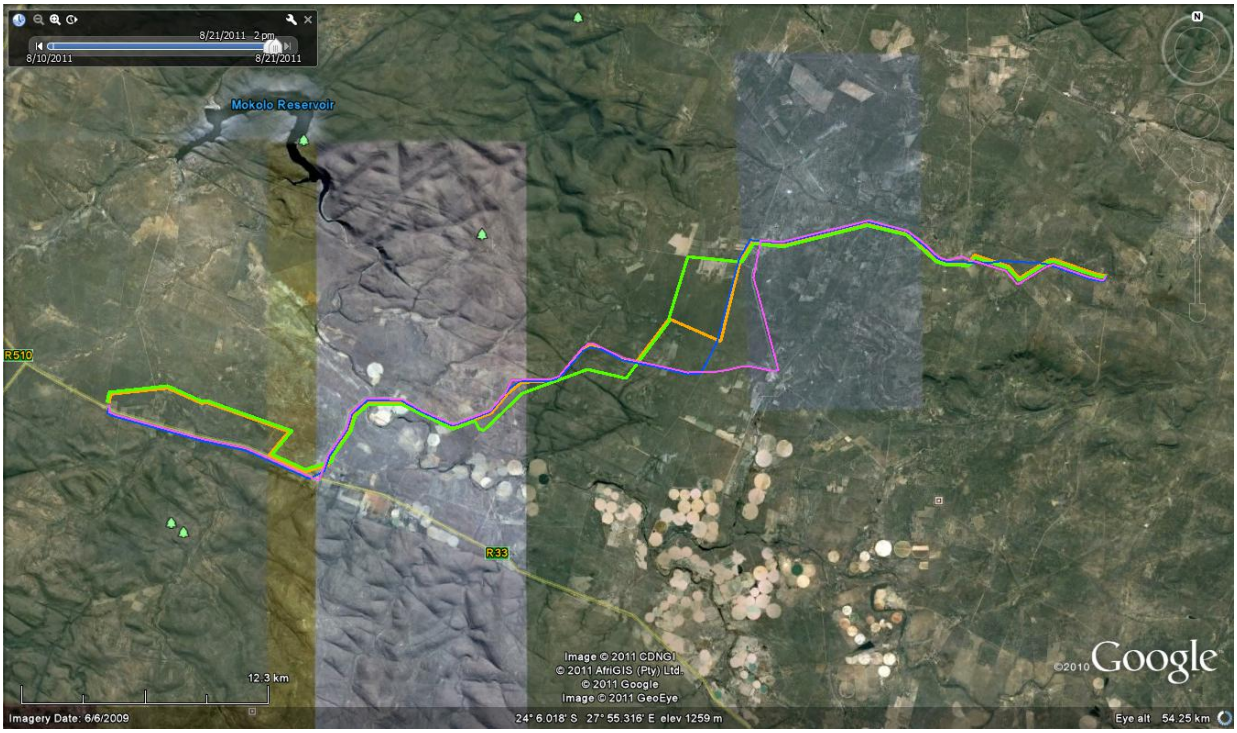


Figure 4: Satellite map of the study area. Blue line = alternative 1. Purple line = alternative 2. Orange line = alternative 3. Green line = alternative 4.

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- Indicate how birdlife will be affected.
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## 1 Sources of information

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

- Bird distribution data of the Southern African Bird Atlas Project 1 and 2 (SABAP1 and SABAP2)(http://sabap2.adu.org.za) was obtained for the quarter-degree grid cells (the equivalent of a 1:50 000 map) traversed by the proposed line, namely 2427BA, 2427BB and 2428AA. The conservation status of all species considered likely to occur in the area was determined as per the most recent iteration of the southern African Red Data list for birds (Barnes 2000), and the most recent and comprehensive summary of southern African bird biology (Hockey *et al.* 2005).
- The author has travelled and worked extensively on power line projects in the Limpopo Province since 1996. Personal observations of avifauna and bird/habitat associations have therefore also been used to supplement the data that is available from SABAP1 and 2, including sightings made during the field trip in December 2010 and June 2011.

- The power line bird mortality incident database of the Eskom - Endangered Wildlife Trust Strategic Partnership (1996 to 2007) was consulted to determine which of the species occurring in the study area are typically impacted upon by power lines and the extent to which they are impacted on.
- A classification of the vegetation types in the quarter degree square was obtained from the Southern African Bird Atlas Project 1 (SABAP1, Harrison *et al.* (1997).
- Information on the micro habitat level was obtained through visiting the area in December 2010 and June 2011 and obtaining a first-hand perspective. The site visit included a helicopter fly-over of the study area. Micro habitats were identified using a combination of ornithological and ecological experience of avifaunal/habitat associations.

### 1.2 Assumptions & Limitations

The following assumptions and limitations are applicable to this study:

- In this instance the 2427BA, 2427BB and 2428AA quarter degree grid cells were not particularly well covered with data being recorded on only 6, 5 and 19 SABAP2 checklists to date. In view of this, the list of Red Data species that could be encountered was supplemented with observations and general knowledge of the area by the author, by consulting species lists for adjacent quarter degree squares with similar habitat, and by consulting the Southern African Bird Atlas Project 1 (SABAP1 – Harrison *et al* 1997).
- Predictions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will hold true under all circumstances. However, power line and substation impacts can be predicted with a fair amount of certainty, based on experience gained by the author through the ongoing investigation of localities in southern Africa, since 1996, where birds have interacted with electrical infrastructure.
- It is important to note that, although the predicted impacts are mostly concerned with Red Data species, the non Red Data species will benefit as much from the proposed mitigation measures as they share the same habitat and face the same impacts as the Red Data species.

## 2 DESCRIPTION OF AFFECTED ENVIRONMENT

### 2.1 Vegetation description

It is widely accepted that vegetation structure is more critical in determining bird habitat, than the actual plant species composition (in Harrison *et al* 1997). The description of vegetation presented in this study therefore concentrates on factors relevant to the bird species present, and is not an exhaustive list of plant species present. The table below shows the vegetation composition of the two relevant quarter degree grid cells (Harrison *et al* 1997).

TABLE 1. Percentage composition of each quarter degree grid cell in terms of vegetation types along the proposed alignments (Harrison *et al* 1997).

| Vegetation type | 2427BA | 2427BB | 2428AA |
|---|---|---|---|
| Moist Woodland | 100% | 100% | 100% |

#### 2.1.1 Woodland

Woodland (or savanna) is the dominant vegetation type in the study area and it is defined as having a grassy under-storey and a distinct woody upper-storey of trees and tall shrubs (Harrison *et al* 1997). Moist woodland comprises predominantly broadleaved, winter deciduous woodland. Soil types are varied but are generally nutrient poor. The woodland biome contains a large variety of bird species (it is the most species-rich community in southern Africa) but very few bird species are restricted to this biome. It is also relatively well conserved compared to the grassland biome. The woodland biome is particularly rich in large raptors, and forms the stronghold of power line sensitive Red Data species such as White-backed Vulture *Gyps africanus*, Cape Vulture *Gyps coprotheres*, Martial Eagle *Polemaetus bellicosus*, Tawny Eagle *Aquila rapax*, and Lappet-faced Vulture *Torgos tracheliotis*. Apart from Red Data species, it also serves as the stronghold of several non-Red Data raptor species, such as the Brown Snake-Eagle *Circaetus cinereus*, Black-chested Snake-Eagle *Circaetus pectoralis*, and a multitude of medium-sized raptors for example the migratory Steppe Buzzard *Buteo vulpinus*, African Harrier Hawk (Gymnogene) *Polyboroides typus*, Wahlberg's Eagle *Aquila wahlbergi* and African Hawk-Eagle *Aquila spilogaster*. Apart from raptors, woodland in its undisturbed state is suitable for a wide range of other power line sensitive birds, including the Kori Bustard *Ardeotis kori*.

The vast majority of the bird habitat in the study area comprises woodland which is relatively well preserved with little evident transformation of the natural habitat. It can therefore be assumed that most of the power lines sensitive species mentioned in the preceding paragraph should still be found in the study area, ranging from residents to occasional visitors (see also TABLE 2 in this respect).

### 2.2 Bird micro-habitats

Whilst much of the bird species distribution in the study area can be explained in terms of the above broad vegetation description (based on the quarter degree grid cells), there are many differences in bird species distribution and density that correspond to differences in habitat at the micro level. These "bird micro-habitats" are evident at a much smaller spatial scale than the broader vegetation types or biomes, and can largely only be identified through a combination of field investigation and experience.

The following bird micro-habitats, within the broader woodland habitat, were identified during the field investigation (see APPENDIX A for examples of the micro-habitat).

#### 2.2.1 Agricultural lands

Limited crop cultivation was practiced in the study area in the past, resulting large areas where the trees were cleared to make way for cereal crops. This practice is not widely followed anymore, and most of these areas have now reverted back to a form of grassland with scattered trees. There are a few irrigated pivots, mostly along the Mokolo River. Red Data power line sensitive species that could be attracted to this type of habitat include Secretarybird *Sagittarius serpentarius* and Kori Bustard *Ardeotis kori.* Other power line sensitive non-Red Data species that could also be attracted to these areas are various raptors, including Black-chested Snake-Eagle and Steppe Buzzard.

2.2.2 Rivers or drainage lines

Most rivers in southern Africa are in the east and extreme south, in the higher rainfall areas. Thirteen species of water bird are mostly restricted to riverine habitat in southern Africa. The map distribution of these species correlates with the river courses in southern Africa. The prominent rivers that occur within the study area, are the Bulge, Mokolo and Malmanies. Some Red Data species listed in TABLE 2 could potentially occur along these rivers, these include all the storks, Half-collared Kingfisher *Alcedo semitorquata* and White-backed Night-Heron *Gorsachius leuconotus*. Rivers are extremely important sources of water for most bird species and will be regularly utilised not only as a source of drinking water and food, but also for bathing. Large trees in the riparian zone are also important for roosting and breeding raptors.

2.2.3 Dams

Many thousands of earthen and other dams exist in the southern African landscape. Whilst dams have altered flow patterns of streams and rivers, and affected many bird species detrimentally, a number of species have benefited from their construction. The construction of these dams has probably resulted in a range expansion for many water bird species that were formerly restricted to areas of higher rainfall. Man made impoundments, although artificial in nature, can be very important for variety of birds, particularly waterbirds. Apart from the water quality, the structure of the dam, and specifically the margins and the associated shoreline and vegetation, plays a big role in determining the species that will be attracted to the dam. In this instance, there are several small dams in the study area. Several Red Data species listed in TABLE 2 could potentially occur at these dams, particularly the storks. Raptors could also be attracted to shallow sloping dams for bathing and drinking purposes.

## 2.3 Bird species present in the study area

TABLE 2 below lists the Red Data species that may occur in the three relevant quarter degree grid cells in which the study area is situated.