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Avifaunal Habitat Assessment

of

MAGAGULA HEIGHTS ON THE REMAINDER OF PORTION 52 OF THE FARM TAMBOEKIESFONTEIN 173 IR

May 2017

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DECLARATION OF INDEPENDENCE:

I, Rihann Frans Geysler (690304 5248 084), 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
- act as an independent specialist consultant in the field of ornithology
- am subcontracted as specialist consultant by Galago Environmental CC for the proposed Magagula Heights housing development on the Remainder of Portion 52 of the farm Tamboekiesfontein 173 IR 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, 2014.



Rihann F. Geysler

VERIFICATION STATEMENT

Mr Rihann F. Geysler is not registered as a Professional Natural Scientist with the S.A. Council for Natural Scientific Professions. This communication serves to verify that the avifaunal report compiled by Mr Rihann 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 fields of zoology and ecology
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Dr. A.C. Kemp

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1. INTRODUCTION

Galago Environmental CC. was appointed to undertake an avifaunal habitat survey for the proposed Magagula Heights housing development on the Remainder of Portion 52 of the farm Tamboekiesfontein 173 IR (hereinafter referred to as the study site). This is in accordance with the 2014 EIA Regulations emanating from Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998). The study site and the 500 m extended study area (e.s.a.) are hereafter referred to as the study area.

The primary objective was to determine the presence of Red Data avifaunal species and to identify suitable habitat for these species. Direct observations and published data apart, qualitative and quantitative habitat assessments were used to derive the presence /-absence of Red Data avifaunal species. A list of avifaunal species likely to be affected by the new development is compiled.

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 avifauna that occur or that are likely to 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

3.1 Locality

The study site, ±12.1351 ha in extent, is situated in the north-western corner of the R550 (Klipriver Drive) and D817 road intersection opposite the north-western corner of the Suikerbosrand Nature Reserve within the Gauteng province (Figure 1). Spatially the study site is defined by GPS coordinates 26°25'40.544"S and 28°11'42.1424"E measured in the centre of the study site.

Furthermore the study area is situated within the 2628AC (Alberton) quarter degree grid cell (q.d.g.c.) and more specifically within the 2625_2810 pentad (SABAP2 protocol) which also falls within the northern section of the Suikerbosrand Nature Reserve (Figure 1). The study site is situated at an altitude of between 1 500 and 1 525 metres above sea level (m a.s.l.).

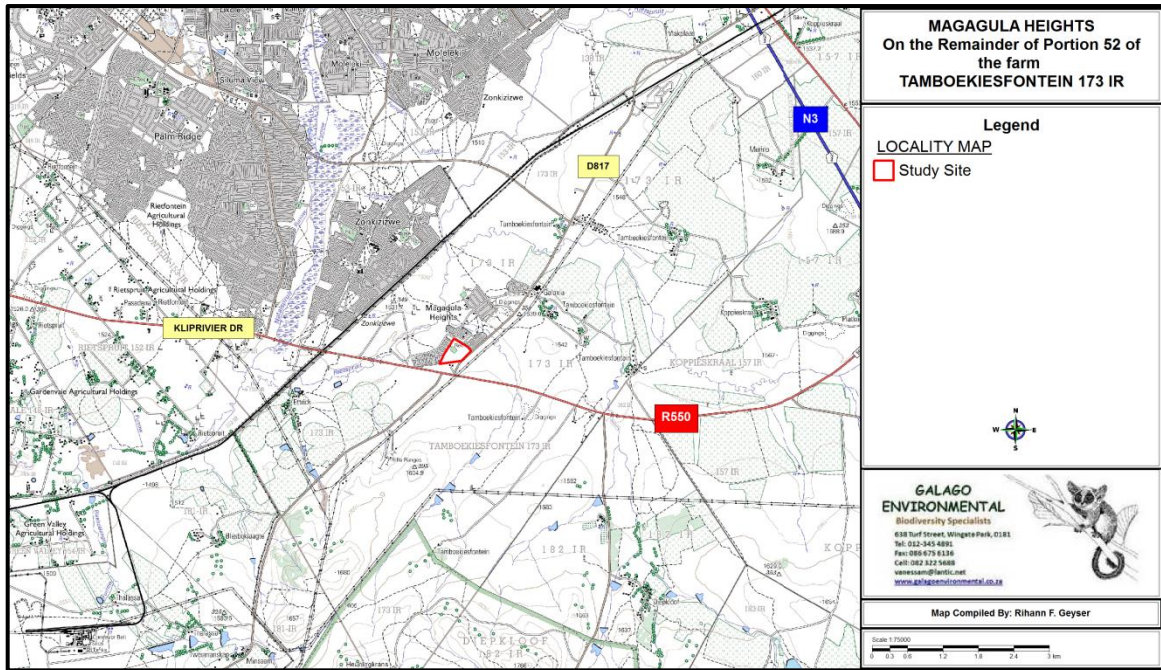


Figure 1: Locality map of the study area

3.2 Land Use

The study site is vacant and being used for recreational purposes.

3.3 Biophysical Information

The entire study site is situated in the Tsakane Clay Grassland vegetation type and the northern section of the study area (500m e.s.a.) within the Eastern Temperate Freshwater Wetland habitat types according to Mucina and Rutherford (2006) (Figure 2).

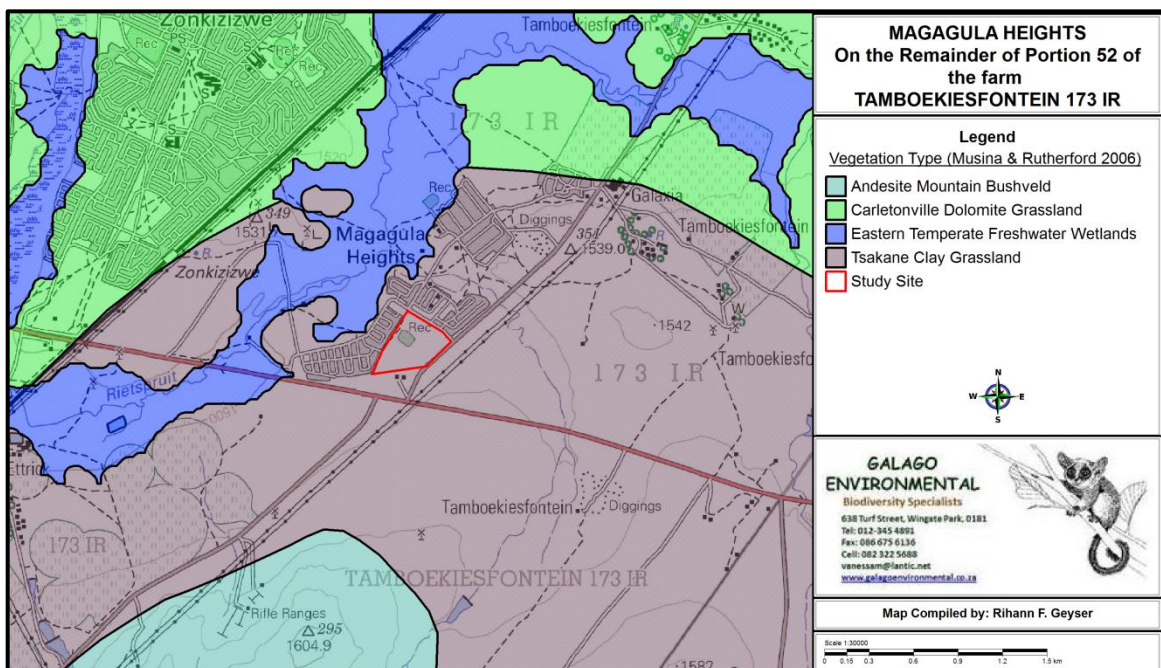


Figure 2: Vegetation types in which the study area is situated (Mucina and Rutherford, 2006)

Eastern Temperate Freshwater Wetlands (AZf 3)

3.3.1 Vegetation type and landscape

The study area north of the study site is situated within the Freshwater Wetlands of the Inland Azonal Vegetation, more specifically within the Eastern Temperate Freshwater Wetlands (AZf 3) vegetation type according to Mucina and Rutherford (2006).

The vegetation and landscape features consists of flat landscape or shallow depressions filled with (temporary) water bodies supporting zoned systems of aquatic and hygrophilous vegetation of temporarily flooded grassland and ephemeral herblands (Mucina and Rutherford, 2006).

3.3.2 Climate

The study site is situated in a extensively summer-rainfall region with an mean average annual rainfall of between 421 - 915 mm with cool-temperate patterns with a mean average annual temperature of between 12.6°C and 16.7°C. Due to the high elevation, frost is a frequent phenomenon (Mucina and Rutherford, 2006).

3.3.4 Conservation status of habitat

Only 5% is statutorily conserved in area such as the Blesbokspuit which is also a Ramsar Site. Some 15% has been transformed by cultivated land, urban areas or plantations. In places intensive grazing and use of lakes and freshwater pans as drinking pools for cattle or sheep cause major damage to the wetland vegetation (Mucina and Rutherford, 2006).

Tsakane Clay Grassland (Gm 9)

3.3.1 Vegetation type and landscape

The entire study site and other areas surrounding it is situated within the Mesic Highveld Grassland Bioregion of the Grassland Biome, more specifically within the Tsakane Clay Grassland vegetation type according to Mucina and Rutherford (2006).

The landscape consists of flat to slightly undulating plains and low hills. Vegetation is short, dense grassland dominated by a mixture of common highveld grasses such as *Themeda triandra*, *Heteropogon contortus*, *Elionurus musticus* and a number of *Eragrostis* species. Most prominent forbs are of the families Asteraceae, Rubiaceae, Malvaceae, Lamiaceae and Fabaceae. Disturbance leads to an increase in the abundance of the grasses *Hyparrhenia hirta* and *Eragrostis chloromelas*.

3.3.2 Climate

The study site is situated in a strongly seasonal summer-rainfall region. The rainfall varies between 630 to 720 mm of rainfall p/a. Winters are very dry with frequent frost , increasing to the south-east.

3.3.3 Conservation status of habitat

This habitat type is considered endangered. Only 1.5% is conserved in statutory reserves. More than 60% of this vegetation type has undergone transformation mostly by urbanisation, cultivation, mining, dam-building and roads. Urbanisation is increasing and further expansion of especially the southern suburbs of Johannesburg and towns of

the East Rand will bring further pressure on the remaining vegetation. Erosion is very low (87%) and low (11%) across the entire unit.

4. METHODS

A four-hour site visit was conducted on 20 May 2017 to record the presence of avifaunal species associated with the habitat systems on the study site and within the study area and to identify possible sensitive areas. During this visit the observed and derived presence of avifaunal species associated with the recognized habitat types of the study site, were recorded. This was done with due regard to the well recorded global distributions of Southern African avifauna, coupled to the qualitative and quantitative nature of recognized habitats.

4.1 Field Surveys

Avifaunal species 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.*, 2011) and Southern African Bird Sounds (Gibbon, 1991).

The 500 m of adjoining properties or extended study area was scanned or surveyed for important avifaunal species and habitats.

During the site visit, avifaunal species 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, avifaunal species 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 avifaunal species, based on authoritative tomes, scientific literature, field guides, atlases and databases. This can be done irrespective of season.

The likely occurrence of key avifaunal 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) and the most recent avifaunal distribution data were obtained from the current SABAP2 project which commenced on 1 July 2007.

The likely occurrence of key avifaunal 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 only Red Data avifaunal species were obtained from the period between 1974 and 1987 according to Tarboton *et al.* (1987). The most recent avifaunal distribution data were obtained from the current SABAP2 project which commenced on 1 July 2007.

The occurrence and historic distribution of likely avifaunal species, especially all Red Data avifaunal species recorded for the q.d.g.c. 2628AC, were verified from SABAP1 (southern Africa Bird Atlas Project 1) data (Harrison *et al.* 1997), Tarboton *et al.* (1987) and the current SABAP2 project (SABAP2 data for the 2628AC q.d.g.c. and for the 2625_2810 pentad) (sabap2.adu.org.za). 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, Red Data species only, the current SABAP2 project period $X 100 \div$ 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. 2625_2810 covers an area of $\pm 27 X 25$ km (± 693 km²) (15 minutes of latitude by 15 minutes of longitude, 15' x 15') and a pentad (SABAP2 Protocol) and area of $\pm 8 X 7.6$ km (5 minutes of latitude by 5 minutes of longitude, 5' x 5') (Figure 3) and it is possible that suitable habitat will exist for a certain Red Data avifaunal 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 in the same q.d.g.c. Red Data bird species were selected and categorised according to Barnes (2000) and Taylor *et al.* (2015).



Figure 3: The 2628AC q.d.g.c. (15 minutes of latitude by 15 minutes of longitude, 15' x 15') is divided in nine smaller grids (5 minutes of latitude by 5 minutes of longitude, 5' x 5') of which each represent a pentad. The pentads in red represent the pentads in which the study area is situated.

An avifaunal biodiversity index (ABI), which gives an indication of the habitat system on the study site that will hold the richest avifaunal species diversity, was calculated as the sum of the probability of occurrence of bird species within a specific habitat system on site. For each species and habitat, the probability of occurrence was ranked as: 5 = present on site, 4 = not observed on site but has a high probability of occurring there, 3 = medium probability, 2 = low probability, 1 = very low probability and 0 = not likely to occur.

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 GDARD's requirements for Biodiversity Assessments, Version 3 (March 2014) and C-Plan Version 3.3 (2011), as well as for any other Red Data avifaunal species: The priority Red Data avifaunal 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 roseus*)
- Lesser Flamingo (*Phoenicopterus minor*)
- White-backed Night Heron (*Gorsachius leuconotus*)
- Black Stork (*Ciconia nigra*)

Particular reference was made by GDARD to the occurrence of **African Grass Owl** (*Tyto capensis*) and **Secretarybird** (*Sagittarius serpentarius*) on or surrounding the study site.

5. RESULTS

5.1 Avifaunal Habitat Assessment

Four major avifaunal habitat systems were identified within the study area. These habitat systems are as follows:

- Aquatic habitat
- Open Grassland
- Disturbed Grassland, Fallow Fields and crop lands
- Disturbed and Transformed Area

Table 1 indicate the habitat systems composition of the study area in terms of surface area and percentage.

Table 1: Avifaunal habitat composition of the study area

Avifaunal Habitat Systems	Area (ha)	%
Aquatic Habitat	±5.7116	1
Open Grassland	±37.6120	6
Disturbed Grassland, Fallow Fields and crop lands	±222.8440	35
Disturbed and Transformed	±235.2150	37
Total surface Area:	±639.9031	

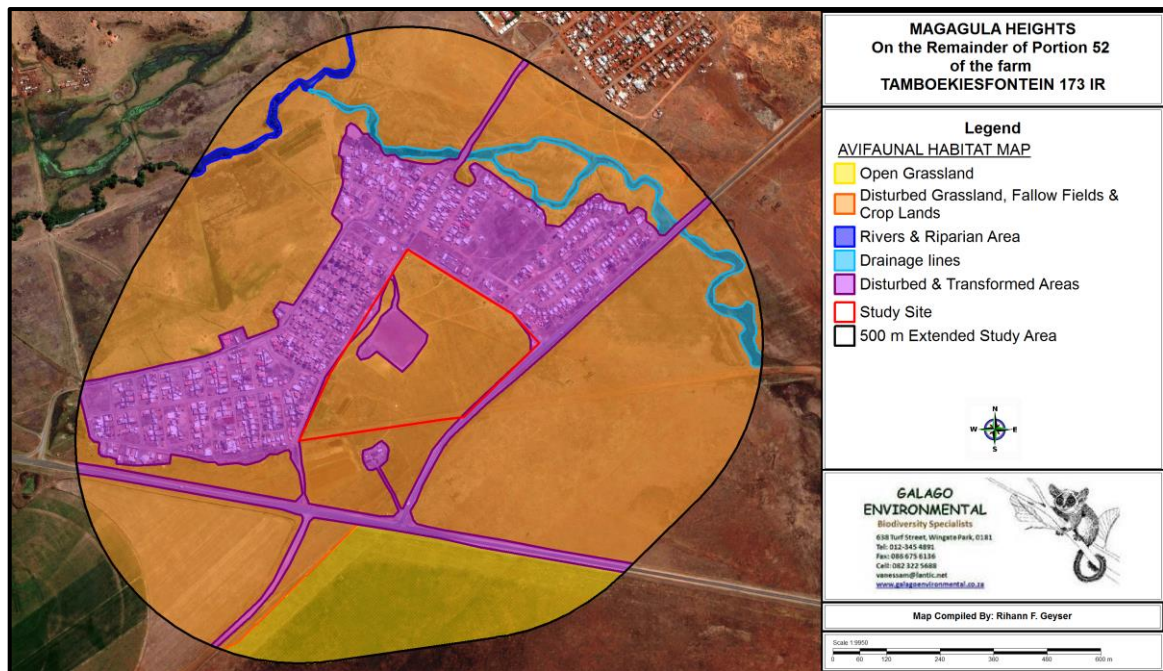


Figure 4: Avifaunal species habitat systems identified on the study site and within the study area.

A short description of each habitat system follows, ranked from most to least important.

Aquatic habitat:

A total of $\pm 2\%$ of the total surface area of the study area consists of aquatic habitat consisting of a drainage line (Figure 5) that forms part of one of the tributaries of the Rietspruit and a river with sparse riparian vegetation of the Rietspruit.



Figure 5: Drainage line in the study area

There is no connectivity between the study site and the aquatic habitat due to roads, built-up areas and disturbed and transformed areas. The aquatic habitat mentioned above does not offer suitable habitat for any Red Data avifaunal species and the areas surrounding them are disturbed and the aquatic vegetation highly trampled by livestock and to a lesser extent, humans and/or polluted. Despite the disturbances it remains a sensitive habitat. Only the more common avifaunal species associated with aquatic

habitat are likely to make use of this habitat system and any development on the study site will not have a negative effect on the avifaunal species that occur or that are likely to occur within the boundaries of the study site.

Open grassland:

A total of 10% of the total surface area of the study area consists of open grassland. The open grassland in the study area represents grassland in the fenced off protected area of the Suikerbosrand Nature Reserve. The open grassland in combination with other habitat systems within the Suikerbosrand Nature Reserve offer more suitable habitat for Red Data avifaunal species.

The presence and abundance of bird species in this habitat will vary from season to season - lush and green in summer after summer rains and dry, brown, frosted or burnt during winter. The habitat favours ground-living bird species, such as lapwings, francolins, pipits, longclaws, larks and chats. These birds hunt for insects and/or breed on the ground, in burrows in the ground, or between the grasses. Weavers and widowbirds make use of such habitat for feeding on ripe seeds during late summer and early winter when the grass is not burnt, and widowbirds and cisticolas will also breed in the tall grass during summer. Species such as weavers and bishops that breed in the wetland habitat during summer will also make use of the open grassland habitat for feeding during winter after the grasses have seeded. Aerial feeding birds such as martins, swifts and swallows will also hunt for insects over the grasslands.

Disturbed grassland, fallow fields and crop lands:

A total of 64% of the total surface area of the study area (including the 500 m extended study area) consists of disturbed grassland, fallow fields and agricultural cropland (Figure 6).



Figure 6: Disturbed grassland on the study site

Only the more common grassland avifaunal species that are able to adapt to areas changed by man are likely to make use of this habitat system.

Disturbed and Transformed Areas:

The rest of the study area $\pm 24\%$ is disturbed and has been transformed by past and present human activities. These areas include built-up areas interspaced with garden vegetation, graded areas, roads, areas with severe dumping and areas overgrown by alien and invasive trees and vegetation.

Only the more common avifaunal species that are able to adapt to areas changed by man will make use of this habitat system. None of these species that occur within this habitat systems are threatened.

5.2 Observed and Expected Species Richness

Of the 345 avifaunal species recorded for the 2628AC q.d.g.c. during the SABAP1 period (Harrison *et al.* 1997) and the current SABA2 period, 127 (37%) are likely to occur on the study site and 24 (19%) of these avifaunal species were actually observed within the study area during the time of the survey.

The avifaunal biodiversity index (ABI) indicates that the largest avifaunal species diversity is likely to occur within the Aquatic habitat system within the study area, with an avifauna biodiversity index (ABI) of 339 followed by the disturbed grassland, fallow field and cropland (ABI 265), disturbed and transformed areas (ABI 264) and open grassland habitat system (ABI 253).

The avifaunal 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 127 species that are likely to occur within the specific habitat systems on and within 500 m extended study area, with those actually observed in **bold**. This does not include overflying birds or rare vagrants. 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. The colour codes of the SABAP2 reporting rate indicate the following; Red = decrease in reporting rate, Green = increase in reporting rate and Yellow = stable reporting rate compared to the SABAP1 data. The habitat preference scores for each species are shown under the recognised habitat types on site: **AH = Aquatic Habitat, OG = Open Grassland, DG = Disturbed Grassland, fallow fields and crop lands** and **DT = Disturbed and Transformed**, with their possibility of occurrence in these specific habitats rated as 5 = present, 4 = High, 3 = Medium, 2 = Low, 1 = Very low, and 0 = Not likely to occur.

Table 1: Avifaunal species observed and that are likely to occur within the study area.

SCIENTIFIC NAME	ENGLISH NAME*	Reporting Rate(%)**		HABITAT PREFERENCE			
		SABAP1	SABAP2	AH	OG	DG	DT
<i>Scleroptila levaillantoides</i>	Orange River Francolin	3	21	1	2	2	0
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	33	47	5	4	4	0
<i>Coturnix coturnix</i>	Common Quail	1	2	0	1	1	0
<i>Numida meleagris</i>	Helmeted Guineafowl	60	67	4	4	4	1
<i>Alopochen aegyptiaca</i>	Egyptian Goose	42	47	2	0	0	0
<i>Plectropterus gambensis</i>	Spur-winged Goose	31	27	1	0	0	0
<i>Anas sparsa</i>	African Black Duck	2	23	3	0	0	0
<i>Anas undulata</i>	Yellow-billed Duck	61	41	3	0	0	0
<i>Anas erythrorhyncha</i>	Red-billed Teal	34	16	1	0	0	0

SCIENTIFIC NAME	ENGLISH NAME*	Reporting Rate(%)**		HABITAT PREFERENCE			
		SABAP1	SABAP2	AH	OG	DG	DT
<i>Jynx ruficollis</i>	Red-throated Wryneck	8	35	0	1	1	2
<i>Tricholaema leucomelas</i>	Acacia Pied Barbet	13	29	0	0	0	2
<i>Lybius torquatus</i>	Black-collared Barbet	33	63	1	0	0	4
<i>Trachyphonus vaillantii</i>	Crested Barbet	27	74	1	0	0	4
<i>Upupa africana</i>	African Hoopoe	24	53	1	1	1	2
<i>Phoeniculus purpureus</i>	Green Wood-Hoopoe	5	43	1	0	0	1
<i>Alcedo cristata</i>	Malachite Kingfisher	1	2	2	0	0	0
<i>Megaceryle maximus</i>	Giant Kingfisher	1	6	2	0	0	0
<i>Ceryle rudis</i>	Pied Kingfisher	5	6	2	0	0	0
<i>Merops bullockoides</i>	White-fronted Bee-eater	<1	21	2	1	1	1
<i>Merops apiaster</i>	European Bee-eater	<1	15	3	4	4	0
Colius striatus	Speckled Mousebird	28	64	4	0	0	5
<i>Urocolius indicus</i>	Red-faced Mousebird	22	71	4	3	3	4
<i>Chrysococcyx caprius</i>	Diderick Cuckoo	16	28	4	4	4	2
<i>Centropus burchellii</i>	Burchell's Coucal	8	8	4	1	2	1
<i>Cypsiurus parvus</i>	African Palm-Swift	2	45	4	4	4	4
<i>Apus affinis</i>	Little Swift	17	36	4	4	4	4
<i>Apus caffer</i>	White-rumped Swift	23	52	4	4	4	4
<i>Corythaixoides concolor</i>	Grey Go-away-bird	2	49	1	0	0	2
<i>Tyto alba</i>	Barn Owl	1	2	1	1	1	1
<i>Bubo africanus</i>	Spotted Eagle-Owl	2	4	1	2	1	1
<i>Asio capensis</i>	Marsh Owl	13	8	1	1	1	0
Columba livia	Rock Dove	26	57	4	4	4	5
Columba guinea	Speckled Pigeon	22	81	5	4	4	5
Streptopelia senegalensis	Laughing Dove	93	95	5	4	5	5
Streptopelia capicola	Cape Turtle-Dove	63	62	4	4	4	5
Streptopelia semitorquata	Red-eyed Dove	33	83	5	4	5	5
<i>Afrotis afraoides</i>	Northern Black Korhaan	3	26	0	2	1	0
<i>Gallinula chloropus</i>	Common Moorhen	61	33	2	0	0	0
<i>Gallinago nigripennis</i>	African Snipe	11	18	2	0	0	0
<i>Tringa glareola</i>	Wood Sandpiper	24	5	1	0	0	0
<i>Actitis hypoleucos</i>	Common Sandpiper	10	1	1	0	0	0
<i>Burhinus capensis</i>	Spotted Thick-knee	6	32	3	4	4	4
<i>Charadrius tricollaris</i>	Three-banded Plover	43	22	2	0	1	0
Vanellus armatus	Blacksmith Lapwing	72	80	5	1	2	3
<i>Vanellus senegallus</i>	African Wattled Lapwing	12	46	4	4	4	2
Vanellus coronatus	Crowned Lapwing	43	77	3	5	5	4
<i>Cursorius temminckii</i>	Temminck's Courser	<1	<1	0	1	1	0
<i>Larus cirrocephalus</i>	Grey-headed Gull	52	11	2	0	0	1
<i>Elanus caeruleus</i>	Black-shouldered Kite	52	49	4	4	4	4
<i>Falco amurensis</i>	Amur Falcon	2	13	2	3	3	0
<i>Tachybaptus ruficollis</i>	Little Grebe	63	30	2	0	0	0
<i>Phalacrocorax africanus</i>	Reed Cormorant	62	35	4	0	0	0
<i>Egretta garzetta</i>	Little Egret	5	7	3	0	0	0
<i>Ardea cinerea</i>	Grey Heron	23	13	2	0	0	0
Ardea melanocephala	Black-headed Heron	54	37	4	4	5	4

SCIENTIFIC NAME	ENGLISH NAME*	Reporting Rate(%)**		HABITAT PREFERENCE			
		SABAP1	SABAP2	AH	OG	DG	DT
<i>Ardea purpurea</i>	Purple Heron	15	8	2	0	0	0
<i>Bubulcus ibis</i>	Western Cattle Egret	56	53	5	5	5	4
<i>Ardeola ralloides</i>	Squacco Heron	7	4	1	0	0	0
<i>Butorides striata</i>	Green-backed Heron	2	1	2	0	0	0
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	22	4	1	0	0	0
<i>Scopus umbretta</i>	Hamerkop	8	6	2	0	0	0
<i>Plegadis falcinellus</i>	Glossy Ibis	46	35	3	0	0	0
<i>Bostrychia hagedash</i>	Hadeda Ibis	64	81	5	4	4	4
<i>Threskiornis aethiopicus</i>	African Sacred Ibis	62	38	4	0	0	0
<i>Telophorus zeylonus</i>	Bokmakierie	38	51	1	2	2	2
<i>Corvus albus</i>	Pied Crow	17	49	4	4	4	4
<i>Lanius collaris</i>	Southern Fiscal	81	83	5	4	5	5
<i>Hirundo rustica</i>	Barn Swallow	38	45	4	4	4	4
<i>Hirundo albigularis</i>	White-throated Swallow	15	40	4	4	4	4
<i>Hirundo cucullata</i>	Greater Striped Swallow	24	62	4	4	4	4
<i>Hirundo spilodera</i>	South African Cliff-Swallow	2	9	2	2	2	2
<i>Hirundo fuligula</i>	Rock Martin	2	9	0	1	1	1
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	35	77	4	1	1	4
<i>Pycnonotus nigricans</i>	African Red-eyed Bulbul	19	20	4	1	1	4
<i>Stenostira scita</i>	Fairy Flycatcher	5	10	0	0	0	1
<i>Sphenoeacus afer</i>	Cape Grassbird	2	7	2	0	1	0
<i>Acrocephalus schoenobaenus</i>	Sedge Warbler	3	<1	2	0	0	0
<i>Acrocephalus baeticatus</i>	African Reed-Warbler	10	14	3	0	0	0
<i>Acrocephalus arundinaceus</i>	Great Reed-Warbler	2	1	2	1	1	1
<i>Acrocephalus gracilirostris</i>	Lesser Swamp-Warbler	26	27	3	0	0	0
<i>Phylloscopus trochilus</i>	Willow Warbler	3	18	4	0	0	4
<i>Zosterops virens</i>	Cape White-eye	34	73	4	0	0	4
<i>Cisticola fulvicapilla</i>	Neddicky	14	48	4	4	4	4
<i>Cisticola juncidis</i>	Zitting Cisticola	10	33	4	4	4	1
<i>Cisticola aridulus</i>	Desert Cisticola	1	3	0	4	4	0
<i>Prinia subflava</i>	Tawny-flanked Prinia	8	39	4	4	4	4
<i>Prinia flavicans</i>	Black-chested Prinia	28	52	4	5	5	4
<i>Mirafra africana</i>	Rufous-naped Lark	15	35	4	4	4	3
<i>Chersomanes albofasciata</i>	Spike-heeled Lark	4	9	0	2	2	0
<i>Calandrella cinerea</i>	Red-capped Lark	3	11	0	4	4	4
<i>Psophocichla litsitsirupa</i>	Groundscraper Thrush	<1	1	0	1	1	1
<i>Sigelus silens</i>	Fiscal Flycatcher	25	61	0	0	0	1
<i>Muscicapa striata</i>	Spotted Flycatcher	4	13	2	0	0	1
<i>Cossypha caffra</i>	Cape Robin-Chat	38	83	4	0	0	4
<i>Saxicola torquatus</i>	African Stonechat	73	80	5	4	5	3
<i>Oenanthe monticola</i>	Mountain Wheatear	27	30	0	1	1	2
<i>Oenanthe pileata</i>	Capped Wheatear	7	24	0	4	4	0
<i>Cercomela familiaris</i>	Familiar Chat	17	17	0	0	0	1

SCIENTIFIC NAME	ENGLISH NAME*	Reporting Rate(%)**		HABITAT PREFERENCE			
		SABAP1	SABAP2	AH	OG	DG	DT
<i>Myrmecocichla formicivora</i>	Ant-eating Chat	17	20	1	4	4	1
<i>Lamprotornis nitens</i>	Cape Glossy Starling	21	67	2	1	1	3
<i>Spreo bicolor</i>	Pied Starling	40	47	4	5	5	4
<i>Creatophora cinerea</i>	Wattled Starling	5	16	2	2	2	2
<i>Sturnus vulgaris</i>	Common Starling (INT)	0	<1	2	2	2	2
<i>Acridotheres tristis</i>	Common Myna (INT)	40	90	5	4	5	5
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	2	25	4	1	1	4
<i>Ploceus capensis</i>	Cape Weaver	12	14	4	2	2	3
<i>Ploceus velatus</i>	Southern Masked-Weaver	85	94	4	4	4	4
<i>Quelea quelea</i>	Red-billed Quelea	7	16	2	2	2	2
<i>Euplectes afer</i>	Yellow-crowned Bishop	17	20	5	4	5	3
<i>Euplectes orix</i>	Southern Red Bishop	65	77	5	5	5	5
<i>Euplectes albonotatus</i>	White-winged Widowbird	1	10	4	4	4	4
<i>Euplectes ardens</i>	Red-collared Widowbird	17	54	3	2	2	1
<i>Euplectes progne</i>	Long-tailed Widowbird	63	57	5	5	5	2
<i>Amblyospiza albifrons</i>	Thick-billed Weaver	2	37	4	3	3	3
<i>Sporaeginthus subflavus</i>	Orange-breasted Waxbill	16	10	3	1	1	0
<i>Amadina erythrocephala</i>	Red-headed Finch	17	42	0	1	3	4
<i>Estrilda astrild</i>	Common Waxbill	21	37	4	4	4	3
<i>Lagonosticta rhodopareia</i>	Jameson's Firefinch	<1	10	1	0	0	0
<i>Vidua macroura</i>	Pin-tailed Whydah	42	41	4	4	4	4
<i>Passer domesticus</i>	House Sparrow (INT)	35	56	0	0	1	5
<i>Passer melanurus</i>	Cape Sparrow	80	86	4	5	5	5
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	6	19	4	4	4	4
<i>Motacilla capensis</i>	Cape Wagtail	84	70	4	0	0	4
<i>Macronyx capensis</i>	Cape Longclaw	35	71	4	4	4	0
<i>Anthus cinnamomeus</i>	African Pipit	12	36	3	4	4	2
<i>Crithagra atrogularis</i>	Black-throated Canary	24	56	4	4	4	4
<i>Crithagra flaviventris</i>	Yellow Canary	6	17	4	4	4	4
Avifaunal Biodiversity Index:				339	253	265	264

*Red data status according to Barnes (2000)/Red Data status according to Taylor *et al* (2015)

Latest bird names according to BirdLife South Africa Checklist of Birds in South Africa (2016)

**The reporting rate of SABAP1 and SABAP2 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.

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.

Red Data avifaunal species categories: **EX**= Extinct (regionally), **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened, **LC** = Least Concern, **DD** = Data Deficient, **NR** = Not Recognised by BirdLife International, **NA** = Not Assessed (Taylor *et al* 2015).

5.3 Threatened and Red Listed Bird Species

The following Red Data avifaunal species were recorded for the 2628AC q.d.g.c. according to the SABAP1 data (Harrison *et al.* 1997) and the SABAP2 data and more specifically the 2625_2810 pentad in which the study area is situated (sabap2.adu.org.za May 2017) (Table 2).

Table 2: Red Data avifaunal species recorded for the 2628AC q.d.g.c.

SCIENTIFIC NAMES	ENGLISH NAMES	REPORTING RATE (%)*		
		SABAP1	SABAP2	2625_2805
<i>Oxyura maccoa</i>	Maccoa Duck (LC/NT)	44	3	<1(n=1)
<i>Coracias garrulus</i>	European Roller (LC/NT)	<1	<1	<1(n=1)
<i>Alcedo semitorquata</i>	Half-collared Kingfisher (NT/NT)	0	<1	0
<i>Tyto capensis</i>	African Grass Owl (VU/VU)	1	1	5(n=18)
<i>Eupodotis caerulescens</i>	Blue Korhaan (NT/LC)	<1	<1	<1(n=1)
<i>Eupodotis senegalensis</i>	White-bellied Korhaan (VU/VU)	0	1	1(n=3)
<i>Anthropoides paradiseus</i>	Blue Crane (VUNT)	16	0	0
<i>Crex crex</i>	Corn Crane (VU/LC)	<1	1	<1(n=1)
<i>Glareola nordmanni</i>	Black-winged Pratincole (NT/NT)	<1	1	1(n=4)
<i>Sterna caspia</i>	Caspian Tern (NT/VU)	0	<1	0
<i>Circus ranivorus</i>	African Marsh Harrier (VU/EN)	2	2	1(n=2)
<i>Aquila verreauxii</i>	Verreaux's Eagle (LC/VU)	3	10	2(n=9)
<i>Circus maurus</i>	Black Harrier (NT/EN)	<1	<1	0
<i>Sagittarius serpentarius</i>	Secretarybird (NT/VU)	1	3	10(n=39)
<i>Falco naumanni</i>	Lesser Kestrel (VU/LC)	2	1	1(n=5)
<i>Falco vespertinus</i>	Red-footed Falcon (LC/NT)	<1	1	2(n=6)
<i>Falco biarmicus</i>	Lanner Falcon (NT/VU)	<1	1	1(n=4)
<i>Falco peregrinus</i>	Peregrine Falcon (NT/LC)	0	1	0
<i>Phoenicopterus ruber</i>	Greater Flamingo (NT/NT)	26	4	0
<i>Phoenicopterus minor</i>	Lesser Flamingo (NT/NT)	6	<1	0
<i>Mycteria ibis</i>	Yellow-billed Stork (NT/EN)	<1	<1	<1(n=1)
<i>Ciconia abdimii</i>	Abdim's Stork (LC/NT)	<1	<1	<1(n=1)
<i>Ciconia nigra</i>	Black Stork (NT/VU)	0	<1	0
<i>Mirafra cheniana</i>	Melodious Lark (NT/LC)	<1	1	1(n=4)
TOTAL:		19	23	16

*Red data status according to Barnes (2000)/Red Data status according to Taylor *et al* (2015)

Latest bird names according to BirdLife South Africa Checklist of Birds in South Africa (2016)

**The reporting rate of SABAP1 and SABAP2 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.

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. The colour codes of the SABAP2 reporting rate indicate the following: **Red** = decrease in reporting rate, **Green** = increase in reporting rate and **Blue** = stable reporting rate compared to the SABAP1 data.

Red Data avifaunal species categories: **EX**= Extinct (regionally), **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened, **LC** = Least Concern, **DD** = Data Deficient, **NR** = Not Recognised by BirdLife International, **NA** = Not Assessed (Taylor *et al* 2015).

A total of 24 Red Data avifaunal species have been recorded within the 2628AC q.d.g.c. during the SABAP1 period (Harrison *et al.* 1997) and the current SABAP2 period, 19 during the SABAP1 period, 23 during the current SABAP2 period and 16 for the pentad (SABAP2) in which the study area is situated (sabap2.adu.org.za May 2017)(Table 2).

A total of 21% (n=5) of the Red Data Species recorded for the 2628AC q.d.g.c. indicate a decrease in reporting rate, 50% (n=12) an increase in reporting rate and 29% (n=7) remains stable.

5.4 Summary of the red data avifaunal species

Table 3 provides a list of the Red Data avifaunal species recorded for the 2628AC q.d.g.c. according to the SABAP1 data (Harrison *et al.* 1997) and the current SABAP2 data and an indication of their likelihood of occurrence within the study area based on actual sightings, habitat and food availability.

Table 3: Red Data avifaunal species assessment for the study site and study area according to the SABAP1 and SABAP2 data for the AC q.d.g.c.

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Oxyura maccoa</i> (Maccoa Duck) (LC/NT)	NONE Prefers permanent wetlands in open grassland and semi-arid country (including fynbos, succulent Karoo, Nama Karoo) that support rich concentrations of benthic invertebrates. Breeding habitat usually contains stands of young, emergent vegetation, mainly rushes and sedges. In KwaZulu-Natal, breeding recorded only at farm dams.	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.
<i>Coracias garrulus</i> (European Roller) (LC/NT)	NONE Closed to very open savanna. Most common in open, broadleaved and <i>Acacia</i> woodlands with grassy clearings; least common in areas with less-developed woody cover.	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.
<i>Alcedo semitorquata</i> * (Half-collared Kingfisher) (NT/NT)	NONE 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> 1997a). 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.
<i>Tyto capensis</i> * (African Grass Owl) (VU/VU)	NONE 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,	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
	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 dried 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> 1997a).	
<i>Eupodotis caerulescens</i> (Blue Korhaan) (VU/LC)	<p style="text-align: center;">NONE</p> <p>Occurs in flat undulating terrain in grassland and Nama Karoo, where rainfall 300-1 000 mm /a. Often on damp ground; sometimes attracted to burnt areas. Favours short vegetation; 61 % of 141 groups where vegetation ≤ belly height. At Wakkerstroom, Mpumalanga, abundance positively correlated with altitude, flat topography and burnt grassland. In Nama Karoo, 96% of 88 groups in natural vegetation, 2% in fallow fields, 1% in cultivated grass and pastures and 1% in lucerne pastures. At De Aar, Northern Cape, near western edge of range, only found close to large lucerne fields. Remains < 1 km from water (Hockey <i>et al.</i>, 2005).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.</p> <p>Localised in SE Gauteng were common. Occasional visitor to most other areas in Gauteng. (Marais & Peacock, 2008)</p>
<i>Eupodotis senegalensis</i> * (White-bellied Korhaan) (VU/VU)	<p style="text-align: center;">NONE</p> <p>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> 1997a).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Scarce in Gauteng and secretive resident; widespread (Marais & Peacock, 2008)</p>
<i>Anthropoides paradiseus</i> * (Blue Crane) (VU/NT)	<p style="text-align: center;">NONE</p> <p>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 inhabit 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> 1997a).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Localised but common in the south-eastern Gauteng (Marais & Peacock, 2008)</p>
<i>Crex crex</i> (Corn Crane) (VU/LC)	<p style="text-align: center;">NONE</p> <p>Rank grassland and savanna, dry grassland bordering marshes and streams, including long grass areas of seasonally flooded grassland and, occasionally, wet clay patches and soft mud fringing ponds. In <i>Acacia</i> savanna, occurs mostly where trees are small and scattered, and grass dense often tussocky, 0.7 – 1.5 m tall (Hockey <i>et al.</i> 2005).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable foraging habitat Rare summer visitor. Widespread but elusive (Marais & Peacock, 2008).</p>

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<p><i>Glareola nordmanni</i> (Black-winged Pratincole) (NT/NT)</p>	<p style="text-align: center;">NONE</p> <p>A non-breeding overland migrant to southern Africa. In southern Africa winter quarters, prefers open grassland, edges of pans and cultivated fields, but most common in seasonally wet grasslands and pan systems. Attracted to damp ground after rains, also to agricultural activities, including mowing and ploughing, and to newly flooded grassland (Hockey <i>et al.</i> 2005).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.</p> <p>Erratic summer migrant sometimes in large flocks (Marais & Peacock, 2008)</p>
<p><i>Sterna caspia</i> (Caspian Tern) (NT/VU)</p>	<p style="text-align: center;">NONE</p> <p>Occurs along coast, mostly in sheltered bays and estuaries. Inland, at large water bodies, both natural and man-made, with preference for saline pans and large impoundments. Coastal breeding habitat primarily offshore islands, but with increasing use of sandy beaches and islands in saltworks, where protection is offered. Inland, breeds on small, low islets in pans and dams (Hockey <i>et al.</i> 2005).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable foraging and breeding habitat. Non-breeding winter visitor to large water bodies in Gauteng (Marais & Peacock, 2008)</p>
<p><i>Circus ranivorus</i>* (African Marsh Harrier) (VU/EN)</p>	<p style="text-align: center;">NONE</p> <p>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>, 1997a). 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).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Declining resident of large vleis, occurs mainly in south-eastern Gauteng (Marais & Peacock, 2008)</p>
<p><i>Circus maurus</i> Black Harrier (NT/EN)</p>	<p style="text-align: center;">NONE</p> <p>Black Harriers hunts over dry and damp grasslands, fynbos and karoo. It also exploits cultivated lands. The known range of the Vlei Rat <i>Otomys irroratus</i> coincides accurately with its present distribution (Harrison <i>et al.</i>, 1997).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.</p>
<p><i>Aquila verreauxii</i> (Verreaux's Eagle) (LC/VU)</p>	<p style="text-align: center;">NONE</p> <p>Mountains and rocky areas with cliffs.</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.</p>
<p><i>Sagittarius serpentarius</i>* (Secretarybird) (NT/VU)</p>	<p style="text-align: center;">NONE</p> <p>Open grassland with scattered trees, shrubland, open <i>Acacia</i> and <i>Combretum</i> savanna (Hockey <i>et al.</i> 2005). Restricted to large conservation areas in the region. Avoids densely wooded areas, rocky hills and mountainous areas (Hockey <i>et al.</i> 2005 & Barnes, 2000). Requires small to medium-sized trees with a flat crown for nesting, and often roosts in similar locations. Nesting density only about 150 km²/pair (n = 4, Kemp, 1995).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Uncommon in open areas within Gauteng (Marais & Peacock, 2008)</p>

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<p><i>Falco naumanni</i>* (Lesser Kestrel) (VU/LC)</p>	<p style="text-align: center;">NONE</p> <p>Non-breeding Palaearctic 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 & 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> Due to a lack of suitable breeding and foraging habitat. Localised summer migrant (Marais & Peacock, 2008)</p>
<p><i>Falco vespertinus</i> (Red-footed Falcon) (VU/LC)</p>	<p style="text-align: center;">NONE</p> <p>Gregarious; on non-breeding grounds (southern Africa), spends much of day in air, often at high altitude, but lower in mornings and evenings when hawking emergent insects. Frequently perches on dead trees, telephone poles and wires, and fence lines. Aggregates in late evening at communal roosts, sometimes containing 1 000+ birds. Settles at dusk, dispersing to foraging area at first light. In east of region, small numbers associate with large flocks of Amur Falcons and/or Lesser Kestrels. Flight graceful, with much gliding and soaring. European breeding population reduced by habitat loss and pesticide spraying.</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding habitat.</p>
<p><i>Falco biarmicus</i>* (Lanner Falcon) (NT/VU)</p>	<p style="text-align: center;">NONE</p> <p>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> 1997a).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding habitat. Uncommon resident in open areas in Gauteng (Marais & Peacock, 2008)</p>

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<p><i>Falco peregrinus</i> (Peregrine Falcon) (NT/LC)</p>	<p style="text-align: center;">NONE</p> <p>Resident <i>F. p. minor</i> mostly restricted to mountainous riparian or coastal habitats, where high cliffs provides breeding and roosting sites. Breeding pairs prefer habitats that favour specialised, high speed, aerial hunting, e.g. high cliffs overhanging vegetation with raised and/or discontinuous canopy (e.g. forest, fynbos, woodland), or expanses of open water. Also uses quarries and dam walls, and frequents city centres, e.g. Cape Town, where tall buildings substitute for rock faces. Migrant <i>F. p. calidus</i> in more open country, often coastal, even roosting on ground on almost unvegetated salt flats.</p>	<p><u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat. Uncommon resident and summer migrant in Gauteng (Marais & Peacock, 2008)</p>
<p><i>Phoenicopterus roseus</i>* (Greater Flamingo) (NT/NT)</p>	<p style="text-align: center;">NONE</p> <p>Breeds at recently flooded, large, eutrophic wetlands (favoured foraging habitat), shallow salt pans; at other times, at coastal mudflats, inland dams, sewage treatments works, small ephemeral pans and river mouths (Hockey <i>et al.</i> 2005). Usually breeds colonially on mudflats in large pans (Harrison <i>et al.</i> 1997a). Shallow pans, especially saline pans when they have water; also occasionally on other bodies of shallow water such as dams and vleis (Tarboton <i>et al.</i> 1987). Large bodies of shallow water, both inland and coastal; prefers saline and brackish water (Maclean 1993). Occasionally forages along sandy coasts.</p>	<p><u>Highly unlikely</u> Due to a lack of suitable foraging and breeding habitat. Mainly restricted to the south-eastern Gauteng (Marais & Peacock, 2008)</p>
<p><i>Phoenicopterus minor</i>* (Lesser Flamingo) (NT/NT)</p>	<p style="text-align: center;">NONE</p> <p>Primarily open, shallow eutrophic, wetlands and coastal lagoons and may occur on water bodies which are more saline and more alkaline than those used by <i>Phoenicopterus ruber</i> (Greater Flamingo). Breeds on saline lakes, salt pans and mudflats far out in pans and lakes (Harrison <i>et al.</i> 1997a). Non-breeding birds aggregate at coastal mudflats, salt works and sewage treatment works where salinities are high. Small, ephemeral freshwater wetlands very important for birds dispersing from breeding grounds (Hockey <i>et al.</i>, 2005). Shallow pans, especially saline pans when they contain water (Tarboton <i>et al.</i>, 1987). Large brackish or saline inland and coastal waters (Maclean, 1993).</p>	<p><u>Highly unlikely</u> Due to a lack of suitable foraging and breeding habitat. Mainly restricted to the south-western and south-eastern Gauteng (Marais & Peacock, 2008)</p>
<p><i>Mycteria ibis</i> (Yellow-billed Stork) (NT/EN)</p>	<p style="text-align: center;">NONE</p> <p>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 & Peacock, 2008)</p>

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Ciconia nigra</i> * (Black Stork) (NT/VU)	NONE 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> 1997a). 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>Ciconia abdimii</i> (Abdim's Stork) (NT/NT)	NONE Grassland, savanna woodland, pan edges, pastures, cultivated land and suburban areas. On migration and after good rains, in semi-desert habitats, including Kalahari. Generally absent from wetlands, but uses rice paddies and marshes near Beira, Mozambique (Hockey <i>et al.</i> , 2005).	<u>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.
<i>Mirafra cheniana</i> (Melodious Lark) (NT/LC)	NONE 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>Highly unlikely</u> Due to a lack of suitable breeding and foraging habitat.

*Priority Red Data bird species according to GDARD.

**Red data status according to Barnes (2000)/Red Data status according to Taylor *et al* (2015)

Latest bird names according to BirdLife South Africa Checklist of Birds in South Africa (2016)

Red Data avifaunal species Categories : **EX**= Extinct (regionally), **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened, **LC** = Least Concern, **DD** = Data Deficient, **NR** = Not Recognised by BirdLife International, **NA** = Not Assessed (Taylor *et al* 2015).

6. FINDINGS AND POTENTIAL IMPLICATIONS

6.1 Red Data avifaunal species confirmed from the study site for which suitable foraging, breeding and roosting habitat was confirmed:

None

6.2 Red Data avifaunal species confirmed within the study area for which suitable foraging, breeding and roosting habitat was confirmed:

None

6.4 Red Data avifaunal species for which suitable foraging, breeding and/or roosting habitat was confirmed from the study site:

None

6.5 Red Data avifaunal species for which suitable foraging, breeding and/or roosting habitat was confirmed within the study area:

None

The study area does not offer suitable habitat for any of the other Red Data avifaunal species recorded for the 26628AC q.d.g.c. Some are only likely to move through the area on very rare occasions.

Particular reference was made to the occurrence of African Grass Owl (*Tyto capensis*) and Secretarybird (*Sagittarius serpentarius*) on or surrounding the study site.

African Grass Owl (*Tyto capensis*):

Criteria for IUCN threatened category (2013): Status: **Least Concern**

Red Data Status according to Barnes (2000): **Vulnerable.**

Red Data Status according to BirdLife SA: Regionally: **Vulnerable**, Globally: **Least Concern**

Habitat: The African Grass Owl is found exclusively in rank grass at fairly high altitudes (Cyrus & Robson 1980) and has been recorded breeding in permanent vleis. It will also breed in long grass usually close to some kind of wetland system but according Tarbonton (*in litt*) their breeding habitat is or not necessarily associated with wetlands. They nest within a system of tunnels on the ground in tall grass with the peak breeding season being between February to April which usually coincides with maximum grass cover (Steyn 1982). In years when rodents are abundant they will hunt during the night over adjacent grassland and dry savanna, which is typically regarded as a sub-optimal habitat (Kemp & Calburn 1987). Their hunting does not extend to agricultural croplands or to short grasslands and seems to be confined to tall grasslands (Kemp & Calburn 1987).

Threat: Land-use change, habitat loss and fragmentation of their ecological requirements are the largest factors that impact this species negatively (Barnes 2000).

On site conclusion: The comparisons between SABAP1 and SABAP2 indicate a stable reporting rate for African Grass Owls for the 2628AC q.d.g.c. The wetland habitat and more specifically the wetland grass area around the tributary of the Rietspruit on the southern border of the study site does not offer suitable breeding, roosting and foraging habitat for the African Grass-Owl.

Secretarybird (*Sagittarius serpentarius*):

Criteria for IUCN threatened category (2013): Status: **Vulnerable**

Red Data Status according to Barnes (2000): **Vulnerable.**

Red Data Status according to BirdLife SA: Regionally: **Vulnerable**, Globally: **Vulnerable**

Habitat: Secretarybird occur in grassland to open woodland, at all altitudes. They avoid densely wooded areas or rocky and hilly country and does not occur in forested areas. Within KwaZulu Natal their habitat ranges from upland grassland, including mountain slopes, to lightly wooded savanna from 300 m.a.s.l. upwards. They require large territories of up to 230 km² outside protected areas and usually smaller territories within conservation areas (Steyn 1982).

Threat: Near-threatened according to Barnes (2000) but now vulnerable according to Taylor *et al* (2015). Secretarybirds are sensitive to habitat degradation from overgrazing and bush encroachment, disturbance, loss of habitat to afforestation and crop cultivation and human-induced decrease and has undergone rapid decline outside protected areas.

On site conclusion: The area on and surrounding the study site is highly disturbed and does not offer suitable habitat for Secretarybirds. They are only likely to fly over the area

to more suitable habitat such as the Suikerbosrand Nature Reserve to the south of the study site.

7. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The Galago Environmental team has appropriate training and registration, as well as extensive practical experience and access to wide-ranging data bases to consider the derived species lists with high limits of accuracy. In this instance the biodiversity of all Alignments has to a greater or lesser extent been jeopardized, which renders the need for field surveys unnecessary. In instances where uncertainty exists regarding the presence of a species it is listed as a potential occupant, which renders the suggested mitigation measures and conclusions more robust.

Even though every care is taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time and budget. Discussions and proposed mitigations are to some extent made on reasonable and informed assumptions built on *bone fide* information sources, as well as deductive reasoning. Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage. Galago Environmental can thus not accept responsibility for conclusions and mitigation measures made in good faith based on own databases or on the information provided at the time of the directive. This report should therefore be viewed and acted upon with these limitations in mind.

The on-site bird survey was done at the end of the main breeding season of most species and during the time when most Palaearctic and intra-African have already started their northern migration. This, however, will not have an effect on recording Red Data species, since most Red Data species are resident to South Africa and the few Red Data species that are Palaearctic migrants are mainly threatened in their northern hemisphere distribution ranges.

The site surveys was done during several hours in one day and not on a regular basis during several season over a period of time thus the avifaunal biodiversity could change slightly as more species are confirmed from the various habitat system within the study area. The time of the day and weather condition also as has an effect on the number of species recorded in the study area during the site visit. The general assessment of species rests mainly on the 1987 atlas for birds of the then-Transvaal (Tarboton *et al.* 1987), the 1997 SABAP1 atlas data (Harrison *et al.* 1997) and the current data for the SABAP2 period for comparison, so any limitations in either of those studies will by implication also affect this survey and conclusions.

The general assessment of species rests mainly on the 1997 SABAP1 atlas data (Harrison *et al.* 1997) for comparison with the current SABAP2 atlas, so any limitations in either of those studies will by implication also affect this survey and conclusions.

Furthermore the number of atlas cards received and the diversity of habitat systems surveyed for avifaunal species within a q.d.g.c. or pentad or lack thereof could also have an effect on the avifaunal diversity that could potentially occur on the study site.

8. RECOMMENDED MITIGATION MEASURES

The following mitigation measures are proposed by the specialist:

- 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.
- 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.
- During the construction phase, noise must be kept to a minimum to reduce the impact of the development on the fauna residing in the surroundings.
- Alien and invasive plants must be removed.

9. CONCLUSIONS

The study area does not offer suitable habitat for the Red Data avifaunal species recorded for the 2628AC q.b.g.c. These Red Data avifaunal species are habitat specific and unable to adapt to areas changed by man. In general the reporting rate of all Red Data avifaunal species recorded for the q.d.g.c. is very low at 1% and less and if they should occur, they are only likely to move through the area on very rare occasions and are unlikely to make use of the habitat systems on a permanent basis. More suitable habitat exists for Red Data avifaunal species within the Suikerbosrand Nature Reserve to the south of the study site. The study site and surrounding study area can be regarded as low sensitive (Figure 7).

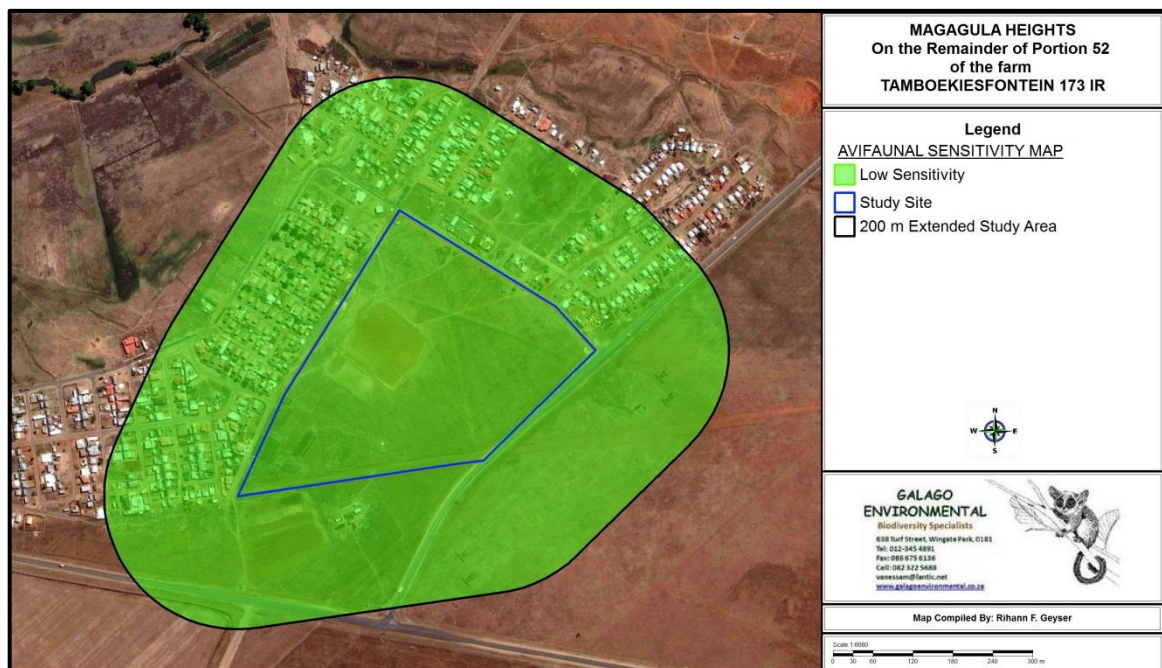


Figure 7: Avifaunal sensitivity map

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