

# GALAGO ENVIRONMENTAL



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## *Avifauna Assessment*

*of*

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## **KYALAMI PIPELINE GROUP**

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### VERIFICATION STATEMENT

Mr R. Geysler is not registered as a Professional Natural Scientist with the S.A. Council for Natural Scientific Professions. This statement serves to verify that the bird report compiled by Mr R.F. Geysler has been prepared under my supervision, and I have verified the contents thereof.

**Declaration of Independence:** I, Alan Charles Kemp (4405075033081), declare that I:

- am committed to biodiversity conservation but concomitantly recognize the need for economic development. Whereas I appreciate the opportunity to also learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them
- abide by the Code of Ethics of the S.A. Council for Natural Scientific Professions
- act as an independent specialist consultant in the field of zoology
- am subcontracted as specialist consultant by Galago Environmental CC for the proposed Kyalami Pipeline group described in this report
- have no financial interest in the proposed development other than remuneration for work performed
- neither have nor will have any vested or conflicting interests in the proposed development
- undertake to disclose to Galago Environmental CC and its client, and the competent authority, any material information that has or may have the potential to influence decisions by the competent authority as required in terms of the Environmental Impact Assessment Regulations 2006



A.C. Kemp

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# 1. INTRODUCTION

Galago Environmental CC. was appointed to undertake an avifaunal habitat survey for the Kyalami Pipeline Group, which is scheduled for the construction of a water pipeline (hereafter referred to as the study area).

This report focuses on the current status of Red Data or Near Threatened species likely to occur on the proposed development site, and suggests measures for mitigation should development be approved.

## 2. SCOPE AND OBJECTIVES OF THE STUDY

- To qualitatively and quantitatively assess the significance of the avifaunal habitat components, and current general conservation status of the property;
- To comment on ecologically sensitive areas;
- To comment on connectivity with natural vegetation and habitats on adjacent sites;
- To provide a list of birds that occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the proposed development on the avifauna of the study site, and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

## 3. STUDY AREA

The study site is situated within the 2528CC quarter degree grid cell (q.d.g.c.) and the 2555\_2800 pentad, within the Kyalami Smallholdings between Pretoria and Johannesburg (25°58'47.0" S 28°03'53.6" E) Gauteng Province. The site is situated at an altitude of between 1 400 and 1 500 metres above sea level (m a.s.l.) and slopes slightly downwards to the east towards the Jukskei River, which is situated  $\pm 2.9$  km further to the west.

The largest portion of the study site is disturbed by past and present human activities and has been largely transformed.

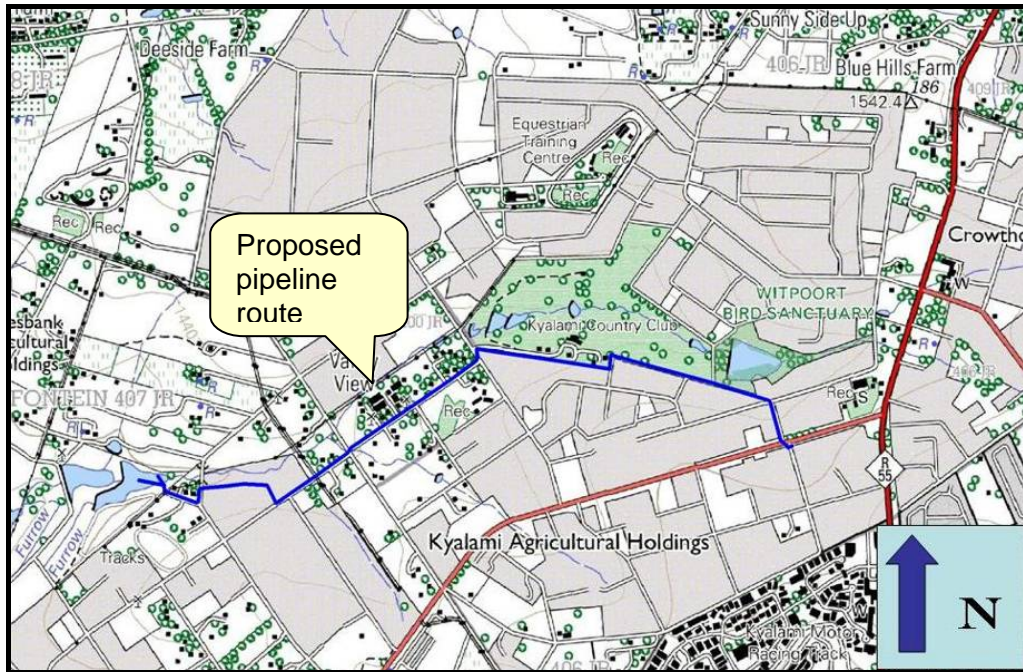


Figure 1: Locality map of the study area

## 4. METHODS

The site visit was conducted on 19 February 2011. During an eight-hour visit the observed and derived presence of avifauna associated with the recognised habitat types of the study site, were recorded. This was done with due regard to the known distributions of Southern African avifauna.

### 4.1 Field Surveys

Birds were identified visually, using 10X42 Bushnell Legend binoculars and a 20X-60X Pentax spotting scope, and by call, and where necessary were verified from Sasol Birds of Southern Africa (Sinclair *et al.*, 2005) and Southern African Bird Sounds (Gibbon, 1991).

The 500 m of adjoining properties was scanned for important animal species and avifaunal habitats.

During the site visit, birds were identified by visual sightings or aural records along random transect walks. No trapping or mist netting was conducted, since the terms of reference did not require such intensive work. In addition, birds were also identified by means of feathers, nests, signs, droppings, burrows or roosting sites. Locals were interviewed to confirm occurrences or absences of species.

### 4.2 Desktop Surveys

The presence of suitable habitats was used to deduce the likelihood of presence or absence of species, based on authoritative tomes, scientific literature, field guides, atlases and databases. This can be done irrespective of season.

The likely occurrence of key bird species was verified according to distribution records obtained during the Southern African Bird Atlas Project 1 (SABAP1) period from 1981 to 1993 (Harrison *et al.* 1997). Earlier records of Red Data species only were obtained from

the period between 1974 and 1987 according to Tarboton *et al.* (1987) and the most recent data from the current SABAP2 project which started on 1 July 2007.

The occurrence and historical distribution of likely avifauna species, especially all Red Data avifaunal species recorded for the q.d.g.c. 2528CC, were verified from Harrison *et al.* (1997), Tarboton *et al.* (1987) and the current SABAP2 project. The reporting rate for each avifaunal species likely to occur on the study site, based on Harrison *et al.* (1997), was scored between 0 – 100% and was calculated as follows: Total number of cards on which a species was reported during the Southern African Bird Atlas SABAP1 and the current SABAP2 project period X 100 ÷ total number of cards for the particular q.d.g.c. (Harrison *et al.*, 1997) and pentad(s) (SABAP2). It is important to note that a q.d.g.c. (SABAP1 Protocol) covers a large area: for example, q.d.g.c. 2528CC covers an area of ±27 X 25 km (±693 km<sup>2</sup>) (15 minutes of latitude by 15 minutes of longitude, 15' x 15') and a pentad (SABAP2 Protocol) and area of ±8 X 7.6 km (5 minutes of latitude by 5 minutes of longitude, 5' x 5') and it is possible that suitable habitat will exist for a certain Red Data avifauna species within this wider area surrounding the study site. However, the specific habitat(s) found on site may not suit the particular Red Data species, even though it has been recorded for the q.d.g.c or pentad. For example, the Cape Vulture occurs along the Magaliesberg but will not favour the habitat found within the Pretoria CBD, both of which are both in the same q.d.g.c. Red Data bird species were selected and categorised according to Barnes (2000).

#### 4.3 Specific Requirements

During the site visit, the study site was surveyed visually and its habitats assessed for the potential occurrence of priority Red Data avifauna, according to GDACE's requirement for Biodiversity Assessments, Version 2 (2009), as well as for any other Red Data bird species: The priority Red Data bird species for Gauteng are (in Roberts VII order and nomenclature, Hockey *et al.* 2005):

- Half-collared Kingfisher (*Alcedo semitorquata*)
- African Grass-Owl (*Tyto capensis*)
- White-bellied Korhaan (*Eupodotis senegalensis*)
- Blue Crane (*Anthropoides paradiseus*)
- African Finfoot (*Podica senegalensis*)
- Cape Vulture (*Gyps coprotheres*)
- African Marsh-Harrier (*Circus ranivorus*)
- Martial Eagle (*Polemaetus bellicosus*)
- Secretarybird (*Sagittarius serpentarius*)
- Lesser Kestrel (*Falco naumanni*)
- Greater Flamingo (*Phoenicopterus ruber*)
- Lesser Flamingo (*Phoenicopterus minor*)
- White-backed Night-Heron (*Gorsachius leuconotus*)
- Black Stork (*Ciconia nigra*)

No particular reference was made to the possible occurrence of any Red Data avifauna species on or surrounding the study site.

## 5. RESULTS

### *Avifaunal Habitat Assessment:*

For the purposes of this report the dams, drainage lines and wetland areas have been combined into one avifauna habitat system known as Drainage Line and Impoundments and the golf course, bird sanctuary, built-up area and small holdings have been combined into Suburban, Rural Garden, Smallholding and Transformed areas, due to the similarity of vegetation that grows within these habitat systems. Thus two major bird habitat systems were identified on and surrounding the study site within the general Egoli Grassland vegetation type (Mucina and Rutherford 2006). The entire site has been transformed and there is very little natural Egoli Grassland left on the pipe line route or directly surrounding the study site. Exotic vegetation dominated these areas. The pipeline route will end in the dam on the western end of the study site and will pass only marginally alongside the grassland area, which is too small and insignificant to mention in this report. This grassland area is also mainly disturbed and will not favour any Red Data avifauna species recorded for the 2528CC q.d.g.c. (refer to figure 2):

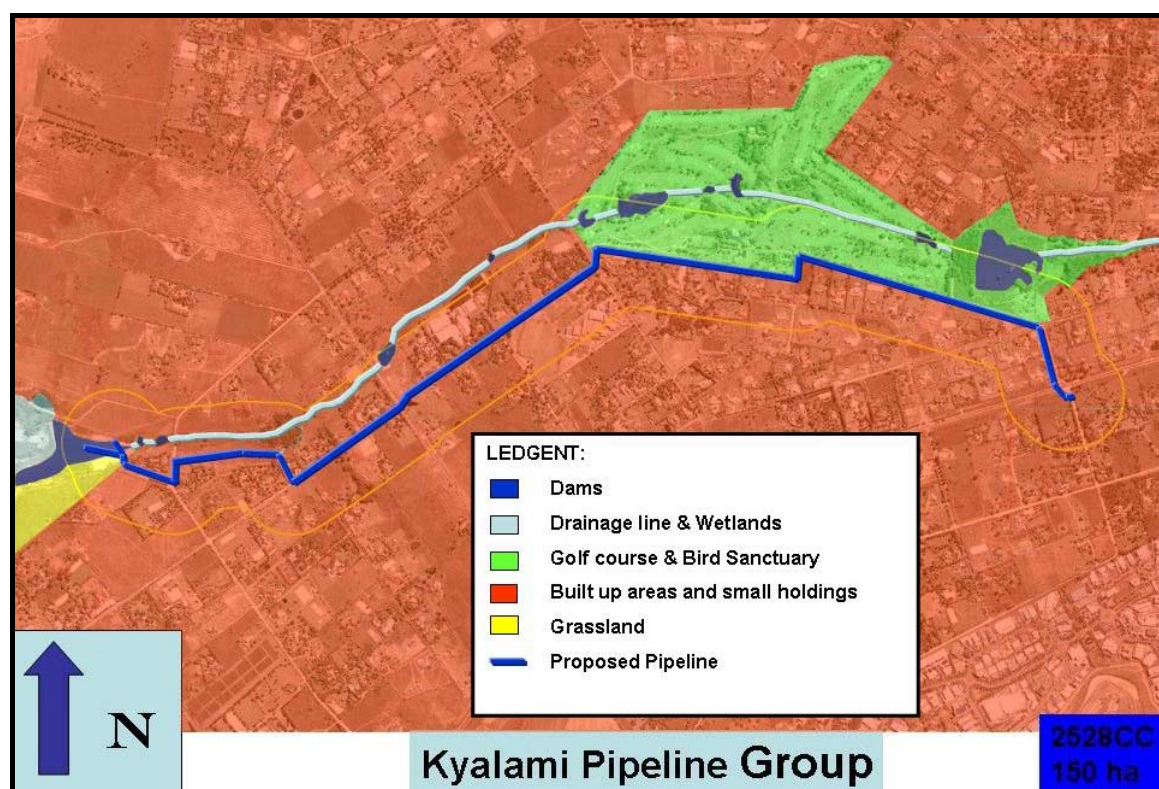


Figure 2: Bird habitat systems identified from the study site.

### **Drainage lines and impoundments:**

A proposed pipeline will run parallel to the south of the drainage line and will not at any stage cross or run alongside the drainage line. A series of man-made dams have been constructed in the drainage line. The pipeline route will mainly run through areas that have already been disturbed by past and present human activities and as a result there are no wetlands affected that could favour any wetland avifaunal Red Data species.

This is mainly a seasonal wetland system and only receives water in the rainy season during summer. Small impoundments have been built within the drainage line, mainly to supply water for livestock, such as horses, to attract birds in an urban environment, and probably also for irrigation purposes. Most of the drainage lines are overgrown by exotic

vegetation such as *Eucalyptus* and poplar trees. Small areas are overgrown by bulrushes and other aquatic and semi-aquatic vegetation.

The more common wetland and water bird species are expected to occur within the vegetation that grows within and along the drainage line, and on the open water and edges of the impoundment on site. These include cisticolas, warblers, bishops and widowbirds, which will breed, forage and roost in this wetland vegetation, and duck and the more common wader species that will temporarily make use of the open water of the impoundments.



**Figure 3: A recently-made weir in the drainage line with newly-planted Kikuyu grass.**



**Figure 4: The drainage line shown in the background infested with various alien invader plant species.**



**Suburban, rural gardens smallholdings and transformed areas:**

Rural and suburban gardens have created an evergreen habitat for many bird species, where birds can hide, breed and forage for food. Natural predators such as snakes and smaller wild-cat species, which largely are persecuted by man, have been driven out of these areas, making it a relatively safe environment for birds apart from domestic cats and dogs. Many bird species have adapted to human-altered areas and these species are mainly the more common bird species found within southern Africa.

The ranges of some species have also increased and species not previously known to occur within Gauteng suburbs are now common, e.g. Grey-go-away Bird and Thick-billed Weaver. Some species, which are mainly alien species, are dependant on humans for survival such as the House Sparrow and Common Myna.



**Figure 5: The mown grass of the Bird Sanctuary.**

Large gardens, parks, sport fields and golf courses with open lawns also create ideal habitat for ground-feeding birds. These lawns are usually well watered and the ground soft, making it easy for birds that probe in the ground with their beaks in search of worms and other ground-living insects. There is usually water present, in the form of irrigation systems, ponds, water features and/or swimming pools. The interest in birds among the public has grown and bird feeders are today a normal feature in most gardens. Certain exotic trees reach considerable heights in gardens, which allow birds to nest in them and thereby be protected from predators.

Fruit-bearing trees are also an important food supply for many bird species. Most of these bird species are not habitat specific and, due to their high level of adaptability, are also not threatened.

Exotic plantations usually do not offer a large variation in plant communities and these trees are mostly unpalatable in their live stage for insect and game species. As a result, few insect-eating bird species will occur within these plantations. A number of nectar

feeding species, such as white-eyes and sunbirds, will feed on the nectar produced by the flowers of these trees, and some birds also make nests in these trees.

A few species of bird of prey, which require tall trees for nest building, have increased their ranges due to the presence of these trees. These include Black and Ovambo Sparrowhawks, and Bat Hawks have also benefited from large *Eucalyptus* (blue gum) trees but do not occur regularly within the Gauteng region.

No or little grass growth takes place on the ground where these trees grow and seed-eating bird species are few. The roots of these trees are known to extract large volumes of water daily and the surrounding ground is normally hard and dry.

### **Observed and Expected Species Richness**

Of the 313 bird species recorded for the 2528CC q.d.g.c. (Harrison *et al.*, 1997), 80 (25.5%) of these bird species were actually observed on site.

The bird species listed in Table 1 are in the species order according to *Roberts - Birds of Southern Africa* VIIth edition (Hockey *et al.*, 2005). These comprise the 69 species actually observed on site. The reporting rate for each species is the percentage for the q.d.g.c. according to the SABAP 1 atlas (Harrison *et al.* 1997) and is represented by colour codes as follows: Yellow = Very Low, Light Orange = Low, Dark Orange = Medium and Red = High.

**Table 1: Bird species observed on the study site.**

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)*
		SABAP1/SABAP2
<i>Numida meleagris</i>	Helmeted Guineafowl	53/80.3
<i>Dendrocygna viduata</i>	White-faced Duck	11/7.2
<i>Anas undulata</i>	Yellow-billed Duck	19/92.4
<i>Lybius torquatus</i>	Black-collared Barbet	55/45.0
<i>Trachyphonus vaillantii</i>	Crested Barbet	79/57.4
<i>Upupa africana</i>	African Hoopoe	76/25.3
<i>Phoeniculus purpureus</i>	Green Wood-Hoopoe	48/15.3
<i>Alcedo cristata</i>	Malachite Kingfisher	3/25.3
<i>Colius striatus</i>	Speckled Mousebird	72/33.7
<i>Urocolius indicus</i>	Red-faced Mousebird	38/27.3
<i>Cypsiurus parvus</i>	African Palm-Swift	23/59.8
<i>Apus affinis</i>	Little Swift	39/22.9
<i>Apus caffer</i>	White-rumped Swift	19/37.8
<i>Corythaixoides concolor</i>	Grey Go-away-bird	44/29.3
<i>Columba livia</i>	Rock Dove	27/11.6
<i>Columba guinea</i>	Speckled Pigeon	42/41.8
<i>Streptopelia senegalensis</i>	Laughing Dove	94/92.0
<i>Streptopelia capicola</i>	Cape Turtle-Dove	81/94.0
<i>Streptopelia semitorquata</i>	Red-eyed Dove	32/91.2
<i>Gallinula chloropus</i>	Common Moorhen	22/88.8
<i>Fulica cristata</i>	Red-knobbed Coot	28/95.6
<i>Actophilornis africanus</i>	African Jacana	0/0.4
<i>Burhinus capensis</i>	Spotted Thick-knee	36/34.5
<i>Charadrius tricollaris</i>	Three-banded Plover	7/38.2
<i>Vanellus armatus</i>	Blacksmith Lapwing	39/95.2
<i>Vanellus senegallus</i>	African Wattled Lapwing	16/66.7
<i>Vanellus coronatus</i>	Crowned Lapwing	74/94.4

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)*
		SABAP1/SABAP2
<i>Milvus migrans</i>	Black Kite	14/0.8
<i>Accipiter ovampensis</i>	Ovambo Sparrowhawk	2/0.8
<i>Tachybaptus ruficollis</i>	Little Grebe	15/59.8
<i>Anhinga rufa</i>	African Darter	12/92.8
<i>Phalacrocorax africanus</i>	Reed Cormorant	28/93.6
<i>Egretta garzetta</i>	Little Egret	7/44.2
<i>Ardea cinerea</i>	Grey Heron	23/19.3
<i>Ardea melanocephala</i>	Black-headed Heron	40/37.8
<i>Bubulcus ibis</i>	Cattle Egret	71/72.3
<i>Bostrychia hagedash</i>	Hadedda Ibis	86/84.3
<i>Threskiornis aethiopicus</i>	African Sacred Ibis	45/79.1
<i>Laniarius ferrugineus</i>	Southern Boubou	28/33.7
<i>Corvus albus</i>	Pied Crow	64/82.3
<i>Lanius collaris</i>	Common Fiscal	90/95.6
<i>Riparia paludicola</i>	Brown-throated Martin	3/23.3
<i>Hirundo rustica</i>	Barn Swallow	28/41.4
<i>Hirundo albigularis</i>	White-throated Swallow	22/52.6
<i>Hirundo cucullata</i>	Greater Striped Swallow	34/49.4
<i>Hirundo abyssinica</i>	Lesser Striped Swallow	20/10.4
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	89/86.7
<i>Phylloscopus trochilus</i>	Willow Warbler	6/8.8
<i>Zosterops virens</i>	Cape White-eye	69/51.4
<i>Cisticola tinniens</i>	Levaillant's Cisticola	10/68.7
<i>Cisticola fulvicapilla</i>	Neddicky	16/41.4
<i>Cisticola juncidis</i>	Zitting Cisticola	11/48.2
<i>Prinia subflava</i>	Tawny-flanked Prinia	22/50.6
<i>Prinia flavicans</i>	Black-chested Prinia	22/30.1
<i>Mirafra africana</i>	Rufous-naped Lark	21/55.4
<i>Psophocichla litsitsirupa</i>	Groundscraper Thrush	2/12.9
<i>Turdus libonyanus</i>	Kurrichane Thrush	7/25.7
<i>Turdus smithi</i>	Karoo Thrush	76/22.5
<i>Sigelus silens</i>	Fiscal Flycatcher	39/29.7
<i>Cossypha caffra</i>	Cape Robin-Chat	66/78.3
<i>Saxicola torquatus</i>	African Stonechat	15/96.4
<i>Onychognathus morio</i>	Red-winged Starling	23/3.6
<i>Lamprotornis nitens</i>	Cape Glossy Starling	46/70.7
<i>Acridotheres tristis</i>	Common Myna (INT)	46/87.6
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	32/17.7
<i>Cinnyris talata</i>	White-bellied Sunbird	37/6.0
<i>Ploceus velatus</i>	Southern Masked-Weaver	73/96.0
<i>Euplectes afer</i>	Yellow-crowned Bishop	5/18.9
<i>Euplectes orix</i>	Southern Red Bishop	38/76.7
<i>Euplectes albonotatus</i>	White-winged Widowbird	10/28.5
<i>Euplectes ardens</i>	Red-collared Widowbird	9/49.0
<i>Amadina erythrocephala</i>	Red-headed Finch	3/4.0
<i>Estrilda astrild</i>	Common Waxbill	10/30.5
<i>Vidua macroura</i>	Pin-tailed Whydah	18/43.8
<i>Passer domesticus</i>	House Sparrow	76/14.1
<i>Passer melanurus</i>	Cape Sparrow	91/81.5
<i>Passer diffusus</i>	Southern Grey-headed	24/58.2

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)*
		SABAP1/SABAP2
	<b>Sparrow</b>	
<i>Motacilla capensis</i>	<b>Cape Wagtail</b>	<b>70/73.9</b>
<i>Anthus cinnamomeus</i>	<b>African Pipit</b>	<b>14/57.0</b>
<i>Crithagra atrogularis</i>	<b>Black-throated Canary</b>	<b>28/33.7</b>

\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell. **INT** = Introduced or alien birds species to Southern Africa.

**Red Data Species Categories for the birds** (Barnes, 2000)

**RE** = Regionally extinct, **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened.

The colour codes for each species are represented as follows: Yellow = Very Low, Light Orange = Low, Dark Orange = Medium and Red = High. The likelihood of occurrence of each species on site in the specific habitat systems are as follow: 5 = present, 4 = High, 3 = Medium, 2 = Low, 1 = very low, and 0 = Not likely to occur.

### Threatened and Red Listed Bird Species

The following Red Data bird species were recorded for the 2528CC q.d.g.c according to Harrison *et al.* (1997) and Tarboton *et al.* (1987) (Table 2).

**Table 2: Red Data bird species recorded for the 2528CC q.d.g.c.**

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)* 2528CC CENTURION
<i>Nettapus auritus</i>	African Pygmy-Goose ( <b>NT</b> )	(T)
<i>Alcedo semitorquata</i>	Half-collared Kingfisher ( <b>NT</b> )	1(T)
<i>Tyto capensis</i>	African Grass-Owl ( <b>VU</b> )	2(Tb)
<i>Neotis denhami</i>	Denham's Bustard ( <b>VU</b> )	(T)
<i>Eupodotis caerulescens</i>	Blue Korhaan ( <b>NT</b> )	(Tb)
<i>Eupodotis senegalensis</i>	White-bellied Korhaan ( <b>VU</b> )	<1(T)
<i>Anthropoides paradiseus</i>	Blue Crane ( <b>VU</b> )	3(Tb)
<i>Podica senegalensis</i>	African Finfoot ( <b>VU</b> )	<1(T)
<i>Crex crex</i>	Corn Crake ( <b>VU</b> )	(T)
<i>Rostratula benghalensis</i>	Greater Painted-snipe ( <b>NT</b> )	(T)
<i>Glareola nordmanni</i>	Black-winged Pratincole ( <b>NT</b> )	(T)
<i>Gyps coprotheres</i>	Cape Vulture ( <b>VU</b> )	<1(T)
<i>Aegypius tracheliotus</i>	Lappet-faced Vulture ( <b>VU</b> )	(T)
<i>Circus ranivorus</i>	African Marsh-Harrier ( <b>VU</b> )	<1(Tb)
<i>Circus macrourus</i>	Pallid Harrier ( <b>NT</b> )	(T)
<i>Aquila ayresii</i>	Ayres's Hawk-Eagle ( <b>NT</b> )	<1(T)
<i>Polemaetus bellicosus</i>	Martial Eagle ( <b>VU</b> )	<1(T)
<i>Sagittarius serpentarius</i>	Secretarybird ( <b>NT</b> )	(Tb)
<i>Falco naumanni</i>	Lesser Kestrel ( <b>VU</b> )	1(T)
<i>Falco biarmicus</i>	Lanner Falcon ( <b>NT</b> )	1(Tb)
<i>Gorsachius leuconotus</i>	White-backed Night-Heron ( <b>VU</b> )	(T)
<i>Pelecanus onocrotalus</i>	Great White Pelican ( <b>NT</b> )	(T)
<i>Pelecanus rufescens</i>	Pink-backed Pelican ( <b>VU</b> )	(T)
<i>Mycteria ibis</i>	Yellow-billed Stork ( <b>NT</b> )	<1(T)
<i>Ciconia nigra</i>	Black Stork ( <b>NT</b> )	<1(T)
<i>Mirafraga cheniana</i>	Melodious Lark ( <b>NT</b> )	<1(T)
	<b>Very Low :</b>	<b>12</b>
	<b>Low :</b>	<b>2</b>
	<b>Medium :</b>	<b>0</b>
	<b>High :</b>	<b>0</b>

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)* 2528CC CENTURION
	<b>TOTAL :</b>	<b>14</b>
	<b>Tarboton :</b>	<b>20</b>
	<b>Tarboton breeding:</b>	<b>6</b>
		<b>26</b>

\*\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell. T = Bird species recorded as present (light blue) and Tb = bird species recording as breeding (dark blue) for the q.d.g.c. according to Tarboton (1987). Bird species with both reporting rates and T or Tb were recorded for the q.d.g.c. according to both Harrison *et al.* (1997) and Tarboton *et al.* (1987). The colour codes for each species are represented as follows: yellow = very low, light orange = low, dark orange = medium and red = high with reference to the specific habitat systems found on site.

**Red Data Species Categories for the birds** (Barnes, 2000)

**RE** = Regionally extinct, **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened.

A total of 26 Red Data bird species have been recorded within the 2528CC q.d.g.c. (Tarboton *et al.* 1987; Harrison *et al.* 1997). Twelve of these appear to have disappeared from the area or were not subsequently recorded for this q.d.g.c. during the time of the Southern African Bird Atlas project. It is unlikely that they will ever recur in this region, except maybe on rare occasions in protected areas. Six of these species used to breed within the said q.d.g.c. (Tarboton, 1987) and only one, the African Grass-Owl, was recorded as a breeding species for the q.d.g.c. during the period of the Southern African Bird Atlas project. This decline in breeding species is probably due to the large extent of development that has taken place during a short space of time. As with the African Grass-Owl, the Blue Crane also showed a low reporting rate but the habitat on site and the level of disturbance will not favour Blue Cranes. The rest of the Red Data species that have been recorded show a very low reporting rate and will more than likely only move through the area on very rare occasions.

### **Summary of the Red Data bird species**

Table 3 provides a list of the Red Data bird species recorded for the 2528CC q.d.g.c. according to Harrison *et al.* (1997) and an indication of their likelihood of occurrence on the study site based on habitat and food availability.

**Table 3: Red Data bird species assessment for the 2528CC q.d.g.c.**

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Alcedo semitorquata</i> * (Half-collared Kingfisher) ( <b>NT</b> )	None on site: Requires fast-flowing streams, rivers and estuaries, usually with dense marginal vegetation (Maclean, 1993), especially perennial streams and smaller rivers with overhanging riparian vegetation on their banks. Nests in sand/earth banks (Tarboton <i>et al.</i> , 1987) and requires riverbanks in which to excavate nest tunnels (Harrison <i>et al.</i> , 1997). Most typically occurs along fast-flowing streams with clear water and well-wooded riparian growth, often near rapids. It most frequently favours broken escarpment terrain and requires at least 1 km up and down stream of undisturbed river and riparian vegetation while breeding. It occurs from sea-level to 2000 m.a.s.l. in southern Africa. Usually perches low down on the banks of rivers and streams, often on exposed roots, as well as exposed rock and low overhanging tree branches.	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Uncommon and easily overlooked; quiet streams (Marais & Peacock, 2008).

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Tyto capensis</i> * (African Grass-Owl) (VU)	None on site: Occurs predominately in rank grass, typically but not always at fairly high altitudes. Breeds mainly in permanent and seasonal vleis, which it vacates while hunting or during post-breeding although it will sometimes breed in any area of long grass, sedges or even weeds (Van Rooyen, pers comm.) and not necessarily associated with wetlands (Tarboton <i>et al.</i> , 1987) although this is more the exception than the rule. Foraging mainly confined to tall grassland next to their wetland vegetation and rarely hunts in short grassland, wetlands or croplands nearby (Barnes, 2000). Mainly restricted to wet areas (marshes and vleis) where tall dense grass and/or sedges occur. Prefers permanent or seasonal vleis and vacates the latter when these dry up or are burnt. Roosts and breeds in vleis but often hunt elsewhere e.g. old lands and disturbed grassland although this is suboptimal habitat conditions (Tarboton <i>et al.</i> , 1987). May rarely occur in sparse <i>Acacia</i> woodland where patches of dense grass cover are present (Harrison <i>et al.</i> , 1997).	<u>Highly unlikely</u> No suitable breeding, roosting and foraging habitat were identified on and surrounding the study site.
<i>Eupodotis senegalensis</i> * (White-bellied Korhaan) (VU)	None on site: Occurs in fairly tall, dense grassland, especially sour and mixed grassland, in open or lightly wooded, undulating to hilly country. In winter, occasionally on modified pastures and burnt ground (Harrison <i>et al.</i> , 1997).	<u>Highly unlikely</u> Due to high human presence on site and disturbance surrounding the study site. Scarce in Gauteng and secretive resident; widespread (Marais & Peacock, 2008).
<i>Anthropoides paradiseus</i> * (Blue Crane) (VU)	None on site: Midlands and highland grassland, edge of Karoo, cultivated land and edges of vleis (Maclean, 1993). Nests in both moist situations in vleis which have short grass cover and in dry sites far from water, usually exposed places such as on hillsides; forages in grassland and cultivated and fallow lands; roosts communally in the shallow water of pans and dams (Tarboton <i>et al.</i> , 1987). Short dry grassland, being more abundant and evenly disturbed in the eastern "sour" grassland, where natural grazing of livestock is the predominant land use. Prefers to nest in areas of open grassland (Barnes, 2000) In the Fynbos biome it inhabits cereal croplands and cultivated pastures and avoids natural vegetation. By contrast, it is found in natural vegetation in the Karoo and grassland biomes, but it also feeds in crop fields (Harrison <i>et al.</i> , 1997).	<u>Highly unlikely</u> Due to the small extent of the grassland, disturbance surrounding the study site and high human presence on the study site. Localised but common in the south-eastern Gauteng (Marais & Peacock, 2008).
<i>Podica senegalensis</i> * (African Finfoot) (VU)	None on site: Occurs mostly along quiet, wooded streams and rivers flanked by thick riparian vegetation and overhanging trees. Also dam verges, especially where there is sufficient overhanging vegetation and reed cover. Avoids both stagnant and very fast-flowing watercourses, with a preference for clear, rather than silted water (Hockey <i>et al.</i> , 2005).	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat, high human presence on site and disturbance surrounding the study site.

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
		Scarce in Gauteng and secretive resident; widespread (Marais & Peacock, 2008).
<i>Gyps coprotheres</i> * (Cape Vulture) (VU)	They mostly occur in mountainous country, or open country with inselbergs and escarpments; less commonly as visitors to savannah or desert (Maclean, 1993). Forage over open grassland, woodland and agricultural areas; usually roosts on cliffs, but will also roost on trees and pylons (Barnes, 2000). It is reliant on tall cliffs for breeding but it wanders widely away from these when foraging. It occurs and breeds from sea level to 3 100 m.a.s.l. Current distribution is closely associated with subsistence communal grazing areas characterised by high stock losses and low use of poisons and, to a lesser extent, with protected areas (Harrison <i>et al.</i> , 1997), but their presence is ultimately dependent on the availability of food.	<u>Highly unlikely</u> Due to a lack of suitable foraging and breeding habitat. Breeds in Magaliesberg; uncommon wanderer elsewhere; mostly SW & NW Gauteng (Marais & Peacock, 2008).
<i>Circus ranivorus</i> * (African Marsh-Harrier) (VU)	None on site: Almost exclusively inland and coastal wetlands (Hockey <i>et al.</i> , 2005). Wetland and surrounding grasslands. Most Highveld wetlands > 100 ha support a breeding pair (Tarboton & Allan, 1984). Nests in extensive reed beds often high above water. Forages over reeds, lake margins, floodplains and occasionally even woodland. Almost entirely absent from areas below 300 mm of rainfall (Harrison <i>et al.</i> , 1997). Marsh, vlei, grassland (usually near water); may hunt over grassland, cultivated lands and open savanna (Maclean, 1993). Dependant on wetlands, particularly permanent wetlands for breeding, roosting and feeding. May utilise small wetlands 1-2 ha in extent for foraging, but larger wetlands are required for breeding (Barnes, 2000).	<u>Highly unlikely</u> There is no suitable foraging, breeding or roosting habitat for this species on the study site. Declining resident of large vleis, occurs mainly in south-eastern Gauteng (Marais & Peacock, 2008).
<i>Aquila ayresii</i> (Ayres's Hawk-Eagle) (NT)	None on site: Non-breeding summer visitor to South Africa, favouring dense woodland and forest edge, often in hilly country. Regular in larger northern cities and towns (Johannesburg, Pretoria, Mokopane/Pietersburg), where it often roosts in <i>Eucalyptus</i> stands or other tall trees within its prime distribution range (Hockey <i>et al.</i> , 2005).	<u>Highly unlikely</u> There is no suitable habitat for this species on the study site. Rare in Gauteng (Marais & Peacock, 2008).
<i>Polemaetus bellicosus</i> * (Martial Eagle) (VU)	None on site: Tolerates a wide range of vegetation types, being found in open grassland, scrub, Karoo, agricultural lands and woodland. It relies on large trees (or electricity pylons) to provide nest sites (Barnes, 2000) as well as windmills and even cliffs in treeless areas. It occurs mainly in flat country and is rarer in mountains, and it also avoids extreme desert, and densely wooded and forested areas (Harrison <i>et al.</i> , 1997 & Barnes, 2000).	<u>Highly unlikely</u> Due to a lack of suitable habitat and disturbance caused by the large scale development surrounding the study site. Uncommon local resident (Marais & Peacock, 2008).

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<p><i>Falco naumanni</i>* (Lesser Kestrel) (VU)</p>	<p>None on site: Non-breeding Palearctic migrant. Forages preferentially in pristine open grassland but also hunts in converted grassland such as small scale pastures provided the conversion is not as total as in plantation forestry or in areas of consolidated agricultural monoculture (Barnes, 2000; Hockey <i>et al.</i>, 2005) such as maize, sorghum, peanuts, wheat, beans and other crops (Tarboton &amp; Allan, 1984) where they hunt for large insects and small rodents, but avoid wooded areas except on migration. They roost communally in tall trees, mainly <i>Eucalyptus</i>, in urban areas (Barnes, 2000), often in towns or villages, but also in farm lands (pers. obs). Favour a warm, dry, open or lightly wooded environment, and are concentrated in the grassy Karoo, western fringes of the grassland biome and southeast Kalahari. Generally avoids foraging in transformed habitats but occurs in some agricultural areas, including croplands, in Fynbos and Renosterveld of the Western Cape (Hockey <i>et al.</i>, 2005). Large numbers congregate in sweet and mixed grasslands of the highveld regions.</p>	<p><u>Highly unlikely</u> Only on very rare occasions. Localised summer migrant (Marais &amp; Peacock, 2008).</p>
<p><i>Falco biarmicus</i>* (Lanner Falcon) (NT)</p>	<p>None on site: Most frequent in open grassland, open or cleared woodland, and agricultural areas. Breeding pairs generally favour habitats where cliffs are available as nest and roost sites, but will use alternative sites such as trees, electricity pylons and building ledges if cliffs are absent (Hockey <i>et al.</i>, 2005). Mountains or open country, from semi desert to woodland and agricultural land, also cities (Maclean, 1993), even on forest-grassland ecotones. Generally a cliff nesting species and its wider distribution is closely associated with mountains with suitable cliffs. Able to breed on lower rock faces than Peregrine Falcon <i>Falco peregrinus</i> and also utilises the disused nests of other species, such as crows, other raptors and storks, on cliffs, in trees and on power pylons, and also quarry walls (Tarboton <i>et al.</i>, 1987). Generally prefers open habitats e.g. alpine grassland and the Kalahari, but exploits a wide range of habitats – grassland, open savanna, agricultural lands, suburban and urban areas, rural settlements – in both flat and hilly or mountainous country. Also breeds in wooded and forested areas where cliffs occur (Harrison <i>et al.</i>, 1997).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding habitat. Uncommon resident in open areas in Gauteng (Marais &amp; Peacock, 2008).</p>
<p><i>Mycteria ibis</i> (Yellow-billed Stork) (NT)</p>	<p>None on site: Utilises diverse wetlands and permanent and seasonal habitats, including alkaline and freshwater lakes, river, dams, pans, flood plains, large marshes, swamps, estuaries, margins of lakes or rivers, flooded grassland and small pools or streams where there are areas of shallow water free of emergent vegetation (Tarboton <i>et al.</i>, 1987); less often marine mudflats and estuaries (Hockey <i>et al.</i>, 2005). Nests colonially on large trees adjacent to productive wetlands, but only locally and erratically during ideal conditions.</p>	<p><u>Highly unlikely</u> Due to a lack of suitable habitat. Common at large wetlands within Gauteng; erratic elsewhere (Marais &amp; Peacock, 2008).</p>



SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Ciconia nigra</i> * (Black Stork) (NT)	None on site: Dams, pans, flood plains, shallows of rivers, pools in dry riverbeds, estuaries and sometimes on marshland and flooded grassland; uncommon at seasonal pans lacking fish. Associated with mountainous regions (Hockey <i>et al.</i> , 2005) where they nest (Maclean, 1993) on cliffs (Harrison <i>et al.</i> , 1997). Feeds in shallow water, but occasionally on dry land, in streams and rivers, marshes, floodplains, coastal estuaries and large and small dams; it is typically seen at pools in large rivers.	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.
<i>Mirafra cheniana</i> (Melodious Lark) (NT)	None on site: Occurs in grassland dominated by <i>Themeda triandra</i> grass in South Africa. Occasionally in planted pastures of <i>Eragrostis curvula</i> and <i>E. tef</i> . Avoids wet lowlands, favouring fairly short grassland (< 0.5 m), with open spaces between tussocks, at 550 – 1 750 m.a.s.l. with annual rainfall of between 400 – 800 mm p/a (Hockey <i>et al.</i> , 2005).	<u>Unlikely</u> Due to a lack of suitable habitat. Localised resident in Gauteng (Marais & Peacock, 2008) where suitable habitat occurs.

\*Priority Red Data bird species according to GDARD.

## 6. FINDINGS AND POTENTIAL IMPLICATIONS

Only the more common bird species that are able to adapt to the areas changed by man or species that are tolerant to human presence are likely to make use of the habitat systems on and surrounding the study site. The habitat systems on site will not favour any of the mentioned Red Data avifauna species due to a lack of suitable breeding, roosting and/or foraging habitat on the study site. The rest of the area within 500 m surrounding the study is unsuitable for any Red Data avifauna species due to high human density and human presence and the area being transformed by man to make place for roads, residential, businesses and agricultural purposes.

## 7. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The general assessment of species rests mainly on the 1987 atlas for birds of the then-Transvaal (Tarboton *et al.*, 1987) and comparison with the 1997 SABAP atlas (Harrison *et al.*, 1997), so any limitations in either of those studies will by implication also affect this survey and conclusions.

## 8. RECOMMENDED MITIGATION MEASURES

The following mitigation measures are proposed by the specialist:

- The pipeline should be constructed under ground and the soil above should be rehabilitated to a natural state as far as possible.
- Proper veld management practises should be implemented with respect to grazing, burning and control of woody invasions.
- Where possible, **work should be restricted to one area at a time**, as this will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- **No vehicles should be allowed to move in or across the wet areas or drainage lines and possibly get stuck.** This leaves visible scars and destroys

habitat, and it is important to conserve areas where there are tall reeds or grass, or areas where there is short grass and mud.

- The contractor must ensure that no fauna is disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- It is suggested that where work is to be done close to the drainage lines, these areas **be fenced off during construction**, to prevent heavy machines and trucks from trampling the plants, compacting the soil and dumping in the system.
- During the construction phase, noise must be kept to a minimum to reduce the impact of the development on the fauna residing on the site.
- Alien and invasive plants must be removed.

## 9. CONCLUSION

The entire study area has been transformed by past and present human activities and none of the Red Data bird species recorded for the 2528CC q.d.g.c. is likely to make use of the habitat systems on and surrounding the study area. The construction of the pipeline will have a limited impact on any bird species found on or that are likely to occur on and surrounding the study site. The pipeline will be constructed under ground and any disturbance will be temporary until the ground above the pipeline has been rehabilitated to its present disturbed state.

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