Avifaunal Habitat Scan

Tshilindzini Hospital

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DECLARATION OF INDEPENDENCE:

I, **Rihann Frans Geyser** (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 Limnology (Pty) Ltd for the proposed development 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 Limnology (Pty) Ltd 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. Geyser

VERIFICATION STATEMENT

Mr Rihann F. Geyser 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. Geyser has been prepared under my supervision, and I have verified the contents thereof.

I, **Bertus Fourie,** declare that -

- I am subcontracted as specialist consultant by Limnology (Pty) Ltd for the project,
- I am a Professional Natural Scientist registered in the field of Ecology,
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity; I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing
  - any decision to be taken with respect to the application by the competent authority; and
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realize that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Bertus Fourie (Pr.Sci.Nat)

Limnologist

SACNASP Pr.Sci.Nat. Reg. No: 400126/17

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1. INTRODUCTION

Limnology PTY Ltd. was appointed to undertake an avifaunal habitat scan for the proposed Tshilindzini development (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

The study site is located at 22°59'34.57"S 30°24'53.56"E, north of the R524, near Makumbane, Limpopo, South Africa (Figure 1).

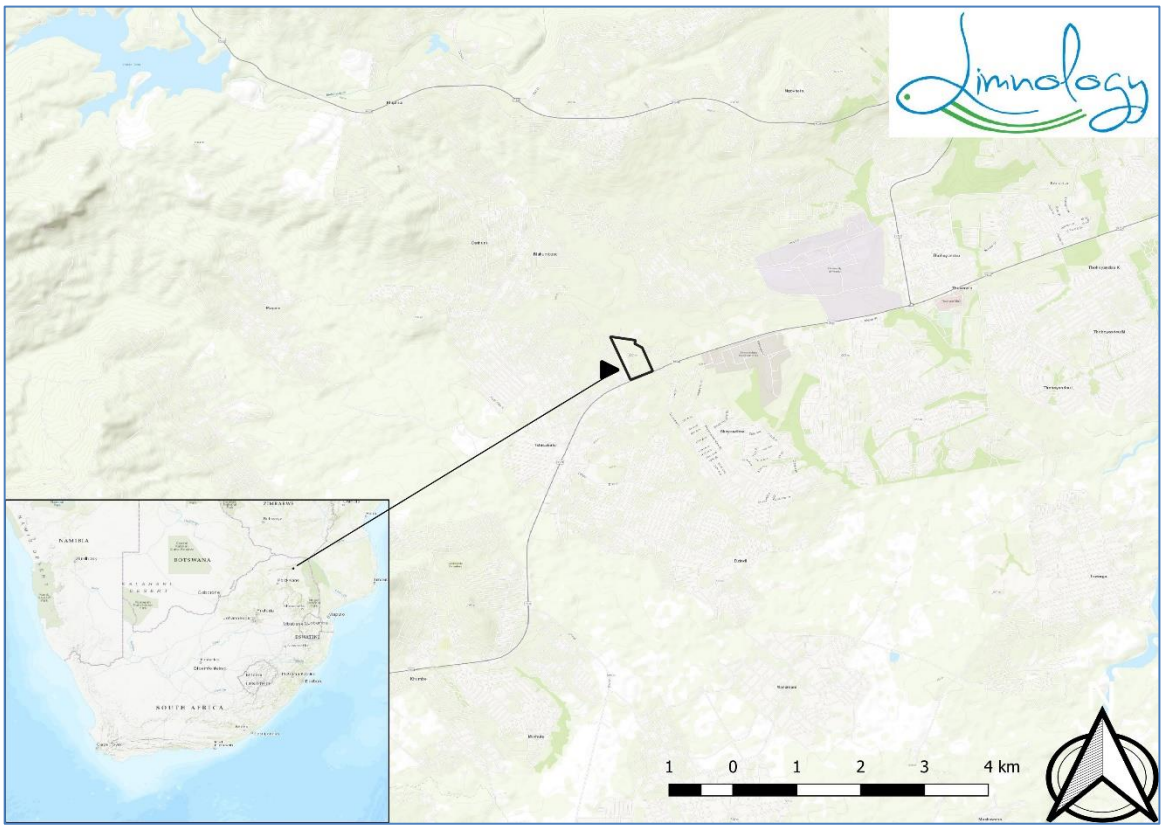

FIGURE 1: STUDY SITE LOCATION

3.1. Proposed Activities

Redevelopment of the existing hospital infrastructure.

3.2. Regional description and vegetation

Mucina & Rutherford (2006) classified the area as SVl 3 Granite Lowveld**.**

Distribution

Limpopo and Mpumalanga Provinces, Swaziland and marginally also KwaZulu-Natal: A north-south belt on the plains east of the escarpment from Thohoyandou in the north, interrupted in the Bolobedu area, continued in the Bitavi area, with an eastward extension on the plains around the Murchison Range and southwards to Abel Erasmus Pass, Mica and Hoedspruit areas to the area east of Bushbuckridge. Substantial parts are found in the Kruger National Park spanning areas east of Orpen Camp southwards through Skukuza and Mkuhlu, including undulating terrain west

of Skukuza to the basin of the Mbyamiti River. It continues further southward to the Hectorspruit area with a narrow westward extension up the Crocodile River Valley past Malelane, Kaapmuiden and the Kaap River Valley, entering Swaziland between Jeppe's Reef in the west and the Komati River in the east, through to the area between Manzini and Siphofaneni, including the Grand Valley, narrowing irregularly and marginally entering KwaZulu-Natal near Pongola. Altitude 250–700 m.

Vegetation & Landscape Features:

Tall shrubland with few trees to moderately dense low woodland on the deep sandy uplands with *Terminalia sericea*, *Combretum zeyheri* and *C. apiculatum* and ground layer including *Pogonarthria squarrosa*, *Tricholaena monachne* and *Eragrostis rigidior*. Dense thicket to open savanna in the bottomlands with *Acacia nigrescens*, *Dichrostachys cinerea*, *Grewia bicolor* in the woody layer. The dense herbaceous layer contains the dominant *Digitaria eriantha*, *Panicum maximum* and *Aristida congesta* on fine-textured soils, while brackish bottomlands support *Sporobolus nitens*, *Urochloa mosambicensis* and *Chloris virgata*. At seep lines, where convex topography changes to concave, a dense fringe of *Terminalia sericea* occurs, with *Eragrostis gummiflua* in the undergrowth.

Geology & Soils

From north to south, the Swazian Goudplaats Gneiss, Makhutswi Gneiss and Nelspruit Suite (granite gneiss and migmatite), and further south still, the younger Mpuluzi Granite (Randian) form the major basement geology of the area. Archaean granite and gneiss weather into sandy soils in the uplands and clayey soils with high sodium content in the lowlands.

Climate

Summer rainfall with dry winters. MAP from about 450 mm on the eastern flats to about 900 mm near the escarpment in the west. In a north-south direction, MAP of the unit appears to peak in Swaziland. Generally a frost-free region. Mean monthly maximum and minimum temperatures for Skukuza 39.5°C and –0.1°C for January and June, respectively. Corresponding values for Hoedspruit 38.0°C and 3.7°C for January and July, respectively. See also climate diagram for SVl 3 Granite Lowveld.

Important Taxa

Tall Trees: *Acacia nigrescens* (d), *Sclerocarya birrea* subsp. *caffra* (d). Small Trees: *Acacia nilotica* (d), *Albizia harveyi* (d), *Combretum apiculatum* (d), *C. imberbe* (d), *C. zeyheri* (d), *Ficus stuhlmannii* (d), *Peltophorum africanum* (d), *Pterocarpus rotundifolius* (d), *Terminalia sericea* (d), *Acacia exuvialis*, *A. gerrardii*, *Bolusanthus speciosus*, *Cassia abbreviata* subsp. *beareana*, *Combretum collinum* subsp. *suluense*, *Dalbergia melanoxylon*, *Gymnosporia glaucophylla*, *Lannea schweinfurthii* var. *stuhlmannii*, *Pavetta schumanniana*, *Plectroniella armata*, *Terminalia prunioides*. Tall Shrubs: *Combretum hereroense* (d), *Dichrostachys cinerea* (d), *Euclea divinorum* (d), *Strychnos madagascariensis* (d), *Gardenia volkensii*, *Hibiscus micranthus*, *Tephrosia polystachya*. Low Shrubs: *Abutilon austro-africanum*, *Agathisanthemum bojeri*, *Aptosimum lineare*, *Barleria elegans*, *Clerodendrum ternatum*, *Commiphora africana*, *Gossypium herbaceum* subsp. *africanum*, *Pavonia burchellii*. Woody Climber: *Sphedamnocarpus pruriens* subsp. *pruriens*. Herbaceous Climber: *Rhynchosia totta*. Graminoids: *Brachiaria nigropedata* (d), *Digitaria eriantha* subsp. *eriantha* (d), *Eragrostis rigidior* (d), *Melinis repens* (d), *Panicum maximum* (d), *Pogonarthria squarrosa* (d), *Aristida congesta*, *Bulbostylis hispidula*, *Chloris mossambicensis*, *Enneapogon cenchroides*, *Heteropogon contortus*, *Leptochloa eleusine*, *Perotis patens*, *Schmidtia pappophoroides*, *Sehima galpinii*, *Tricholaena monachne*, *Urochloa mosambicensis*. Herbs: *Achyranthes aspera*, *Aspilia mossambicensis*, *Becium filamentosum*, *Chamaecrista absus*, *Commelina benghalensis*, *C. erecta*, *Cucumis africanus*, *Evolvulus alsinoides*, *Heliotropium strigosum*, *Hermbstaedtia odorata*, *Hibiscus praeteritus*, *Indigofera filipes, I. sanguinea*, *Kohautia virgata*, *Kyphocarpa angustifolia*, *Leucas glabrata*, *Ocimum gratissimum*, *Phyllanthus maderaspatensis*, *Pupalia lappacea*, *Vahlia capensis* subsp. *vulgaris*, *Waltheria indica*. Succulent Herbs: *Orbea rogersii*, *Stapelia leendertziae.*

4. METHODS

A two-hour site visit was conducted on 20 March 2020 to identify possible sensitive avifaunal habitat systems. During this visit the observed and derived presence of Red Data 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 Red Data 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. 2627BB, were verified from SABAP1 (southern Africa Bird Atlas Project 1) data (Harrison *et al.* 1997) and the current SABAP2 project (SABAP2 data for the 2627BB q.d.g.c. and for the 2605_2745 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 ÷ 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. 2627BB covers an area of ±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 ±8 X 7.6 km (5 minutes of latitude by 5 minutes of longitude, 5' x 5') (Figure 2) 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 2: THE 2627BB Q.D.G.C. DIVIDED IN NINE SMALLER GRIDS REPRESENTING A PENTAD (RED REPRESENTS STUDY SITE)

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*)

5. RESULTS

5.1. Avifaunal Habitat Assessment

One of the primary reasons for conserving avifaunal species is that they are environmental indicators. Being a very mobile fauna, they move from less favourable environments to more favourable ones and are the first to respond to any environmental change, whether positive or negative. One of the difficulties with human-induced environmental change is that it can often be many years before the full, long-term effects of a particular action become apparent. However, avifaunal species are quick to colonize optimal environments and to leave poor or degraded ones.

Some avifaunal species are habitat-specific or have very definite biological or ecological requirements, such as specific breeding, roosting or foraging habitat systems. These avifaunal

species may not be able to move on and so often become threatened species, especially if their preferred habitat continues to shrink or degrade due to various impacts, which could include change in land-use or water regimes, altered weather patterns, and impacts such as overgrazing, bush encroachment, afforestation, desertification, human development and the general transformation of natural vegetation due to urbanisation, mining and industrialisation. The number of threatened species in an area is therefore an indication of its general environmental health. Avifaunal species are very sensitive to environmental change and when deciding on whether a habitat is suitable, avifaunal species consider things such as the arrangement of vegetation, spaces between the foliage in trees and so on. Because of this sensitivity to their surroundings, avifaunal species can also be used as indicators to determine the health of existing areas. The presence or absence of certain avifaunal species (not only threatened species but also the more common grassland or wetland species) can give an immediate indication of the quality of the habitat system, such as water quality, depending on particular species individual requirements. This is however a long-term process and the presence of these avifaunal species in a certain area can only be determined over a period of time and during different seasons. The availability of suitable habitat is just as important due to the rate that these habitats are being transformed not only for threatened avifaunal species but also species that are habitat specific such as endemic and near-endemic avifaunal species.

Some avifaunal species will favour a specific habitat type such as open grassland while other bird species will make use of more than one habitat system such as open grassland and woodland vegetation. Some avifaunal species are able to adapt to areas change by man while other are very sensitive to human disturbance and areas transformed by man.

Only two major avifaunal habitat systems were identified within the study area. These habitat systems are as follow:

- Subsistence agricultural croplands
- Disturbed and transformed areas

5.1.1. Subsistence agricultural croplands

Most of the total surface area of the study area consists of wet areas along a drainage line overgrown by agricultural croplands.

Agriculture is a major environmental problem for threatened bird species. The tilling of soil for cultivated fields is one of the most drastic and irrevocable alternations wrought on natural systems, destroying the structure and species composition of the natural vegetation (Barnes, 1998). This disturbance is mainly permanent and thereby has a massive impact on the taxa that are dependent on that vegetation. Bird species that are able to exploit monoculture and cultivated crops or by-product of cultivation such as bare ground may benefit temporarily.

The conversion of natural vegetation into cultivated fields has a negative impact on natural vegetation. Seed-eating bird species (granivorous species), such as quelea, doves and bishops, largely benefit from maize, wheat and other cereals as their seeds supply food in large quantities. Many of these species flock in large numbers on to these fields and become pests to farmers, and weeds that grow on cropped and/or fallow fields also supply abundant seeds. The birds least likely to be affected by this transformation of grassland to cultivated fields are smaller species that are able to persist in small fragmented remnants of the undisturbed grassland habitat. The larger species with larger home ranges are most likely to show disrupted patterns of distribution (Barnes, 1998). The only species that will benefit from the current state of this disturbed habitat are bishops, widowbirds, waxbills, cisticolas and prinias, that forage and breed within the grass but feed among the plants that have been established on these cultivated fields. Aerial feeding birds such as martins, swifts and swallows will hunt for insects over these cultivated fields, and some Red Data species such as the Blue Crane, and White-bellied and Blue Korhaans, have been observed to forage and breed on or adjacent to agricultural land and fields (Barnes, 2000).

5.1.2. Disturbed and Transformed Areas:

The rest of the study area is disturbed and has been transformed by past and present human activities. These areas include built-up areas interspaces with garden vegetation, graded area, 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 change by man will make use if this habitat system. None of these species that occur within this habitat systems are threatened.

The avifaunal species diversity in this habitat system generally includes a variety of arboreal passerines, such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers, and arboreal non-passerines, such as doves, cuckoos barbets, hoopoes, hornbills and woodpeckers.

Many of these species make use of the nature of the trees to build their nests. Aerial-feeding avifaunal species such as swallows and swifts will hunt for insects between the trees that grow within this habitat system.

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.

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, man-made dams such as at golf courses, 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.

5.2. Threatened and Red Listed Bird Species

The following Red Data avifaunal species were recorded for the 2627BB q.d.g.c. according to the SABAP1 data (Harrison *et al.* 1997) and the SABAP2 data for the 2627BB q.d.g.c. and more specifically the 2605_2745 pentad in which the study area is situated (sabap2.adu.org.za March 2020) (Table 1).

TABLE 1: RED DATA AVIFAUNAL SPECIES RECORDED FOR THE 2627BB Q.D.G.C.

SCIENTIFIC NAMES	COMMON NAMES*	Reporting Rate (%)**		
		SABAP1	SABAP2	Pentad
Coracias garrulus	European Roller (LC/NT)	**4(n=1)**	0	0
Alcedo semitorquata	Half-collared Kingfisher (NT/NT)	0	**3(n=1)**	0
Poicephalus robustus	Cape Parrot (EN/EN)	**22(n=5)**	0	0

SCIENTIFIC NAMES	COMMON NAMES*	Reporting Rate (%)**		
		SABAP1	SABAP2	Pentad
Lissotis melanogaster	Black-bellied Bustard (NT/NT)	**4(n=1)**	0	0
Terathopius ecaudatus	Bateleur (VU/EN)	**4(n=1)**	0	0
Aquila verreauxii	Verreaux's Eagle (LC/VU)	**4(n=1)**	0	0
Stephanoaetus coronatus	African Crowned Eagle (NT/VU)	**13(n=3)**	**3(n=1)**	0
Falco biarmicus	Lanner Falcon (NT/VU)	0	**5(n=2)**	0
Ciconia abdimii	Abdim's Stork (LC/NT)	**4(n=1)**	0	0
Zoothera gurneyi	Orange Ground Thrush (NT/NT)	**9(n=2)**	**5(n=2)**	0
Hypargos margaritatus	Pink-throated Twinspot (NT/LC)	**13(n=3)**	**25(n=10)**	0
	TOTAL:	**9**	**5**	**0**

*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 23 Red Data avifaunal species have been recorded within the 2627BB q.d.g.c. during the SABAP1 period (Harrison *et al*. 1997) and the current SABAP2 period, 18 during the SABAP1 period , 21 during the current SABAP2 period and 2 for the pentad (SABAP2) in which the study area is situated (sabap2.adu.org.za March 2020).

A total of 35% (n=8) of the Red Data Species recorded for the 2627BB q.d.g.c. indicate a decrease in reporting rate, 26% (n=6) an increase in reporting rate and 39% (n=9) remains stable.

5.3.SUMMARY OF THE RED DATA AVIFAUNAL SPECIES

Table 2 provides a list of the Red Data avifaunal species recorded for the 2230CD 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. These species exclude those species that are now of least concern (**LC**).

TABLE 2: RED DATA AVIFAUNAL SPECIES ASSESSMENT FOR THE STUDY SITE AND STUDY AREA ACCORDING TO THE SABAP1 AND SABAP2 DATA FOR THE 2230CD Q.D.G.C.

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
Coracias garrulus (European Roller) (**LC/NT**)	**SUBOPTIMAL** Closed to very open savanna. Most common in open, broadleaved and *Acacia* woodlands with grassy clearings; least common in areas with less-developed woody cover.	Unlikely Might only pass through the area on rare occasions to and from more suitable habitat surrounding the study site.
Alcedo semitorquata (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 *et al*. 1987) and requires riverbanks in which to excavate nest tunnels (Harrison *et al.* 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.	Highly unlikely Due to a lack of suitable habitat.

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
Poicephalus robustus (Cape Parrot) (**EN/EN**)	**NONE** Afromontane forest, primarily canopy of yellowwood trees (*Podocarpus* spp), particularly Small-leaved Yellowwood *Podocarpus falcatus*. Occasionally forages in other habitats with fruiting trees, including orchards (Hockey *et al*. 2005).	Highly unlikely Due to a lack of suitable habitat
Lissotis melanogaster (Black-bellied Bustard) (**NT/NT**)	**NONE** Occur in tall dense grassland and grassy savanna, in both hilly and flat country, where rainfall is above 600 mm. In various woodland types, including cluster-leaf (*Terminalia* spp), Zambezi Teak *Baikiaea plurijuga*, bushwillows (*Combretum* spp), Mopane *Colophospermum mopane* and miombo (*Brachystegia*). Often at wetland margins, and occasionally in cultivated pastures, fields and fallow lands. Generally at low altitude, but up to 1 800 m near Wakkerstroom, Mpumalanga.	Highly unlikely Due to a lack of suitable habitat
Terathopius ecaudatus (Bateleur) (**VU/EN**)	**NONE** Predominately a bird of semi-arid regions (rainfall less than 600mm and often less than 400mm), it has a marked preference for arid woodland, Mopane, dry bush country as in the Kalahari, and in the arid parts of Namibia, particularly the Namib Desert itself. Even in well-wooded country it prefers open areas with scattered short trees (Harrison *et al*. 1997a).	Highly unlikely Due to a lack of suitable habitat and disturbance cause by the large scale development on and surrounding the study site.
Aquila verreauxii (Verreaux's Eagle) (**LC/VU**)	**NONE** Mountains and rocky areas with cliffs (Hockey *et al*. 2005).	Highly unlikely Due to a lack of suitable habitat end the high human population on and surrounding the study site.
Stephanoaetus coronatus	**NONE**	Highly unlikely

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
(African Crowned Eagle) (**NT/VU**)	Occurs in dense indigenous forest, including riverine gallery forest; may range far from forest to hunt.	Due to a lack of suitable habitat end the high human population on and surrounding the study site.
Falco biarmicus (Lanner Falcon) (**NT/VU**)	**NONE** 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 *et al*. 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 *Falco peregrinus* 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 *et al*. 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 *et al*. 1997a).	Highly unlikely Due to a lack of suitable breeding habitat. Only likely to move through the area on rare occasions.
Ciconia abdimii (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 *et al*., 2005).	Highly unlikely Due to a lack of suitable habitat. Only likely to move through the area on very rare occasions.

SPECIES NAME**	PRESENCE OF SUITABLE HABITAT AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
Zoothera gurneyi (Orange Ground-Thrush) (**NT/NT**)	**NONE** Coastal and lowland evergreen forest (Hockey *et al*., 2005).	Highly unlikely Due to a lack of suitable habitat.

**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 area for which suitable foraging, breeding and roosting habitat was confirmed:

None

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

None

The study area does not offer optimal habitat conditions for any of the other Red Data avifaunal species recorded for the 2230CD q.d.g.c. due to a lack of suitable breeding, roosting and/or foraging habitat on and surrounding the study site. Some are only likely to move through the area on rare to very rare occasions.

The footprint area of the study site is small and surrounding by secondary vegetation, densely populated area and areas that has been transformed by past and present human activities. Due to the small extent of the study site the development will not have a negative effect on any Red Data avifaunal species recorded for the 2330AC q.d.g.c.

7. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The Limnology (Pty) Ltd 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. Limnology (Pty) Ltd 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 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:

- 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.
- Where possible the construction of the proposed development should take place during the winter months during the time when most avifaunal species are not breeding.
- **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.
- With proper cultivation of specific indigenous plant species, the bird numbers and species in the area could even increase. Indigenous plant species that attract birds to gardens or that are natural to the area could be obtained from the local nurseries surrounding the area. The area must however be kept as natural as possible.
- 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. CONCLUSIONS

The study area does not offer suitable habitat for the Red Data avifaunal species recorded for the 2230CD q.b.g.c. These Red Data avifaunal species are habitat specific and unable to adapt to area 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 rare occasion and unlikely to make used of the habitat systems on a permanent basis. The development should be restricted to areas that are already disturbed by past and present human activities or area that are overgrazed in the lower foothills of the mountains that flank the study site. The entire study site can be considered as of low sensitivity with regards to Red Data avifaunal species.

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