

# GALAGO ENVIRONMENTAL



**Fauna and Flora Specialists**

PO Box 886

Irene, 0062

Tel: 012-345 4891

Fax: 086 675 6136

Email: [Vanessam@lantic.net](mailto:Vanessam@lantic.net)

## ***Flora and Fauna Habitat Assessment***

*of*

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**PORTIONS 146 & 147 AND THE REMAINDER  
OF PORTIONS 145, 160 & 164 OF  
THE FARM WITFONTEIN 301 JR  
(KLERKSOORD X 25&26)**

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**Compiled by:** Ms. Vanessa Marais  
and the Galago Team comprising:  
L.A. Coetzer (D.Sc.)  
I.L. Rautenbach (Ph.D., T.H.E.D., Prof. Nat. Sci.)  
Mr. W.D. Haacke (M.Sc., Prof. Nat. Sci.)  
Mr. R. Geysler

## EXECUTIVE SUMMARY

Galago Environmental CC: Fauna and flora specialist was appointed to undertake a mammal, bird, reptile, amphibian and plant survey on Portions 146 and 147 and the remainder of Portions 145, 160 and 164 of the farm Witfontein 301 JR, known as Klerksoord x 25&26 (elsewhere referred to as the study site). It is understood that the proposed development involves the rezoning of "Industrial 2" to:

1. Light industrial
2. Residential 1 and 3
3. Business
4. Public Open Space / Parks.

The 85 ha study area is located in the quarter degree grid square 2528CA. Its is situated south of the Onderstepoort Nature Reserve and the Pyramid Koppies, to the east of the Klerksoord Industrial Area and north of the N4 Freeway and railway line. It stretches from the railway line to the Onderstepoort Nature Reserve.

Mucina and Rutherford (2006) classify the area as Marikana Thornveld at an altitude between 1050 m and 1450 m. They describe the area as open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains with some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitats protected from fire. Only one vegetation community could be distinguished on the study site. Two roads and a prominent drainage line divide the study area in almost equally sized blocks, which aided in determining the six different vegetation study areas

The vegetation of the study area ranges from almost pristine in some areas to disturbed of various degrees, ranging from slight to severe. It shows unnatural vegetation in the vicinity of the former farmhouse next to the informal settlement and along the roads. It will take many years to return to its original state if left to natural ecological forces. Although the habitat is suitable for some of the Red- and Orange-listed plant species known to occur in this quarter degree grid square (2528CA), no specimens were found. The bordering developed areas were not visited to check for possible Red/Orange Listed species, as the natural vegetation is destroyed.

From a fauna perspective only one habitat type could be distinguished on site – *Acacia* savanna and mixed *Acacia* broadleaf woodland. A large amount of fauna will be present on site as a result of the connectivity with the Onderstepoort Nature Reserve, bordering the site to the north and the undisturbed nature of the vegetation on site. Four red data mammal species may on occasion move through the site from the nature reserve. These species will probably move back to the nature reserve as soon as disturbance in the form of development start on the site.

Mitigation measures proposed to reduce the impact of the development on the fauna and flora is to conserve the large indigenous trees on site and to keep the connectivity with the Nature reserve so that fauna can move into safer environments when needed. It is also recommended that some of the interesting plants found on site be incorporated in the landscaping of the site

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# 1. INTRODUCTION

Galago Environmental CC: Fauna and flora specialist was appointed to undertake a mammal, bird, reptile, amphibian and plant survey on Portions 146 and 147 and the remainder of Portions 145, 160 and 164 of the farm Witfontein 301 JR, known as Klerksoord x 25&26 (elsewhere referred to as the study site). It is understood that the proposed development involves the rezoning of "Industrial 2" to:

5. Light industrial
6. Residential 1 and 3
7. Business
8. Public Open Space / Parks.

The study site can be divided into a northern section (36,9030 ha) which will mainly be used for light industrial purposes, and a southern section (41,6090 ha) which will be used as residential. The southern section will also include a small shopping centre.

The objective of this survey was to determine which species might still reside on the site. Special attention had to be given to the habitat requirements of all the Red Data species, which may occur in the area. This survey focuses on the current status of threatened vertebrate and plant species occurring, or which are likely to occur on the proposed development site, and a description of the available and sensitive habitats on the site.

## 2. OBJECTIVES OF THE HABITAT STUDY

- To assess the current habitat and conservation status on the study site;
- To list the perceptible flora in the vicinity of the proposed development and to recommend steps to be taken should endangered, vulnerable or rare species be found;
- To provide lists of mammals, birds, reptiles and amphibians which occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the development on the fauna and flora of the study site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

## 3. SCOPE OF STUDY

This report:

- Lists the more noticeable trees, shrubs, suffrutices, herbs, geophytes and grasses observed during the study and offers recommendations about the rehabilitation of the drainage line and man-made wetlands on the study site;
- Indicates medicinal plants recorded and lists alien species;
- Comments on connectivity with natural vegetation on adjacent sites;
- Is a mammal, bird, reptile and amphibian survey based on sightings and literature, with comments on preferred habitats;
- Comments on ecological sensitive areas;
- Evaluates the conservation importance and significance of the study site with special emphasis on the current status of resident threatened species;
- Offers recommendations to reduce or minimise impacts, should the proposed development be approved.

## 4. STUDY AREA

The 85 ha study area is located in the quarter degree grid square 2528CA. It is situated south of the Onderstepoort Nature Reserve and the Pyramid Koppies, to the east of the Klerksoord Industrial Area and north of the N4 Freeway and railway line. It stretches from the railway line to the Onderstepoort Nature Reserve (Figure 1). The R566 runs approximately through the middle of the study site and divides the site into a northern (Klerksoord Extension 25,) and a southern (Klerksoord Extension 26) section.

Mucina and Rutherford (2006) classify the area as Marikana Thornveld at an altitude between 1050 m and 1450 m. They describe the area as open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains with some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitats protected from fire.

Geology and soils – most of the area is underlain by the mafic intrusive rocks of the Rustenburg Layered Suite of the Bushveld Igneous Complex. The shales and quartzites of the Pretoria Group also contribute. Mainly vertic melanic clays with some dystrophic or mesotrophic plinthic catenas and some freely drained, deep soils occur (Mucina & Rutherford, 2006).

The conservation status of this vegetation type is endangered, with 48% transformed and industrial development is a major threat. Its conservation target is 19%, with less than 1% of it statutorily conserved, for example, in Magaliesberg Nature Area and Onderstepoort Nature Reserve. Erosion is very low to moderate. Alien invasive plants occur localised in high densities and especially along the drainage lines.

The climate is moderate. This is a strongly seasonal summer-rainfall region with very dry winters. The mean annual precipitation is 600 – 700 mm with incidence of frost frequent in winter (Mucina & Rutherford, 2006).

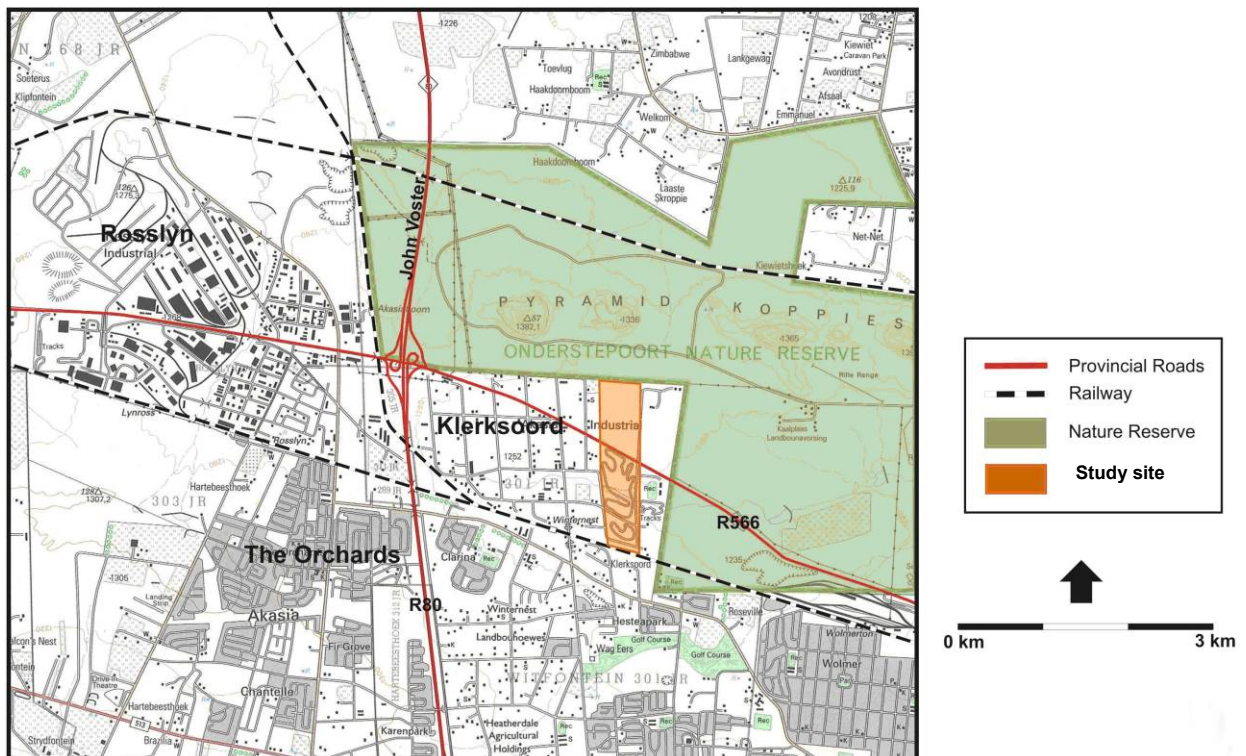


Figure 1: Map to indicate the locality of the study site

## **5. METHODS**

### **5.1 Vegetation survey**

Information about the Red Data and other vulnerable species that may occur in the area was obtained from GDACE. The Guidelines issued by GDACE to plant specialists as well as the Red List and Orange List of plant species recorded from Gauteng were consulted to ascertain the occurrence and habitat of the Red Data species concerned. The vegetation map and important taxa published in Mucina and Rutherford (2006) were also consulted for information on the composition of Marikana Thornveld.

The survey was conducted on 14 February 2008, endeavouring to identify vegetation types on the basis of species composition and differences in habitat. Six main vegetation types (areas for investigation) were identified. Different localities in each vegetation type were sampled and scanned in a crisscross pattern. Species that could not be identified on the site were collected and identified in the HGWJ Schweickerdt Herbarium at the University of Pretoria.

### **5.2 Fauna survey**

A site visit was conducted on 3 February 2008. During a four-hour visit the observed and derived presence of fauna associated with the recognised habitat types of the study site, were recorded. This was done with due regard to the well-recorded global distributions of Southern African fauna.

The 500 meters of adjoining properties were scanned for important fauna habitats.

#### **5.2.1 Field Surveys**

During the site visit mammals, birds, reptiles, and amphibians were identified by visual sightings through random transect walks. In addition, mammals were also identified by means of spoor, droppings or roosting sites. Possible burrows or reptile habitats (stumps or rocks) were inspected for any inhabitants. Amphibians were also identified by their vocalisations. No trapping or mist netting was conducted, as the terms of reference did not require such intensive work.

Birds were identified visually using a 10X42 Bushnell Legend binocular and a 20X-60X Pentax spotting scope and by call and where necessary verified from *Sasol Birds of Southern Africa* (Sinclair *et al.*, 2005) and *Southern African Bird Sounds* (Gibbon, 1991). All sightings of bird species on site were plotted on a PDA using Cyber Tracker as a database, which is connected to an external GPS mouse via blue tooth. Birds were also identified by means of their calls and other signs such as nests and feathers.

Three criteria were used to assess the probability of occurrence of Red Data and other bird species on the study site that will most probably make use of the site and surrounding area for breeding or feeding purposes. These criteria include known distribution range, habitat preference and the presence of suitable habitat on site as well as the presence of food.

#### **5.2.2 Desktop Surveys**

As the majority of mammals, reptiles and amphibians are secretive, nocturnal and/or poikilothermic or seasonal, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species based on authoritative tomes, scientific literature, field guides, atlases and databases. This can be done irrespective of season.

The probability of occurrences of **mammal** species was based on their respective geographical distributional ranges and the suitability of on-site habitat. In other words, *high* probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site. Another consideration for inclusion in this category is the inclination of a species to be common, i.e. normally occurring at high population densities.

*Medium* probability pertains to a mammal species with its distributional range peripherally overlapping the study site, or required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation is also taken into consideration. Species categorised as *medium* normally do not occur at high population numbers, but cannot be deemed as rare.

A *low* probability of occurrence will mean that the species' distributional range is peripheral to the study site and habitat is sub-optimal. Furthermore, some mammals categorised as *low* are generally deemed rare.

The occurrence of **key** bird species was verified according to the distribution record obtained during the Southern African Bird Atlas period from 1981 to 1993 (Harrison *et al* 1997) as well as records from 1974 to 1987 according to Tarboton *et al* (1987).

The occurrence and historic distribution of these birds, including all Red Data bird species for the 2528CA quarter-degree grid cell were all verified according to Harrison *et al* (1997) and Tarboton *et al* (1987). The reporting rate was scored between 0 – 100% and is calculated as follows: Total number of cards on which a species was reported during the Southern African Bird Atlas period X 100 ÷ total number of cards for a particular quarter degree grid cell. The colour codes for each species are represented as follows: YELLOW = VERY LOW, LIGHT ORANGE = LOW, DARK ORANGE = MEDIUM AND RED = HIGH with reference to the specific habitat systems found on site. It is important to note that a quarter-degree grid cell covers a large area. A quarter-degree square, for example 2528CA, covers an area of ±27 X 25 kilometres (±693 km<sup>2</sup>) and it is possible that suitable habitat will exist for a certain Red Data species within this general and surrounding area. However, the specific habitat found on site will not suit the particular Red Data species although it was recorded for the quarter-degree grid cell. For example, Cape Vulture occurs along the Magaliesberg but will not favour the habitat found within the Pretoria CBD, which are both in the same quarter-degree grid cell. Red Data bird species were categorised according to Barnes (2000).

The biodiversity index gives an indication of which habitat will hold the richest bird diversity on site. This is calculated on the sum of the probability of occurrence: 5 = present on site, 4 = not observed on site but has a high probability of occurring on site, 3 = medium, 2 = low, 1 = very low and 0 = not likely to occur, of bird species within a specific habitat system on site.

### 5.2.3 Specific Requirements

The site was surveyed and assessed for the potential occurrence of Red Data and/or wetland-associated species such as:

- Juliana's golden mole (*Neamblosomus juliana*)
- Rough-haired golden mole (*Chrysospalax villosus*)
- African marsh rat (*Dasymys incomtus*)
- Angoni vlei rat (*Otomys angoniensis*)
- Vlei rat (*Otomys irroratus*)

- African clawless otter (*Aonyx capensis*)
- Spotted-necked otter (*Lutra maculicollis*)
- Marsh mongoose (*Atilax paludinosus*)
- Giant Bullfrogs (*Pyxicephalus adspersus*);
- Red Data avifauna

#### 5.2.4 Participating Specialists

This investigation was conducted by:

Specialists	Aspect Investigated	Qualifications	Prof. Reg.	Date of Field Survey
Coetzer, L.A.	Botany	D.Sc. (Botany)	Pending	14 February 2008
Rautenbach, I.L.	Mammalogy	Ph.D., T.H.E.D.	Prof. Nat. Sci.	3 February 2008
Haacke, W.D.	Herpetology	M.Sc.	Prof. Nat. Sci.	3 February 2008
Geyser, R.	Ornithology		Pending	3 February 2008
Marais, V.	Environmental Impacts and maps	BL Landscape Architecture		3 February 2008

## 6. RESULTS

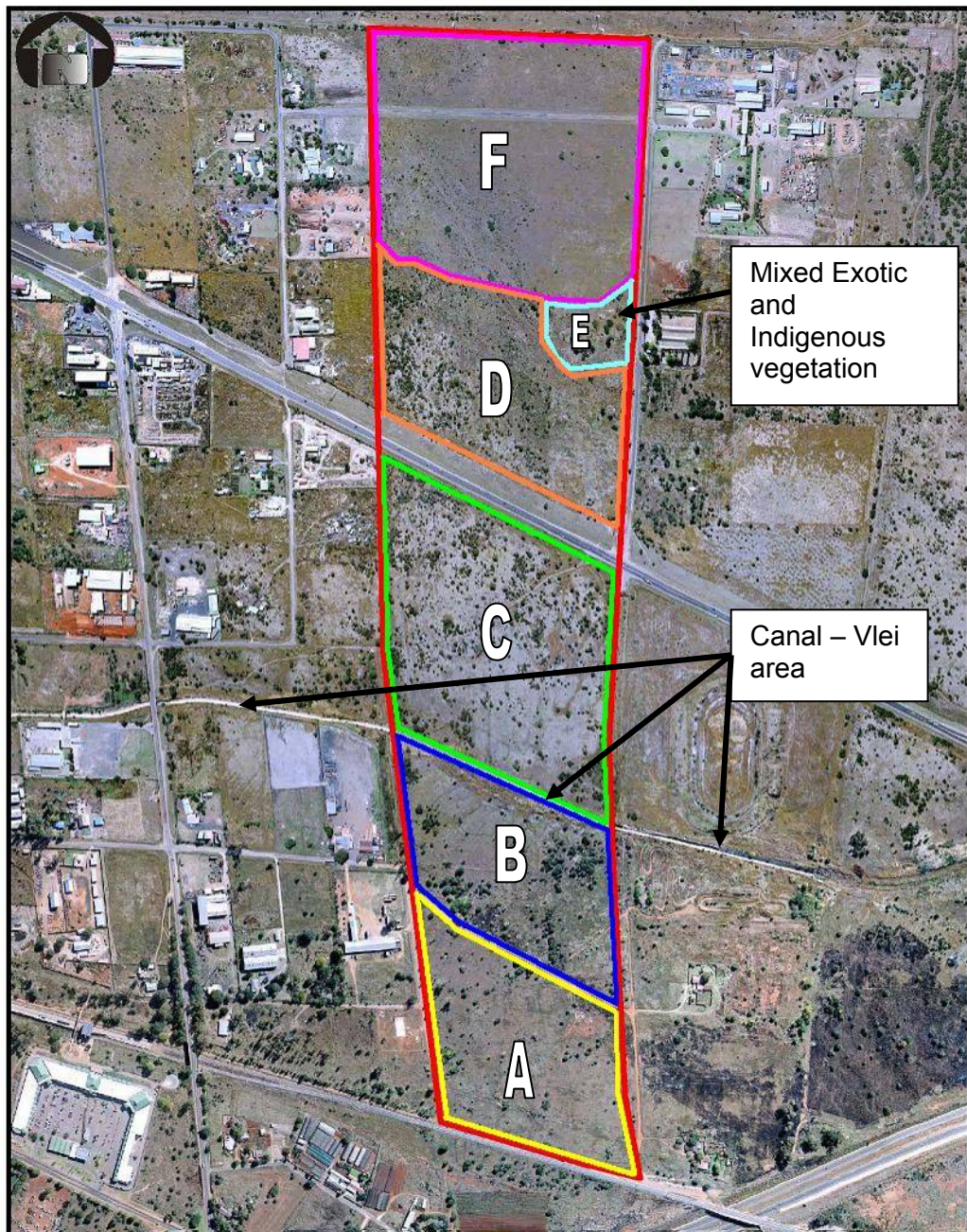
### 6.1 Vegetation survey:

#### 6.1.1 Plant Communities

Mucina and Rutherford (2006) classify the area as Marikana Thornveld and describe it as open *Acacia karroo* woodland. The woody areas alternate with undulating plains of open grassland with varying degrees of disturbance. The study site basically reflects this sentiment since it can not be divided into vegetation communities, but rather areas for easier identification. Two roads and a prominent drainage line divide the study area in almost equally sized blocks, which aided in determining the six different study areas (see Figure 2).

Area E seems to have been the location of a former farm dwelling with several remaining garden trees, of which most are exotic. The other areas are less disturbed but are used as dumping sites for garden and domestic refuse. To the east and west developments such as shops, factories, residences and informal settlements border the study site. Figure 2 shows only part of these bordering developments. Many footpaths and vehicle tracks crisscross areas A, B and C. This may be one of the reasons for many of the weed species occurring in all of the study sites.





**Figure 2:** Aerial view of the study site indicating the locality of areas A to F, which is representative of the *Acacia Karoo* vegetation community.

### 6.1.2 Medicinal plants

The number of medicinal plant species in the six surveyed areas is shown in Table 1 and represent  $\pm 10\%$  of the total number in each area. The names of the species with known medicinal use found in the study area are indicated separately in tables. Of the 230 plant species recorded, 14 species are reported to have medicinal properties (Van Wyk *et al.* 2002, Van Wyk & Gericke, 2000). It is important, however, to note that only a small number of plants of each of the recorded plant species used for medicinal purposes, occur on the study site.

**Table 1: Number of medicinal plant species in the different sections.**

SECTION	TOTAL NO. OF SPECIES IN AREA	NO. OF MEDICINAL SPECIES
Area A	101	12
Area B	82	8
Area C	43	5
Area D	68	7
Area E	27	1
Area F	88	10



**Photo 1:** View to the north showing a typical open grassland with trees.

### 6.1.3 Alien plants

Most of the alien plant species, in terms of total number found in the study area, seem to occur in Area A, but it may be explained by the size of the area. The alien species are not listed separately, but are shown in the species lists of the areas as they form part of these sections. In the lists, their names are marked with an asterisk and their occurrence in the different sections is indicated in Table 2. A total of 54 alien plant species were found in the studied sites of which 9 are Category 1 weeds, 2 are Category 2 invaders, 4 are Category 3 invaders and 39 are not declared.

**Table 2: Number of alien species in each section (area).**

Section	No. Of species	Cat. 1	Cat. 2	Cat. 3	Not declared
Area A	27	6	1	2	18
Area B	15	3	0	3	9
Area C	9	3	0	1	5
Area D	19	1	0	1	17
Area E	18	2	1	3	12
Area F	9	2	0	0	7

The alien plant names printed in bold in the species lists, are those of Category 1 Declared Weeds and the removal of these plants is compulsory in terms of the regulations under “The Conservation of Agricultural Resources Act” (Act No. 43 of 1983), as amended. Category 2 and 3 Declared invaders should likewise be controlled. They are *Campuloclinium macrocephalum* (Pom pom weed), *Ipomoea purpurea* (Morning glory), *Melia azedarach* (Syringa), *Datura stramonium* (Thorn Apple), *Lantana camara* (Lantana), *Solanum mauritianum* (Bug tree), *Tithonia rotundifolia* (Red Sunflower) and *Xanthium strumarium* (Large Cocklebur). Many



seedlings of especially *Melia azedarach* occur on a part of the study site (see discussion of Area A & B).

#### 6.1.4 Orange-listed species

According to the data of Orange-listed species supplied by GDACE, only three species viz *Habenaria kraenzliniana*, *Stenostelma umbelluliferum* and *Trachyandra erythrorrhiza* occur in open grassland and have been recorded from the 2628CA quarter degree grid in which the study site is situated. None of these species were collected or observed in this study site. However, three plants of *Eucomis autumnalis* subsp *clavata* were observed in Area D.

#### 6.1.5 Red-listed species

No Red Data species was found on the study site as indicated on the data of Red-listed species supplied by GDACE. The list refers to plant species that have been recorded from the quarter degree grid in which the study site is situated.

#### 6.1.6 Railway area (Area A)

The vegetation in this area is a mixture of indigenous and exotic plants of which the trees are the most prominent. The area comprises the southern part of the study site and links to area B to the north. This area is referred to as the Railway area because it borders onto the railway line as well as an accompanying gravel road. All along this road are signs of habitat disturbance concomitant with the occurrence of weeds. Area A is bordered by a gravel road on all four sides.

This area is almost level and has a relatively high number of trees comprising 10 species, with *Acacia karroo* the most abundant. Dwarfing, also known as the bonsai effect of the clayish soil, was observed on some of the trees and shrubs such as *Acacia karroo*, *Acacia tortilis* and *Ehretia rigida*.

The grass population reflects some areas of climax development with *Themeda triandra* very prominent. In other areas where *Themeda triandra* is absent, other grass species and weeds occur indicating degrees of disturbance. More than 20 grass species were identified. Most of the disturbed areas occur along the border of area A, but there are signs of temporary dwellings being erected in the tree areas. No Red Data species were found within this section, or in the 200m zone outside the borders of this area.



**Photo 2:** View to the north as seen from the railway line. Trees in the distance designate the southern part of Area B.

Number of species in area A, representing the different plant life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	10
Shrubs	7
Grasses	23
Geophytes	14
Herbs	47
Number of indigenous species	74
Total number of species	101

**Table 3: Plant species recorded in Area A. Alien species are indicated by \*, weed species by \*\* and medicinal species by #.**

SCIENTIFIC NAME	ENGLISH NAME
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<i>Acacia nilotica</i>	Scented thorn / Lekkerruikpeul
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella thorn / Haak-en-steek
<i>Agave americana</i> *	Sisal tree / Garingboom
<i>Aloe greatheadii</i> subsp <i>davyana</i> #	
<i>Alternanthera pungens</i> **	Kakiedubbeltjie
<i>Amaranthus hybridus</i> **	Misbredie
<i>Anthericum cooperi</i>	
<i>Aristida canescens</i> subsp <i>canescens</i>	Pal three awn / Vaalsteekgras
<i>Aristida congesta</i> subsp <i>barbicollis</i>	Spreading Three-awn / Lossteekgras
<i>Aristida transvaalensis</i>	Klipgras
<i>Asparagus laricinus</i>	
<i>Asparagus suaveolens</i>	Wild Asparagus / Katdoring
<i>Bidens pilosa</i> **	Blackjack / Knapsekêrel
<b><i>Campuloclinium macrocephalum</i> **</b>	Pom pom weed / Pompombossie
<i>Chamaecrista mimosoides</i>	Fishbone cassia / Boesmanstee
<i>Chenopodium album</i> **	White goosefoot / Withondebossie
<i>Chenopodium murale</i> **	Nettle leaved goosefoot / Muurhondebossie
<i>Chloris virgata</i>	Feather top chloris / Witpluimchloris
<i>Clematis brachiata</i>	Traveller's joy / Klimop
<i>Cleome monophylla</i>	Spindle pod / Rusperbossie
<i>Commelina africana</i> var <i>barberae</i> #	
<i>Commelina bengalensis</i> #	
<i>Convolvulus sagittatus</i> subsp <i>sagittatus</i>	Bindweed / Bobbejaantou
<i>Convolvulus sagittatus</i> var <i>aschersonii</i>	
<i>Corchorus confusus</i>	
<i>Crassula lanceolata</i> subsp <i>transvaalensis</i>	
<i>Crotalaria agatiflora</i> *	Bird Flower / Voëltjebos
<i>Cucumis zeyheri</i>	
<i>Cymbopogon excavatus</i>	Turpentine grass / Breëblaarterpentyngras
<i>Cynodon dactylon</i>	Couch grass / Kweekgras
<i>Cyperus esculentus</i> **	Yellow Nutsedge / Geeluintjie
<b><i>Datura stramonium</i> **#</b>	Thorn Apple / Olieboom
<i>Dicerocaryum eriocarpum</i> #	Devil's Thorn / Elandsdoring
<i>Dichrostachys cinerea</i>	Sickle Bush / Sekelbos
<i>Digitaria eriantha</i>	Common finger grass / Gewone vingergras
<i>Ehretia rigida</i>	Puzzle bush / Deurmekaarbos
<i>Eleusine coracana</i> subsp <i>africana</i> **	African goosegrass / Jongosgras
<i>Eragrostis chloromelas</i>	Narrow curly leaf / Smalkrulblaar
<i>Eragrostis plana</i>	Tough love-grass / Taai-pol-eragrostis

SCIENTIFIC NAME	ENGLISH NAME
<i>Euphorbia heterophylla</i> **	Painted euphorbia / Gekleurde euphorbia
<i>Eustachys paspaloides</i>	Brown Rhodes grass / Bruinhoenderspoor
<i>Ficus thonningii</i>	Common wild fig / Gewone wildevy
<i>Flaveria bidentis</i>	Smelter's bush / Smelterbossie
<i>Gazania krebsiana</i> subsp <i>krebsiana</i>	Botterblom
<i>Geigeria burkei</i> subsp <i>burkei</i>	Vermeerbos
<i>Gymnosporia buxifolia</i>	Spike thorn / Pendoring
<i>Hermannia depressa</i> #	Rooi opslag
<i>Heteropogon contortus</i>	Spear grass / Assegaaigras
<i>Hibiscus trionum</i> **	Bladder's hibicus / Terblansbossie
<i>Hyparrhenia hirta</i>	Thatching Grass / Gewone Dekgras
<i>Indigofera filipes</i>	
<i>Indigofera holubi</i>	
<i>Ipomoea crassipes</i>	
<i>Ipomoea ommaneyi</i> #	Beespatat
<i>Ipomoea purpurea</i> **	Morning glory / Purperwinde
<i>Kyphocarpa angustifolia</i>	
<b>Lantana camara</b> **	Lantana
<i>Lantana rugosa</i>	Bird's brandy
<i>Ledebouria ovatifolia</i>	
<i>Ledebouria revoluta</i>	
<i>Leonotis dysophilla</i> #	Wild dagga / Wildedagga
<i>Limeum viscosum</i> subsp <i>viscosum</i>	
<i>Melia azedarach</i> *	Syringa / Maksering
<i>Melinis repens</i>	Natal Red Top / Natal rooipluim
<i>Monsonia angustifolia</i>	Crane's bill / Angelbossie
<i>Nidorella hottentotica</i>	
<i>Panicum coloratum</i>	Small Buffalo grass / Kleinbuffelsgras
<i>Panicum maximum</i>	Guinea grass / Buffelsgras
<i>Paspalum dilatatum</i>	Dallis grass / Gewone Paspalum
<i>Pentarrhinum insipidum</i>	Donkieperske
<i>Physalis angulata</i> **	Wild gooseberry / Wilde appelliefie
<i>Pollichia campestris</i>	Wax berry / Wasbessie
<i>Polygala hottentotta</i>	
<i>Portulaca kermesina</i>	
<i>Ptycholobium plicatum</i>	
<i>Rhus leptodictya</i>	Mountain karee / Bergkaree
<i>Rhus pyroides</i>	Common wild currant / Taaibos
<i>Rhynchosia minima</i> var. <i>prostrata</i>	
<i>Schkuhria pinnata</i> **#	Dwarf Marigold / Kleinkakiebos
<i>Sesbania bispinosa</i> **	Spiny Sesbania / Stekelsesbania
<i>Sida alba</i>	Spiny sida / Stekeltaaiman
<b>Solanum mauritianum</b> **	Bugtree / Luisboom
<i>Solanum panduriforme</i>	Poison apple / Gifappel
<i>Sonchus dregeanus</i>	
<i>Sonchus oleraceus</i> **	Sow thistle / Sydissel
<i>Sonchus wilmsii</i>	Milk thistle / Melkdissel
<i>Sorghum halepense</i> **	Johnson Grass / Johnson-gras
<i>Sporobolus africanus</i>	Ratstail dropseed / Taaipol
<i>Tagetes minuta</i> **	Khaki weed / Kakiebos
<i>Themeda triandra</i>	Red grass / Rooigras

SCIENTIFIC NAME	ENGLISH NAME
<i>Tithonia rotundifolia</i> **	Red Sunflower / Rooisonneblom
<i>Tragus berteronianus</i>	Carrotseed grass / Kousklits
<i>Turbina oblongata</i>	
<i>Typha capensis</i> #	Bulrush / Papkuil
<i>Vangueria infausta</i>	Wild medlar / Mispel
<i>Verbena bonariensis</i> **	Purple top / Blouwaterbossie
<i>Vernonia oligocephala</i> #	Bitterbossie
<i>Xanthium strumarium</i> **	Large Cockleburr / Kankerroos
<i>Zinnia peruviana</i> **	Redstar zinnia / Wildejakobregop
<i>Ziziphus mucronata</i> #	Buffalo thorn / Blinkblaar-wag-'n-bietjie

### 6.1.7 Grassland and vlei (Area B)

Area B slopes down slightly to the north and ends in a vlei area flowing from west to east. The prominent wet areas of the vlei is most probably caused by a concrete canal blocking off the natural flow of the water to the east, with the result of wet areas next to the canal during the rainy season. Some weed species occur along the canal. Others like *Imperata cylindrica*, *Setaria sphacelata* and *Typha capensis* are very typical for a wetland.



**Photo 3:** The Canal which forms the northern border of Area B. Many different weeds, *Melia azadarach* and *Arundo donax* grow along this canal.

Area B is typical open woodland with some trees and abundant grass interspersed with herbs and geophytes and may experience frequent winter veld fires. The species diversity and richness is remarkable, especially the number of different grass species, geophytes and annuals.

Number of indigenous species in Area B representing the different life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	11
Shrubs	3
Grasses	24
Geophytes	12
Herbs	32
Number of indigenous species	67
Total number of species	82

Several illegal dumping sites for garden waste and domestic refuse were found and may well be the source for some of the exotic species found in Area B.

The area slopes down to the north, with a change in the soil from a red loamy clay to a coarse, black turf. This is also evident in the occurrence of sedges, Spanish Reed and *Typha*. *Sesbania bispinosa* grows abundantly and very lush along the canal. No Red Data species were found within this section, or in the prescribed zone outside the borders of this area.

**Table 4: Plant species recorded in area B. Alien species are indicated by \*, weeds by \*\* and medicinal species by #.**

SCIENTIFIC NAME	ENGLISH NAME
<i>Acacia galpinii</i>	Monkey Thorn / Apiesdoring
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<i>Acacia sieberiana</i> var <i>woodii</i>	Paperbark thorn / Papierbas
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella thorn / Haak-en-steek
<i>Alysicarpus rugosus</i> subsp <i>perennirufus</i>	
<i>Anthericum cooperi</i>	
<i>Aristida bipartite</i>	Rolling Grass / Grootrolgras
<b><i>Arundo donax</i></b> **	Spanish Reed / Spaansriet
<i>Barleria macrostegia</i> #	
<i>Bauhinia variegata</i> *	Orchid tree / Orgideëboom
<i>Berkheya radula</i>	Boesmansrietjie
<i>Brachiaria eruciformis</i>	Sweet Signal Grass / Litjiesinjalgras
<i>Bromus catharticus</i> **	Rescue Grass / Reddingsgras
<i>Buchnera longispicata</i>	
<b><i>Campuloclinium macrocephalum</i></b> **	Pom pom weed / Pompombossie
<i>Celtis sinensis</i> *	Chinese Nettle Tree / Sjinese netelboom
<i>Conyza podocephala</i>	
<i>Corchorus confuses</i>	
<i>Crotalaria agatiflora</i> *	Bird Flower / Voëltjebos
<i>Cynodon dactylon</i>	Couch grass / Kweekgras
<i>Cyperus esculentus</i> **	Yellow Nutsedge / Geeluintjie
<i>Dichrostachys cinerea</i>	Sickle Bush / Sekelbos
<i>Diheteropogon amplexans</i>	Broad-leaved Bluestem / Breëblaarblougras
<i>Elionurus muticus</i>	Wire grass / Koperdraadgras
<i>Eragrostis chloromelas</i>	Narrow curly leaf / Smalkrulblaar
<i>Eragrostis habrantha</i>	
<i>Eragrostis plana</i>	Tough love-grass / Taaipol-eragrostis
<i>Eragrostis racemosa</i>	Narrow Heart Lovegrass / Smalhartjiesgras
<i>Eragrostis superba</i>	Saw-tooth Love Grass / Weeluisgras
<i>Erythrina lysistemon</i> #	Common coral tree / Gewone koraalboom
<i>Eucalyptus</i> sp cf <i>E. grandis</i> *	Saligna Gum / Saligna-bloekom
<i>Euphorbia heterophylla</i> **	Painted euphorbia / Gekleurde euphorbia
<i>Euphorbia trichadenia</i>	Melkbol
<i>Gazania krebsiana</i> subsp <i>krebsiana</i>	Botterblom
<i>Gladiolus elliotii</i>	
<i>Haplocarpha scaposa</i>	Tonteldoosbossie
<i>Helianthus annuus</i> *	Subflower / Sonneblom
<i>Helichrysum aureonitens</i>	
<i>Helichrysum rugulosum</i>	
<i>Heteropogon contortus</i>	Spear grass / Assegaaigras
<i>Hyparrhenia hirta</i>	Common Thatching Grass / Gewone Dekgras

SCIENTIFIC NAME	ENGLISH NAME
<i>Hyperthelia dissolute</i>	Yellow Thatching grass / Geeltamboekiegras
<i>Hypoxis hemerocallidea</i> #	African potato / Afrika-aartappel
<i>Imperata cylindrical</i>	Cotton Wool Grass / Donsgras
<i>Indigofera hilaris</i>	
<i>Indigofera holubi</i>	
<i>Ipomoea bathycolpos</i> var <i>bathycolpos</i>	Veldsambreeltjies
<i>Ipomoea purpurea</i> **	Morning glory / Purperwinde
<i>Jatropha zeyheri</i> #	Verfbol
<i>Kohautia amatymbica</i>	
<i>Leonotis microphylla</i>	Rock Dagga / Klipdagga
<i>Lotononis calycina</i> var <i>hirsutissima</i>	
<i>Maclidium macrocephalum</i>	
<i>Maclidium zeyheri</i>	Tuislanddissel /
<i>Manihot</i> sp cf <i>M. esculenta</i> *	Tapioca / Kassava
<i>Melia azedarach</i> *	Syringa / Maksering
<i>Microchloa caffra</i>	Pincushion Grass / Elsgrass
<i>Monsonia angustifolia</i>	Crane's bill / Angelbossie
<i>Panicum maximum</i>	Guinea grass / Buffelsgras
<i>Panicum repens</i>	Couch Panicum / Kruipgras
<i>Polygala hottentota</i>	
<i>Ptychlobium plicatum</i>	
<i>Raphionacme lucens</i>	
<i>Rhus lancea</i>	Karee
<i>Rhynchosia minima</i> var. <i>prostrata</i>	
<i>Rhynchosia totta</i>	
<i>Rubia horrida</i>	Kleefgras
<i>Scabiosa columbaria</i> #	Wild Scabiosa / Bitterbos
<i>Schoenoplectus corymbosus</i>	
<i>Senecio inornatus</i>	
<i>Senecio othonniflorus</i>	
<i>Sesbania bispinosa</i> **	Spiny Sesbania / Stekelsesbania
<i>Setaria sphacelata</i> var <i>sericea</i>	Golden Bristle Grass / Goue Mannagras
<i>Sorghum versicolor</i>	Black-seed Sorghum / Swartsaadsorghum
<i>Striga elegans</i>	Large witchweed / Groot rooiblim
<i>Themeda triandra</i>	Red grass / Rooigras
<b><i>Tithonia rotundifolia</i></b> **	Red Sunflower / Rooisonneblom
<i>Turbina oblongata</i>	
<i>Typha capensis</i>	Bulrush / Papkuil
<i>Urelytrum agropyroides</i>	Centipede grass / Varkstertgras
<i>Vernonia oligocephala</i> #	Bitterbossie
<i>Vigna vexillata</i>	

### 6.1.8 Area south of R566 (Area C)

Area C represents the area between the canal and the R566 road and has the smallest number of species for the total area designated. This is because of the low species diversity of the area. *Acacia karroo* and *Aristida bipartita*, interspersed with few other species, occur on large parts of Area C. However, a large number of grasses such as *Paspalum dilatatum*, *Cynodon dactylon*, *Aristida congesta* and *Tragus berteronianus*, associated with disturbed areas, are prominent. The bonsai effect is clearly visible on some of the trees in area C.





**Photo 4:** Typical stunted growth of *Acacia karroo* on the turf soil.

The vegetation of Area C is determined by the black turf soil. Some weeds are present, mostly in the disturbed areas, but not in such large numbers as in some of the other areas. The majority of the weeds occur along foot paths, vehicle tracks and the canal. There is a large informal settlement on the western border of Area C and it may be the origin of the many foot paths in this area. Several dumping sites were found for garden waste and building rubble. This is also the site where *Catharanthus roseus* and *Agapanthus* plants were found. No Red Data species were found within this section, or in the 200m zone outside the borders of this area.

Number of indigenous species in Area C representing the different life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	7
Shrubs	3
Grasses	19
Geophytes	4
Herbs	10
Number of indigenous species	34
Total number of species	43

**Table 5: Plant species recorded in Area C. Alien species are indicated by \*, weeds by \*\* and medicinal species by #.**

SCIENTIFIC NAME	ENGLISH NAME
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella thorn / Haak-en-steek
<i>Aristida bipartita</i>	Rolling Grass / Grootrolgras
<i>Aristida congesta</i> subsp <i>congesta</i>	Tassel Three-awn / Katstertsteekgras
<i>Asparagus laricinus</i>	
<i>Bidens pilosa</i> **	Blackjack / Knapsekêrel
<i>Brachiaria eruciformis</i>	Sweet Signal Grass / Litjiesinjaalgras
<i>Buchnera longispicata</i>	
<b><i>Campuloclinium macrocephalum</i> **</b>	Pom pom weed / Pompombossie
<i>Catharanthus roseus</i> *	Madagascar Periwinkle / Grafblommetjie
<i>Clematis brachiata</i>	Traveller's joy / Klimop
<i>Corchorus confusus</i>	
<i>Cynodon dactylon</i>	Couch grass / Kweekgras
<b><i>Datura stramonium</i> **#</b>	Thorn Apple / Olieboom

SCIENTIFIC NAME	ENGLISH NAME
<i>Dichrostachys cinerea</i>	Sickle Bush / Sekelbos
<i>Diheteropogon amplexans</i>	Broad-leaved Bluestem / Blaarblougras
<i>Ehretia rigida</i>	Puzzle bush / Deurmekaarbos
<i>Eleusine coracana</i> subsp <i>africana</i> **	African goosegrass / Jongosgras
<i>Eragrostis habrantha</i>	
<i>Eustachys paspaloides</i>	Brown Rhodes grass / Bruinhoenderspoor
<i>Gladiolus elliotii</i>	
<i>Haplocarpha scaposa</i>	Tonteldoosbossie
<i>Hyparrhenia hirta</i>	Thatching Grass / Gewone Dekgras
<i>Indigofera hiliaris</i>	
<i>Leonotis dysophilla</i> #	Wild dagga / Wildedagga
<i>Melia azedarach</i> *	Syringa / Maksering
<b><i>Opuntia ficus-indica</i></b> **	Prickly pear / Turksvy
<i>Oxalis depressa</i>	
<i>Panicum maximum</i>	Guinea grass / Buffelsgras
<i>Panicum volutans</i>	
<i>Paspalum dilatatum</i>	Dallis grass / Gewone Paspalum
<i>Physalis angulata</i> **	Wild gooseberry / Wilde appelliefie
<i>Rhus lancea</i>	Karee
<i>Rhus leptodictya</i>	Mountain karee / Bergkaree
<i>Sesbania bispinosa</i> **	Spiny Sesbania / Stekelsesbania
<i>Setaria incrassata</i>	Vlei bristle grass / Vleimannagras
<i>Setaria sphacelata</i> var <i>sericea</i>	Golden Bristle Grass / Goue Mannagras
<i>Sorghum versicolor</i>	Black-seed Sorghum / Swartsaadsorghum
<i>Stipagrostis uniplumis</i> var <i>uniplumis</i>	Silky Bushman grass / Blinkblaarbgras
<i>Tagetes minuta</i> **	Khaki weed / Kakiebos
<i>Themeda triandra</i>	Red grass / Rooigras
<i>Tragus berteronianus</i>	Carrotseed grass / Kousklits
<i>Typha capensis</i> #	Bulrush / Papkuil
<i>Ziziphus mucronata</i> #	Buffalo thorn / Blinkblaar-wag-'n-bietjie

### 6.1.9 Area north of R566 (Area D)

This is a relatively level area comprising open grassland with a relatively high species diversity. This is also evident in the low number of trees, relatively high number of grasses and nine species of geophytes. A large part of Area D is dominated by *Themeda triandra* and *Hyparrhenia hirta* respectively. *Acacia karroo* is the most dominant of the few tree species. Some of the trees and large shrubs appear in sparsely distributed groups. The road reserve along the R566 is often mowed and the signs of disturbance are clearly visible in the specific grass and weed species present. This is also the area with only one Category 1 declared weed (Pom pom weed) and one Category 3 invader (Syringa).

Another distinction is the presence of the only Orange Listed plant species on the entire study site. Only three plants of *Eucomis autumnalis* subsp *clavata* were found. No Red Data species were found within this section, or in the 200m zone outside the borders of this area.

Number of indigenous species in area D representing the different plant life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	7
Shrubs	4
Grasses	21
Geophytes	9
Herbs	27
Number of indigenous species	49
Total number of species	68



**Photo 5:** Open grassland with some trees in Area D. *Sorghum versicolor* in the foreground and some of the trees from Area E can be distinguished in the background.

**Table 6:** Plant species recorded in Area D. Alien species are indicated by \*, weeds by \*\* and medicinal species by #.

SCIENTIFIC NAME	COMMON NAME
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<i>Acacia sieberiana</i> var <i>woodii</i>	Paperbark thorn / Papierbas
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella thorn / Haak-en-steek
<i>Acalypha indica</i>	
<i>Argemone mexicana</i> **	Mexican poppy / Geelblombloudissel
<i>Aristida congesta</i> subsp <i>barbicollis</i>	Spreading Three-awn / Lossteekgras
<i>Asclepias fruticosa</i> #	
<i>Asparagus laricinus</i>	
<i>Bidens pilosa</i> **	Blackjack / Knapsekêrel
<i>Brachiaria eruciformis</i>	Sweet Signal Grass / Litjiesinjaalgras
<i>Brachiaria serrata</i>	Velvet signal grass / Fluweelsinjaalgras
<b><i>Campuloclinium macrocephalum</i></b> **	Pom pom weed / Pompombossie
<i>Catharanthus roseus</i> *	Grafblommetjie
<i>Cenchrus ciliaris</i>	Foxtail Buffalo Grass / Bloubuffelsgras
<i>Chamaecrista mimosoides</i>	Fishbone cassia / Boesmanstee
<i>Chenopodium murale</i> **	Nettle leaved goosefoot / Muurhondebossie
<i>Crotalaria sphaerocarpa</i>	Mealie crotalaria / Mieliecrotalaria
<i>Cynodon dactylon</i>	Couch grass / Kweekgras
<i>Cyperus esculentus</i> **	Yellow Nutsedge / Geeluintjie

SCIENTIFIC NAME	COMMON NAME
<i>Digitaria eriantha</i>	Common finger grass / Gewone vingergras
<i>Diheteropogon amplexans</i>	Broad-leaved Bluestem / Breëblaarblougras
<i>Ehretia rigida</i>	Puzzle bush / Deurmekaarbos
<i>Eragrostis chloromelas</i>	Narrow curly leaf / Smalkrulblaar
<i>Eragrostis heteromera</i>	Bronze Love grass / Rooikopergras
<i>Eriosema burkei</i>	
<i>Eucomis autumnalis</i> subsp <i>clavata</i> #	Pineapple flower / Pynappellelie
<i>Euphorbia heterophylla</i> **	Painted euphorbia / Gekleurde euphorbia
<i>Eustachys paspaloides</i>	Brown Rhodes grass / Bruinhoenderspoor
<i>Galinsoga parviflora</i> **	Small flowered quickweed / Knopkruid
<i>Gladiolus crassifolius</i>	
<i>Gladiolus elliotii</i>	
<i>Gnidia caffra</i>	Gifbossie
<i>Gomphrena celosioides</i> **	Bachelor's button / Mierbossie
<i>Hemizygia canescens</i>	
<i>Hibiscus cannabinus</i> **	Wild Stock rose / Wilde stokroos
<i>Hibiscus trionum</i> **	Bladder's hibicus / Terblansbossie
<i>Hyparrhenia hirta</i>	Common Thatching Grass / Gewone Dekgras
<i>Indigofera hiliaris</i>	
<i>Kohautia caespitosa</i>	
<i>Lantana rugosa</i>	Bird's brandy
<i>Ledebouria ovatifolia</i>	
<i>Lepidium bonariense</i> **	Pepper weed / Peperbossie
<i>Melia azedarach</i> *	Syringa / Maksering
<i>Melinis repens</i>	Natal Red Top / Natal rooipluim
<i>Monsonia angustifolia</i>	Crane's bill / Angelbossie
<i>Nidorella anomala</i>	
<i>Oxalis depressa</i>	
<i>Panicum maximum</i>	Guinea grass / Buffelsgras
<i>Panicum volutans</i>	
<i>Paspalum dilatatum</i>	Dallis grass / Gewone Paspalum
<i>Portulaca oleracea</i> **	Purslane / Varkkos
<i>Rhus pyroides</i>	Common wild currant / Taaibos
<i>Rhynchosia totta</i>	
<i>Scabiosa columbaria</i> #	Wild Scabiosa / Bitterbos
<i>Schkuhria pinnata</i> **#	Dwarf Marigold / Kleinkakiebos
<i>Schoenoplectus corymbosus</i>	
<i>Sesbania bispinosa</i> **	Spiny Sesbania / Stekelsesbania
<i>Solanum panduriforme</i>	Poison apple / Gifappel
<i>Sorghum versicolor</i>	Black-seed Sorghum / Swartsaadsorghum
<i>Sporobolus africanus</i>	Ratstail dropseed / Taaipol
<i>Tagetes minuta</i> **	Khaki weed / Kakiebos
<i>Themeda triandra</i>	Red grass / Rooigras
<i>Typha capensis</i> #	Bulrush / Papkuil
<i>Vangueria infausta</i>	Wild medlar / Mispel
<i>Verbena artistigera</i> **	Fine leaved verbena / Fynblaarverbena
<i>Zinnia peruviana</i> **	Wilde jakobregop
<i>Ziziphus mucronata</i> #	Buffalo thorn / Blinkblaar-wag-'n-bietjie
<i>Ziziphus zeyheriana</i>	Dwergblinkblaar-wag-'n-bietjie

### 6.1.10 Mixed Exotic and Indigenous area (Area E)

Area E is most probably the site of a former farm dwelling. This assumption is supported by the presence of some exotic trees in a relatively small garden area. Further evidence is the presence of *Cenchrus ciliaris* (Foxtail Buffalo grass) which is usually cultivated for grazing and does not occur naturally in this area. It occurs in alternating strips with *Hyparrhenia hirta* and has even spread to the neighbouring Area D.



**Photo 6:** Strips of alternating *Cenchrus ciliaris* and *Hyparrhenia hirta* grasses.

The dominance of *Cenchrus ciliaris* is very evident in the absence of other grass species that are typical for this area. The same applies for the absence of geophytes that were removed or destroyed during previous cultivation activities. The presence of several invader species as well as two Category 1 declared weeds, are also typical for the garden of a farm dwelling.

Many seedlings of some of these invaders have been spotted and they pose a threat to the remainder of the natural vegetation.

Number of indigenous species in area E representing the different plant life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	15
Shrubs	5
Grasses	3
Geophytes	0
Herbs	3
Number of indigenous species	8
Total number of species	26

**Table 7: Plant species recorded in Area E. Alien species are indicated by \*, weeds by \*\* and medicinal species by #.**

SCIENTIFIC NAME	ENGLISH NAME
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<b><i>Arundo donax</i></b> **	Spanish Reed / Spaansriet
<i>Bauhinia variegata</i> *	Orchid tree / Orgideëboom
<i>Bidens pilosa</i> **	Blackjack / Knapsekêrel
<i>Brachychiton populneum</i> *	Kurrajong / Koerajong
<i>Catharanthus roseus</i> *	Grafblommetjie
<i>Cenchrus ciliaris</i>	Foxtail Buffalo Grass / Bloubuffelsgras
<i>Chorisia speciosa</i> *	Floss silk tree / Kapokboom
<i>Combretum erythrophyllum</i>	River Bushwillow / Vaderlandswilg
<i>Erythrina humeana</i>	Kleinkoraalboom
<i>Eucalyptus</i> sp cf <i>E. alba</i> *	White Gum / Witbloekom
<i>Eucalyptus</i> sp cf <i>E. grandis</i> *	Saligna Gum / Saligna-bloekom
<i>Gnidia caffra</i>	Gifbossie
<i>Grevillea robusta</i> *	Silky Oak / Silwereik
<i>Hyparrhenia hirta</i>	Common Thatching Grass / Dekgras
<i>Jacaranda mimosifolia</i> *	Jacaranda / Jakaranda
<i>Lagerstroemia indica</i> *	Pride of India / Skubliesroos
<b><i>Lantana camara</i></b> **	Lantata
<i>Melia azedarach</i> *	Syringa / Maksering
<i>Morus nigra</i> *	Black mulberry / Swart moerby
<i>Panicum maximum</i>	Guinea grass / Buffelsgras
<i>Pinus</i> sp. cf <i>P. radiata</i> *	Monterey pine / Radiataden
<i>Rhus leptodictya</i>	Mountain karee / Bergkaree
<i>Senecio inornatus</i>	
<i>Tagetes minuta</i> **	Khaki weed / Kakiebos
<i>Tipuana tipu</i> *	Tipu tree / Tipoeboom
<i>Ulmus procera</i> *	English Elm / Skurwe-olm

### 6.1.11 Grassland (Area F)

In comparison to the other five areas, the vegetation of Area F is the least disturbed. This is notwithstanding the impact of the road crossing Area F from east to west. However, it links onto the neighbouring Onderstepoort Nature Reserve to the north and shows a very similar vegetation that comprises an open grassland with some trees. This is also reflected by the low number of trees and shrubs compared to the larger number of grasses, geophytes and herbs.

Only two Category 1 declared weeds were found and seven undeclared weeds which shows a high degree of climax vegetation with little disturbance. A single specimen of *Lantana camara* was nonetheless found on this site as well as the only sighting of Dodder (*Cuscuta campestris*).





**Photo 7:** Single leaved specimens of *Eriospermum cooperi* in shallow soil close to natural exposure of granite.

Some single leaved specimens of *Eriospermum cooperi* were found. This site is also the only one with visible granite outcrops amongst the plants, and can be explained by its closeness to the granite koppies in the adjacent Nature Reserve. No Red Data species were found within this section, or in the prescribed zone outside the borders of this area where access was possible.

Number of indigenous species in Area F representing the different plant life forms.

LIFE FORM	NUMBER OF SPECIES
Trees	5
Shrubs	8
Grasses	15
Geophytes	17
Herbs	43
Number of indigenous species	43
Total number of species	52

**Table 8: Plant species recorded in Area F. Alien species are indicated by \*, weeds by \*\* and medicinal species by #.**

SCIENTIFIC NAME	ENGLISH NAME
<i>Acacia karroo</i> #	Sweet thorn / Soetdoring
<i>Acacia nilotica</i>	Scented thorn / Lekkerruikpeul
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella thorn / Haak-en-steek
<i>Aloe greatheadii</i> subsp <i>davyana</i> #	
<i>Aloe transvaalensis</i>	
<i>Andropogon schirensis</i>	Stab grass / Tweevingergras
<i>Anthericum cooperi</i>	
<i>Aristida adscensionis</i>	Annual Three-awn / Eenjarige steekgras
<i>Aristida congesta</i> subsp <i>barbicollis</i>	Spreading Three-awn / Lossteekgras
<i>Aristida diffusa</i>	Iron grass / Ystergras
<i>Barleria macrostegia</i> #	
<i>Bidens pilosa</i> **	Blackjack / Knapsekêrel
<i>Brachiaria serrata</i>	Velvet signal grass / Fluweelsinjaalgras
<i>Buchnera longispicata</i>	
<i>Bulbine abyssinica</i>	

SCIENTIFIC NAME	ENGLISH NAME
<i>Chamaecrista mimosoides</i>	Fishbone cassia / Boesmanstee
<i>Chascanum hederaceum</i>	
<i>Chenopodium murale</i> **	Nettle leaved goosefoot / Muurhondebossie
<i>Chlorophytum cooperi</i>	
<i>Clematis brachiata</i>	Traveller's joy / Klimop
<i>Convolvulus sagittatus</i> subsp <i>sagittatus</i>	Bindweed / Bobbejaantou
<i>Conyza podocephala</i>	
<i>Corchorus confusus</i>	
<i>Crotalaria eremicola</i>	
<b><i>Cuscuta campestris</i></b> **	Dodder
<i>Cymbopogon excavatus</i>	Broad-leaved Turpentine grass / Breëblaarterpentyngras
<i>Dicerocaryum eriocarpum</i> #	Devil's Thorn / Elandsdoring
<i>Dichrostachys cinerea</i>	Sickle Bush / Sekelbos
<i>Ehretia rigida</i>	Puzzle bush / Deurmekaarbos
<i>Elephantorrhiza elephantina</i> #	Elephant's root / Olifantwortel
<i>Elionurus muticus</i>	Wire grass / Koperdraadgras
<i>Eriosema burkei</i>	
<i>Eriospermum cooperi</i>	
<i>Felicia muricata</i> subsp <i>muricata</i>	
<i>Gladiolus crassifolius</i>	
<i>Gnidia capitata</i>	Kerrieblom
<i>Hermannia depressa</i> #	Rooi-opslag
<i>Heteropogon contortus</i>	Spear grass / Assegaaigras
<i>Hibiscus trionum</i> **	Bladder's hibicus / Terblansbossie
<i>Hyparrhenia hirta</i>	Common Thatching Grass / Gewone Dekgras
<i>Hypoxis rigidula</i> var <i>rigidula</i>	Tuislandtulp
<i>Indigastrum burkeanum</i>	
<i>Indigofera adenoides</i>	
<i>Indigofera comosa</i>	
<i>Indigofera daleoides</i> var <i>daleoides</i>	
<i>Indigofera filipes</i>	
<i>Indigofera sordida</i>	
<i>Indigofera zeyheri</i>	
<i>Ipomoea bathycolpos</i> var <i>bathycolpos</i>	Veldsambreeltjies
<i>Kohautia caespitosa</i>	
<b><i>Lantana camara</i></b> **	Lantana
<i>Ledebouria revoluta</i>	
<i>Lippia javanica</i> #	Fever tea / Beukesbossie
<i>Melinis repens</i>	Natal Red Top / Natal rooipluim
<i>Microchloa caffra</i>	Pincushion Grass / Elsgrass
<i>Monsonia angustifolia</i>	Crane's bill / Angelbossie
<i>Neorautanenia ficifolius</i>	Blou-ertjie
<i>Nidorella hottentotica</i>	
<i>Oenothera indecora</i> **	Small Evening Primrose / Nagblom
<i>Ornithogalum tenuifolium</i> subsp <i>tenuifolium</i>	Bosui
<i>Oxalis depressa</i>	
<i>Pachycarpus schinzianus</i>	Bitterwortel
<i>Plectranthus madagascariensis</i>	
<i>Pollichia campestris</i>	Wax berry / Wasbessie
<i>Polygala amatymbica</i>	
<i>Polygala hottentotta</i>	



SCIENTIFIC NAME	ENGLISH NAME
<i>Raphionacme lucens</i>	
<i>Rhus leptodictya</i>	Mountain karee / Bergkaree
<i>Rhynchosia totta</i>	
<i>Schkuhria pinnata</i> **#	Dwarf Marigold / Kleinkakiebos
<i>Sebaea grandis</i>	
<i>Senecio barbertonicus</i>	
<i>Setaria sphacelata</i> var <i>sphacelata</i>	Common Bristle Grass / Gewone Mannagras
<i>Setaria ustilata</i>	
<i>Sida dregei</i>	Spider leg
<i>Solanum incanum</i>	Bitter apple / Bitterappel
<i>Sonchus dregeanus</i>	
<i>Striga bilabiata</i>	
<i>Tagetes minuta</i> **	Khaki weed / Kakiebos
<i>Themeda triandra</i>	Red grass / Rooigras
<i>Trichodesma angustifolia</i>	
<i>Urelytrum agropyroides</i>	Centipede grass / Varkstertgras
<i>Ursinia nana</i> subsp <i>nana</i>	
<i>Vangueria infausta</i>	Wild medlar / Mispel
<i>Vernonia oligocephala</i> #	Bitterbossie
<i>Zinnia peruviana</i> **	Wilde jakobregop
<i>Ziziphus mucronata</i> #	Buffalo thorn / Blinkblaar-wag-'n-bietjie
<i>Ziziphus zeyheriana</i>	Dwergblinkblaar-wag-'n-bietjie

## 6.2 Vertebrate Faunal Survey

### 6.2.1 Mammals

The local occurrences of mammals are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupicolous (rock-dwelling) and wetland-associated vegetation cover. It is thus possible to deduce the presence or absence of mammal species by evaluating the habitat types within the context of global distribution ranges. Sight records and information from residents or knowledgeable locals audit such deductions.

From a mammal habitat perspective, two of the four major habitat types are present on the study site, i.e. terrestrial and arboreal.

No bat caves are present on the site.

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

Large mammals have long since succumbed to farming activities, and only medium-sized mammals can be expected in the region, viz. baboons, monkeys, duiker and steenbok.

Of the 43 mammal species expected to occur on the study site (Table 9), four were confirmed during the site visit (Table 10). It should be noted that potential occurrences are interpreted to be possible over a period of time as a result of expansion and contractions of population densities and concomitantly of ranges.

Table 9 lists the mammals which were observed or deduced to occupy the site, or to be occasional visitors. All feral mammal species expected to occur on the study site (e.g. house mice, house rats, dogs and cats) were omitted from the assessment since these species normally associate with human settlements.

All but the four Red Data species (Table 9) are common and widespread.

It can be expected that medium-sized mammals will venture onto the site from the adjoining nature reserve, viz. duiker, steenbok brown hyena, baboons and monkeys. The crevices in the rocky randjie to the north, as well as larger trees present bats with ample daytime roosting sites. These small flying mammals are sure to overfly the site during their dusk quests for aerial insects.

The relatively high diversity is due to: the large size of the site and adjoining properties; the fact that it is bordering a nature reserve from where an influx of animals is possible; and fairly good quality of conservation.

### **Mammal Habitat Assessment**

Presently, the grass cover is dense and high. This provides excellent cover and nourishment for small mammals. The tall grass will favour grass-climbing mice. The soils are sub-optimal for burrowing mammals, but the areas with red sandy soils can be expected to allow for the occurrence of small burrowing mammals. The woody component on the northern section consists mostly of shrub-like *Acacias* too small to meet the requirements of arboreal mammals. However, larger trees in the southern section are ideal for arboreal mammals such as galagos, woodland dormice, *Acacia* rats and black-tailed tree rats.

The 500 meters of adjoining properties vary from pristine conditions in the Onderstepoort Nature Reserve, to usage typical to smallholdings, to industrial and business sites. The potential of immigration from the nature reserve is excellent.

**Table 9: The mammals, which were observed or deduced to occupy the site.**

	<b>SCIENTIFIC NAME</b>	<b>ENGLISH NAME</b>
?	<i>Elephantulus brachyrhynchus</i>	Short-snouted elephant shrew
√	<i>Lepus saxatilis</i>	Scrub hare
√	<i>Cryptomys hottentotus</i>	African mole rat
?	<i>Hystrix africaeustralis</i>	Cape porcupine
?	<i>Graphiurus murinus</i>	Woodland dormouse
√	<i>Rhabdomys pumilio</i>	Four-striped grass mouse
√	<i>Mus minutoides</i>	Pygmy mouse
√	<i>Mastomys natalensis</i>	Natal multimammate mouse
√	<i>Mastomys coucha</i>	Southern multimammate mouse
?	<i>Thallomys paedulus</i>	Acacia rat
?	<i>Thallomys nigricauda</i>	Black-tailed tree rat
√	<i>Aethomys ineptus</i>	Tete veld rat
√	<i>Tatera leucogaster</i>	Bushveld gerbil
√	<i>Saccostomus campestris</i>	Pouched mouse
√	<i>Dendromys melanotis</i>	Grey pygmy climbing mouse
√	<i>Dendromus mesomelas</i>	Brants' climbing mouse
√	<i>Dendromus mystacalis</i>	Chestnut climbing mouse
?	<i>Galago moholi</i>	South African galago
?	<i>Papio hamadryas</i>	Chacma baboon
?	<i>Cercopithecus pygerythrus</i>	Vervet monkey
√	<i>Crocidura cyanea</i>	Reddish-grey musk shrew
√	<i>Crocidura hirta</i>	Lesser red musk shrew
<b>R?</b>	<i>Atelerix frontalis</i>	Southern African hedgehog
?	<i>Epomophorus wahlbergi</i>	Wahlberg's epauletted fruit bat
*	<i>Taphozous mauritianus</i>	Mauritian tomb bat
*	<i>Sauromys petrophilus</i>	Flat-headed free-tailed bat
*	<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat
√	<i>Neoromicia capensis</i>	Cape serotine bat

	SCIENTIFIC NAME	ENGLISH NAME
√	<i>Scotophilus dinganii</i>	African yellow house bat
√	<i>Scotophilus viridis</i>	Greenish yellow house bat
<b>R?</b>	<i>Parahyaena brunnea</i>	Brown hyaena
<b>?</b>	<i>Caracal caracal</i>	Caracal
<b>V?</b>	<i>Felis silvestris</i>	African wild cat
√	<i>Genetta genetta</i>	Small-spotted genet
√	<i>Genetta tigrina</i>	SA large-spotted genet
√	<i>Cynictis penicillata</i>	Yellow mongoose
√	<i>Galerella sanguinea</i>	Slender mongoose
*	<i>Mungos mungo</i>	Banded mongoose
*	<i>Canis mesomelas</i>	Black-backed jackal
<b>R?</b>	<i>Poecilogale albinucha</i>	African weasel
*	<i>Ictonyx striatus</i>	Striped polecat
√	<i>Sylvicapra grimmia</i>	Common duiker
√	<i>Raphicerus campestris</i>	Steenbok

√ Definitely there or have a *high* probability to occur;

\* *Medium* probability to occur based on ecological and distributional parameters;

? *Low* probability to occur.

Red Data species are given in the first column, i.e. **R** = Rare, **V** = Vulnerable, **I** = Indeterminate.

**Table 10: Mammal species positively confirmed from the study site, observed indicators and habitat.**

SCIENTIFIC NAME	ENGLISH NAME	OBSERVATION INDICATOR	HABITAT
<i>L. saxatilis</i>	Scrub hare	Faecal pellets	Short grassland
<i>C. hottentotus</i>	African mole rat	Tunnel systems	Wide tolerance
<i>C. penicillata</i>	Yellow mongoose	Sight record	Wide tolerance
<i>G. sanguinea</i>	Slender mongoose	Sight record	Wide tolerance

It would be remarkable if the presence of these four common and widespread species is not recorded from a sizeable and relatively undisturbed site larger than 20 hectares. All four have behaviors and habitat utilisation mechanisms allowing co-existence with human habitation and activities. The fact that the two small and swift carnivores are catholic in their diets contribute to their ability to resist great civilization pressures.

### **Threatened and Red Listed Mammal Species**

The likelihood of hedgehogs occurring in the grasslands of the site is good, especially when considering the conservation provided in the adjoining nature reserve. The adjoining nature reserve furthermore increases the potential of brown hyenas, African wild cats and African weasels venturing onto the site itself.

## **6.2.2 Avifauna**

### **Avifaunal Habitat Assessment:**

The study site is situated within the Central Bushveld Bioregion of the Savanna Biome and more specifically within the Marikana Thornveld vegetation type according to Mucina and Rutherford (2006).

Only one distinct bird habitat system was identified. A short description of this habitat is as follows:

### **Acacia savanna and mixed Acacia / broadleaf woodland:**

The entire study site consists of *Acacia* dominated woodland interspaced with natural grassland. Some broadleaf trees is found growing amongst the *Acacia* trees throughout this

habitat. This woodland varies in density from dense bush to open *Acacia* savanna woodland with scattered trees and large open grassland areas between the trees. Some areas on the study site have been disturbed through past and present human activities and a network of human tracks and roads criss-cross the area especially within the southern portion of the study site. Exotic trees such as a *Eucalyptus* sp also occur. The bird species within this habitat generally include a variety of arboreal passerines such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers as well as arboreal non-passerines such as doves, cuckoos, woodpeckers. Many of these species make use of the thorny nature of *Acacia* trees to build their nests. *Acacia* trees generally attract many insects and in turn attract a good diversity of typical *Acacia* savanna bird species. The ground cover between the trees consists of mainly short to long grasses interspersed with shrubs.

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

Of the 347 bird species recorded for the 2528CA q.d.g.c., 156 (44.9%) are likely to occur on site and 26 (16.6%) of these bird species were actually observed on the study site.

The bird species listed are in species order according to *Roberts - Birds of Southern Africa* VII th edition (Hockey *et al.*, 2005). These were actually observed on site (**in bold**) or are likely to occur within the specific habitat(s) found on site. This does not include overflying birds or rare vagrants. Reporting rate (%) according to Harrison *et al.* (1997). The habitat preference, **AW = Acacia savanna Woodland** are indicated next to the reporting rate with their possibility of occurrence in these specific habitats on site are rated as 5 = present, 4 = High, 3 = Medium, 2 = Low, 1 = very low, and 0 = Not likely to occur.

**Table 11: List of bird species observed on site and that are likely to occur on the study site.**

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) * 2528CA	HABITAT PREFERENCE AS
<i>Peliperdix coqui</i>	Coqui Francolin	9	4
<i>Dendroperdix sephaena</i>	Crested Francolin	3	2
<i>Pternistis natalensis</i>	Natal Spurfowl	7	2
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	17	4
<i>Numida meleagris</i>	Helmeted Guineafowl	59	4
<i>Indicator indicator</i>	Greater Honeyguide	6	2
<i>Indicator minor</i>	Lesser Honeyguide	8	4
<i>Prodotiscus regulus</i>	Brown-backed Honeybird	1	1
<i>Jynx ruficollis</i>	Red-throated Wryneck	9	4
<i>Campethera abingoni</i>	Golden-tailed Woodpecker	13	4
<i>Dendropicos fuscescens</i>	Cardinal Woodpecker	22	4
<i>Dendropicos namaquus</i>	Bearded Woodpecker	1	2
<i>Pogoniulus chrysoconus</i>	Yellow-fronted Tinkerbird	9	4
<i>Tricholaema leucomelas</i>	Acacia Pied Barbet	9	4
<i>Lybius torquatus</i>	Black-collared Barbet	66	4
<b><i>Trachyphonus vaillantii</i></b>	<b>Crested Barbet</b>	<b>87</b>	5
<i>Tockus nasutus</i>	African Grey Hornbill	18	4
<i>Upupa africana</i>	African Hoopoe	84	4
<i>Phoeniculus purpureus</i>	Green Wood-Hoopoe	55	4
<i>Rhinopomastus cyanomelas</i>	Common Scimitarbill	2	2

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) <sup>*</sup> 2528CA	HABITAT PREFERENCE
			AS
<i>Halcyon senegalensis</i>	Woodland Kingfisher	7	2
<i>Halcyon albiventris</i>	Brown-hooded Kingfisher	39	4
<i>Merops bullockoides</i>	White-fronted Bee-eater	10	4
<i>Merops pusillus</i>	Little Bee-eater	3	2
<i>Merops apiaster</i>	European Bee-eater	31	4
<i>Colius striatus</i>	Speckled Mousebird	82	4
<i>Urocolius indicus</i>	Red-faced Mousebird	49	4
<i>Clamator jacobinus</i>	Jacobin Cuckoo	3	3
<i>Clamator levaillantii</i>	Levaillant's Cuckoo	<1	2
<i>Cuculus solitarius</i>	Red-chested Cuckoo	18	3
<i>Cuculus clamosus</i>	Black Cuckoo	6	3
<i>Cuculus gularis</i>	African Cuckoo	1	2
<i>Chrysococcyx klaas</i>	Klaas's Cuckoo	4	3
<b><i>Chrysococcyx caprius</i></b>	<b>Diderick Cuckoo</b>	27	5
<i>Centropus burchellii</i>	Burchell's Coucal	70	3
<b><i>Cypsiurus parvus</i></b>	<b>African Palm-Swift</b>	21	5
<i>Apus affinis</i>	Little Swift	39	4
<i>Apus caffer</i>	White-rumped Swift	17	4
<b><i>Corythaixoides concolor</i></b>	<b>Grey Go-away-bird</b>	63	5
<i>Tyto alba</i>	Barn Owl	11	4
<i>Bubo africanus</i>	Spotted Eagle-Owl	8	4
<i>Glaucidium perlatum</i>	Pearl-spotted Owlet	3	3
<i>Columba livia</i>	Rock Dove	53	2
<i>Columba guinea</i>	Speckled Pigeon	54	3
<b><i>Streptopelia senegalensis</i></b>	<b>Laughing Dove</b>	98	5
<b><i>Streptopelia capicola</i></b>	<b>Cape Turtle-Dove</b>	57	5
<b><i>Streptopelia semitorquata</i></b>	<b>Red-eyed Dove</b>	33	5
<i>Treron calvus</i>	African Green-Pigeon	5	2
<i>Burhinus capensis</i>	Spotted Thick-knee	24	4
<i>Vanellus armatus</i>	Blacksmith Lapwing	37	2
<i>Vanellus senegallus</i>	African Wattled Lapwing	10	2
<i>Vanellus coronatus</i>	Crowned Lapwing	79	3
<i>Elanus caeruleus</i>	Black-shouldered Kite	47	4
<i>Milvus migrans</i>	Black Kite	17	2
<i>Accipiter minullus</i>	Little Sparrowhawk	2	2
<i>Buteo vulpinus</i>	Steppe Buzzard	5	3
<i>Ardea melanocephala</i>	Black-headed Heron	31	2
<i>Bubulcus ibis</i>	Cattle Egret	81	4
<i>Bostrychia hagedash</i>	Hadedda Ibis	84	3
<i>Oriolus larvatus</i>	Black-headed Oriole	25	3
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	37	4

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%)* 2528CA	HABITAT PREFERENCE
			AS
<b><i>Terpsiphone viridis</i></b>	<b>African Paradise-Flycatcher</b>	23	5
<i>Nilaus afer</i>	Brubru	7	3
<i>Dryoscopus cubla</i>	Black-backed Puffback	42	5
<i>Tchagra senegalus</i>	Black-crowned Tchagra	38	3
<i>Tchagra australis</i>	Brown-crowned Tchagra	15	4
<i>Laniarius ferrugineus</i>	Southern Boubou	48	4
<i>Laniarius atrococcineus</i>	Crimson-breasted Shrike	9	3
<i>Telophorus zeylonus</i>	Bokmakierie	40	3
<i>Telophorus sulfureopectus</i>	Orange-breasted Bush-Shrike	<1	2
<i>Malaconotus blanchoti</i>	Grey-headed Bush-Shrike	6	3
<b><i>Batis molitor</i></b>	<b>Chinspot Batis</b>	22	5
<i>Corvus albus</i>	Pied Crow	58	4
<i>Lanius collurio</i>	Red-backed Shrike	4	3
<b><i>Lanius collaris</i></b>	<b>Common Fiscal</b>	88	5
<i>Campephaga flava</i>	Black Cuckooshrike	3	3
<i>Parus niger</i>	Southern Black Tit	3	3
<i>Riparia paludicola</i>	Brown-throated Martin	8	2
<b><i>Hirundo rustica</i></b>	<b>Barn Swallow</b>	34	5
<i>Hirundo albigularis</i>	White-throated Swallow	12	2
<i>Hirundo dimidiata</i>	Pearl-breasted Swallow	3	2
<b><i>Hirundo cucullata</i></b>	<b>Greater Striped Swallow</b>	31	5
<i>Hirundo abyssinica</i>	Lesser Striped Swallow	24	4
<i>Hirundo semirufa</i>	Red-breasted Swallow	10	3
<i>Delichon urbicum</i>	Common House-Martin	4	2
<b><i>Pycnonotus tricolor</i></b>	<b>Dark-capped Bulbul</b>	93	5
<i>Stenostira scita</i>	Fairy Flycatcher	2	3
<i>Sylvietta rufescens</i>	Long-billed Crombec	21	4
<i>Eremomela usticollis</i>	Burnt-necked Eremomela	1	2
<b><i>Acrocephalus palustris</i></b>	<b>Marsh Warbler</b>	<1	5
<i>Hippolais icterina</i>	Icterine Warbler	2	1
<i>Phylloscopus trochilus</i>	Willow Warbler	12	4
<i>Turdoides jardineii</i>	Arrow-marked Babbler	35	4
<i>Parisoma subcaeruleum</i>	Chestnut-vented Tit-Babbler	10	4
<i>Sylvia borin</i>	Garden Warbler	1	3
<i>Sylvia communis</i>	Common Whitethroat	1	2
<i>Zosterops virens</i>	Cape White-eye	83	4
<i>Cisticola chiniana</i>	Rattling Cisticola	6	2
<b><i>Cisticola fulvicapilla</i></b>	<b>Neddicky</b>	20	5
<b><i>Cisticola juncidis</i></b>	<b>Zitting Cisticola</b>	9	5
<b><i>Cisticola aridulus</i></b>	<b>Desert Cisticola</b>	3	5
<i>Prinia subflava</i>	Tawny-flanked Prinia	28	4

SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) <sup>*</sup> 2528CA	HABITAT PREFERENCE
			AS
<b><i>Prinia flavicans</i></b>	<b>Black-chested Prinia</b>	<b>22</b>	5
<i>Apalis thoracica</i>	Bar-throated Apalis	6	3
<i>Camaroptera brevicaudata</i>	Grey-backed Camaroptera	1	1
<i>Mirafra africana</i>	Rufous-naped Lark	12	2
<i>Calendulauda sabota</i>	Sabota Lark	3	2
<i>Psophocichla litsitsirupa</i>	Groundscraper Thrush	5	3
<i>Turdus libonyanus</i>	Kurrichane Thrush	24	3
<i>Turdus smithi</i>	Karoo Thrush	82	4
<i>Melaenornis pammelaina</i>	Southern Black Flycatcher	2	2
<i>Sigelus silens</i>	Fiscal Flycatcher	38	4
<i>Muscicapa striata</i>	Spotted Flycatcher	8	4
<i>Cossypha caffra</i>	Cape Robin-Chat	72	4
<i>Cossypha humeralis</i>	White-throated Robin-Chat	13	3
<i>Cossypha heuglini</i>	White-browed Robin-Chat	4	4
<i>Saxicola torquatus</i>	African Stonechat	8	1
<i>Onychognathus morio</i>	Red-winged Starling	30	1
<i>Lamprotornis nitens</i>	Cape Glossy Starling	18	4
<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	10	4
<i>Creatophora cinerea</i>	Wattled Starling	1	1
<b><i>Acridotheres tristis</i></b>	<b>Common Myna (INT)</b>	<b>22</b>	5
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	49	4
<i>Cinnyris talatala</i>	White-bellied Sunbird	63	4
<i>Cinnyris mariquensis</i>	Marico Sunbird	6	3
<i>Sporopipes squamifrons</i>	Scaly-feathered Finch	4	2
<i>Ploceus intermedius</i>	Lesser Masked-Weaver	2	1
<i>Ploceus capensis</i>	Cape Weaver	14	3
<b><i>Ploceus velatus</i></b>	<b>Southern Masked-Weaver</b>	<b>77</b>	4
<i>Ploceus cucullatus</i>	Village Weaver	6	2
<i>Quelea quelea</i>	Red-billed Quelea	8	4
<i>Euplectes orix</i>	Southern Red Bishop	40	4
<b><i>Euplectes albonotatus</i></b>	<b>White-winged Widowbird</b>	<b>27</b>	2
<i>Euplectes ardens</i>	Red-collared Widowbird	6	0
<i>Euplectes progne</i>	Long-tailed Widowbird	8	1
<i>Amblyospiza albifrons</i>	Thick-billed Weaver	2	2
<i>Sporaeginthus subflavus</i>	Orange-breasted Waxbill	6	2
<i>Ortygospiza atricollis</i>	African Quailfinch	2	2
<i>Amadina erythrocephala</i>	Red-headed Finch	3	3
<i>Amadina fasciata</i>	Cut-throat Finch	5	3
<i>Estrilda astrild</i>	Common Waxbill	16	3
<b><i>Uraeginthus angolensis</i></b>	<b>Blue Waxbill</b>	<b>21</b>	5
<i>Pytilia melba</i>	Green-winged Pytilia	3	4



SCIENTIFIC NAME	ENGLISH NAME	R RATE (%) <sup>*</sup> 2528CA	HABITAT PREFERENCE
			AS
<i>Lagonosticta senegala</i>	Red-billed Firefinch	6	4
<i>Lagonosticta rhodopareia</i>	Jameson's Firefinch	4	4
<b><i>Spermestes cucullatus</i></b>	<b>Bronze Mannikin</b>	27	4
<i>Vidua macroura</i>	Pin-tailed Whydah	20	4
<i>Vidua paradisaea</i>	Long-tailed Paradise-Whydah	8	4
<b><i>Passer melanurus</i></b>	<b>Cape Sparrow</b>	94	5
<b><i>Passer diffusus</i></b>	<b>Southern Grey-headed Sparrow</b>	24	5
<i>Motacilla capensis</i>	Cape Wagtail	75	1
<i>Anthus cinnamomeus</i>	African Pipit	8	1
<i>Crithagra mozambicus</i>	Yellow-fronted Canary	18	3
<b><i>Crithagra atrogularis</i></b>	<b>Black-throated Canary</b>	39	5
<i>Crithagra gularis</i>	Streaky-headed Seedeater	30	4
<i>Emberiza flaviventris</i>	Golden-breasted Bunting	3	2
Biodiversity Index:			514

\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell.

INT = Introduced or alien birds species to Southern Africa.

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

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

### Threatened and Red Listed Bird Species

The following Red Data bird species were recorded for the 2528CA quarter degree grid cell (q.d.g.c) according to Harrison *et al.* (1997) and Tarboton *et al.* (1987).

Table 12: Red Data bird species recorded for the 2528CA q.d.g.c.

SCIENTIFIC NAME	ENGLISH NAME	REPORTING RATE (%) <sup>*</sup> 2528CA PRETORIA
<i>Alcedo semitorquata</i>	Half-collared Kingfisher (NT)	<1(T)
<i>Tyto capensis</i>	African Grass-Owl (VU)	(T)
<i>Eupodotis senegalensis</i>	White-bellied Korhaan (VU)	(T)
<i>Anthropoides paradiseus</i>	Blue Crane (VU)	1(T)
<i>Rostratula benghalensis</i>	Greater Painted-snipe (NT)	<1
<i>Macheiramphus alcinus</i>	Bat Hawk (NT)	(T)
<i>Gyps coprotheres</i>	Cape Vulture (VU)	2(T)
<i>Circus ranivorus</i>	African Marsh-Harrier (VU)	<1(T)
<i>Aquila rapax</i>	Tawny Eagle (VU)	<1
<i>Aquila ayresii</i>	Ayres's Hawk-Eagle (NT)	3(T)
<i>Polemaetus bellicosus</i>	Martial Eagle (VU)	(T)
<i>Sagittarius serpentarius</i>	Secretarybird (NT)	<1(Tb)
<i>Falco naumanni</i>	Lesser Kestrel (VU)	1(T)
<i>Falco biarmicus</i>	Lanner Falcon (NT)	1(Tb)
<i>Falco peregrinus</i>	Peregrine Falcon (NT)	(T)
<i>Phoenicopterus ruber</i>	Greater Flamingo (NT)	<1(T)
<i>Phoenicopterus minor</i>	Lesser Flamingo (NT)	(T)



SCIENTIFIC NAME	ENGLISH NAME	REPORTING RATE (%)* 2528CA PRETORIA
<i>Pelecanus rufescens</i>	Pink-backed Pelican ( <b>VU</b> )	(T)
<i>Mycteria ibis</i>	Yellow-billed Stork ( <b>NT</b> )	1(T)
<i>Ciconia nigra</i>	Black Stork ( <b>NT</b> )	1(T)
<i>Leptoptilos crumeniferus</i>	Marabou Stork ( <b>NT</b> )	<1(T)
<i>Mirafra cheniana</i>	Melodious Lark ( <b>NT</b> )	(Tb)
	Very Low :	12
	Low :	2
	Medium :	0
	High :	0
	TOTAL :	14
	Tarboton :	17
	Tarboton breeding:	3
		20

\*The reporting rate is calculated as follows: Total number of cards on which a species was reported X 100 ÷ total number of cards for a particular quarter degree grid cell.

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

**RE** = Regionally extinct, **CR** = Critically Endangered **EN** = Endangered, **VU** = Vulnerable, **NT** = Near-threatened.  
Br? = Suspected breeding, Br = Confirmed breeding, V = Vagrant, RV = Rare Vagrant, VRV = Vary Rare Vagrant, OV = Occasional Visitor and (?) or (X) Unlikely to occur on site

Twenty-two Red Data bird species were recorded within the 2528CA q.d.g.c. Eight of these have disappeared from the area or were not recorded for this quarter degree grid cell during the time of the southern African Bird Atlas project. It is unlikely that they will ever be seen in this region again, except maybe on rare occasions in protected areas. Three of these species used to breed within the said q.d.g.c (Tarboton, 1987) and none have been recorded breeding for the q.d.g.c. during the period of the Southern African bird atlas project. Most of the Red Data species that have been recorded indicate a low to very low reporting rate. The Cape Vulture and the Ayres's Hawk-Eagle indicate a low reporting rate compared to the other birds that indicate a very low reporting rate. No suitable breeding and foraging habitat exists site for any of the above-mentioned Red Data bird species. This decline in breeding species is probably due to the large extent of development that has taken place during a short space of time.

Table 13 provides a summary of the Red Data bird species recorded for the 2528CA q.d.g.c according to Harrison *et al.* (1997) and an indication of the likelihood of occurring on the study site based on habitat and food availability on site.

**Table 13: Red Data species assessment for birds.**

SCIENTIFIC NAME	PRESENCE OF SUITABLE HABITAT	LIKELIHOOD OF OCCURRENCE ON STUDY SITE
<i>Alcedo semitorquata</i> (Half-collared Kingfisher) (NT)	None, prefers clear fast-flowing rivers fringed with riparian growth.	Highly unlikely
<i>Anthropoides paradiseus</i> (Blue Crane) (VU)	None. Prefers more open grassland and Karriod grassland. Might on occasion just move over the area.	Highly unlikely
<i>Rostratula benghalensis</i> (Greater Painted-snipe) (NT)	None. Prefers marshes within wetland habitat.	Highly unlikely
<i>Gyps coprotheres</i> (Cape Vulture) (VU)	None. Their presence is dependent on the availability of food and roosting.	Highly unlikely
<i>Circus ranivorus</i> (African Marsh-Harrier) (VU)	None. Dependent on permanent wetlands for breeding, roosting and foraging.	Highly unlikely
<i>Aquila rapax</i> (Tawny Eagle) (VU)	None. Their presence is dependent on the availability of food and it is a rare visitor to the region.	Highly unlikely
<i>Aquila ayresii</i> (Ayres's Hawk-Eagle) (VU)	None.	Highly unlikely.
<i>Sagittarius serpentarius</i> (Secretarybird) (NT)	None. Restricted to large conservation areas in the region.	Highly unlikely
<i>Falco naumanni</i> (Lesser Kestrel) (VU)	None. Palaearctic migrant. Prefers open country such as pristine open grassland and pastures for foraging purposes.	Unlikely: May on rare occasions hunt on the study site
<i>Falco biarmicus</i> (Lanner Falcon) (NT)	None.	Highly unlikely
<i>Phoenicopterus ruber</i> (Greater Flamingo) (NT)	None. Prefers extensive systems of wetland, notably pans, marshes, lakes and floodplains	Highly unlikely
<i>Mycteria ibis</i> (Yellow-billed Stork) (NT)	None. Prefers extensive systems of wetland, notably pans, marshes, lakes and floodplains.	Highly unlikely
<i>Ciconia nigra</i> (Black Stork) (NT)	None. Prefers shallow waterbodies such as estuaries and rivers.	Highly unlikely
<i>Leptoptilos crumeniferus</i> (Marabou Stork) (NT)	None. Its presence depends on the availability of food.	Highly unlikely

### 6.2.3 Reptiles and Amphibians

The following list of species, that may occur on this site, was compiled based on the impressions gathered during this visit, records in the Transvaal Museum, from publications such as the documentation of the herpetofauna of the then Transvaal by Dr N. H. G. Jacobsen (Unpublished Ph.D. thesis, University of Pretoria, 1989) and his internal departmental report 'The Herpetofauna of Gauteng Province, 1995', as well as the 'Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland' (Minter, *et al*, 2004). The latest taxonomic nomenclature is being used. The vegetation type was analysed according to Low and Rebelo (1996) and Mucina and Rutherford (2006).

**Table 14: List of amphibians and reptiles which may occur on this site.**

SCIENTIFIC NAME	ENGLISH NAME	PROBABILITY OF OCCURRENCE
<b>CLASS: AMPHIBIA</b>	<b>AMPHIBIANS</b>	
<b>Order: ANURA</b>	<b>FROGS</b>	
<b>Family: Bufonidae</b>	<b>Toads</b>	
<i>Bufo gutturalis</i>	Guttural Toad	Low
<i>Bufo rangeri</i>	Ranger's Toad	Low
<i>Schismaderma carens</i>	Red Toad	Low
<b>Family: Ranidae</b>	<b>Common Frogs</b>	
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	Low
<i>Tomopterna natalensis</i>	Natal Sand Frog	Low
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	? Medium
<i>Cacosternum boettgeri</i>	Common Caco	Medium
<b>Family: Hyperoliidae</b>	<b>Reed Frogs</b>	
<i>Kassina senegalensis</i>	<i>Bubbling Kassina</i>	Low
<b>CLASS: REPTILIA</b>	<b>REPTILES</b>	
<b>ORDER: SQUAMATA</b>	<b>SCALE-BEARING REPTILES</b>	
<b>Suborder: LACERTILIA</b>	<b>LIZARDS</b>	
<b>Family: Geckonidae</b>	<b>Geckos</b>	
<i>Lygodactylus capensis</i>	Cape Dwarf Gecko	Medium
<i>Pachydactylus affinis</i>	Transvaal Thick-toed Gecko	Low
<i>Pachydactylus capensis</i>	Cape Thick-toed Gecko	Low
<b>Family: Agamidae</b>	<b>Agamas</b>	
<i>Agama distanti</i>	Distant's Ground Agama	Low
<i>Acanthocercus atricollis</i>	Tree Agama	Low
<b>Family: Chamaeleonidae</b>	<b>Chameleons</b>	
<i>Chamaeleo dilepis</i>	Flap-necked Chameleon	Low
<b>Family: Lacertidae</b>	<b>Lacertids</b>	
<i>Nucras holubi</i>	Holub's Sandveld Lizard	Low
<i>Nucras ornata</i>	Ornate Sandveld Lizard	Low
<i>Ichnotropis capensis</i>	Cape Rough-scaled Lizard	Low
<b>Family: Scincidae</b>	<b>Skinks</b>	
<i>Trachylepis punctatissima</i>	Speckled Skink	Medium
<i>Trachylepis capensis</i>	Cape Skink	Low
<i>Trachylepis varia</i>	Variable Skink	Low
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	Low
<i>Lygosoma sundevallii</i>	Sundevall's Writhing Skink	Medium
<b>Family: Gerrhosauridae</b>	<b>Plated Lizards</b>	
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	Low
<b>Suborder: SERPENTES</b>	<b>SNAKES</b>	
<b>Familie: Typhlopidae</b>	<b>Blind Snakes</b>	
<i>Typhlops bibronii</i>	Bibron's Blind Snake	Low
<b>Family: Leptotyphlopidae</b>	<b>Thread Snakes</b>	
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	Medium
<i>Leptotyphlops incognitus</i>	Eastern Thread Snake	Medium
<b>Family: Atractaspididae</b>	<b>African Burrowing Snakes</b>	
<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	Low
<i>Aparallactus capensis</i>	Cape Centipede-eater	Medium
<i>Amblyodipsas polylepis</i>	Purple-glossed Snake	Low
<b>Family: Colubridae</b>	<b>Typical Snakes</b>	

SCIENTIFIC NAME	ENGLISH NAME	PROBABILITY OF OCCURRENCE
<i>Lamprophis capensis</i>	Brown House Snake	Low
<i>Lycophidion capense</i>	Cape Wolf Snake	Low
<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker	Low
<i>Psammophylax rhombeatus</i>	Rhombic Skaapsteker	Low
<i>Psammophis brevirostris</i>	Short-snouted Sand Snake	Medium
<i>Prosymna s. sundevallii</i>	Sundevall's Shovel-snout	Low
<i>Crotaphopeltis hotamboeia</i>	Herald Snake	Low
<i>Telescopus semiannulatus</i>	Tiger Snake	Low
<i>Dispholidus typus</i>	Boomslang	Low
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Medium
<b>Family: Elapidae</b>	<b>Cobras, Mambas &amp; Elapids</b>	
<i>Naja annulifera</i>	Snouted Cobra	Low
<i>Naja mossambica</i>	Mozambique Spitting Cobra	Low
<b>Family: Viperidae</b>	<b>Adders</b>	
<i>Causus rhombeatus</i>	Rhombic Night Adder	Low
<i>Bitis arietans</i>	Puff Adder	Low

## 7. FINDINGS AND POTENTIAL IMPLICATIONS

### 7.1 Flora

The vegetation of the study area ranges from almost pristine in some areas to disturbed of various degrees, ranging from slight to severe. It shows unnatural vegetation in the vicinity of the former farmhouse next to the informal settlement and along the roads. It will take many years to return to its original state if left to natural ecological forces. Although the habitat is suitable for some of the Red- and Orange-listed plant species known to occur in this quarter degree grid square (2627BB), no specimens were found. The bordering developed areas were not visited to check for possible Red/Orange Listed species, as the natural vegetation is destroyed.

### 7.2 Fauna

#### 7.2.1 Mammals

The study site will have a large number of mammals as a result of the neighbouring nature reserved and connectivity with the reserved is very important. The proposed development will not result in a loss of ecologically sensitive and important habitat units, ecosystem function (e.g. reduction in water quality, soil pollution), loss of faunal habitat, nor of loss/displacement of threatened or protected fauna.

#### 7.2.2 Avifauna

With regard to the specific habitat found on site, none of the Red Data species listed in the *Eskom Red Data Book of Birds of Southern Africa, Lesotho and Swaziland* (Barnes, 2000) are likely to make use of the study site due to the small extent of the site, the lack of sufficient breeding and foraging habitat, and the large scale of development and disturbance surrounding the site. The woodland habitat on site will attract a large diversity of woodland bird species.

### 7.2.3 Reptiles and Amphibians

The habitat of this terrain north of the Magaliesberg is of a transitional nature, as the tropical savannah bushveld, here referred to as Marikana Bushveld (Mucina and Rutherford, 2006), reaches its southern limit and appears to be relatively undisturbed. Apart from the road and graded tracks, no agricultural activities have taken place. As the site is incompletely fenced, it is probable that it was not used for grazing. The herpetofauna can thus be assumed to be reasonably undisturbed and even a source for re-colonisation of the adjacent sites, several of which are occupied smallholdings. Several savannah lizards, such as two *Nucras* species, may occur in the open grassveld, while the Tree Agama (*Acanthocercus atricollis*) has been recorded from the foot of the Magaliesberg. Both listed cobra (*Naja* spp.) species are inhabitants of tropical savannah and their southern range limit coincides with this mountain range, although some infiltration through gaps in the range and along river valleys does occur. No records of the Red Data species, the Striped Harlequin Snake (*Homoroselaps dorsalis*) are known from this area north of the Magaliesberg. The Near Threatened Giant Bullfrog (*Pixycephalus adspersus*) is present in the general area but has not been confirmed from the study site. No sites suitable for breeding ponds were noticed but the terrain does appear suitable as dispersal area.

## 8. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

Recent good rains have resulted in the excellent condition of all the plants, especially those in disturbed areas, being annuals developing after their seed have germinated. This optimal growth has contributed to the ease of identifying most of them. Some plants, however, could not immediately be identified up to species-level because only sterile parts were available. Fortunately, it was only a minor problem with this site. Therefore, sufficient information could be gathered to reach sound conclusions and make well-considered recommendations.

The Galago Environmental team is amply experienced to derive reasonably accurate species lists of a location such as this study site. The team has access to ample databases and information resources, and has earlier conducted numerous intensive field surveys allowing the extrapolation of habitat diversity and quality into species richness. In this instance, an intensive vertebrate survey is deemed an expensive and fruitless expense with little chance of radically altering our primary data.

## 9. RECOMMENDED MITIGATION MEASURES

- All possible measures should be taken to prevent further unnecessary damage to the natural vegetation during any construction period. Special attention should be given to preserve the remaining indigenous trees on the site.
- All Category 1 declared weeds must be removed. Other species currently occurring on the site that can invade natural vegetation, such as *Ipomoea purpurea*, *Melia azedarach*, *Morus nigra* and *Opuntia ficus-indica* should be removed together with the Category 1 declared weeds.
- Special measures should be taken to conserve the geophytes in this area. Options are, with approval first by GDACE, to designate an area on site for these plants, or they can be used and managed in the landscaping of this development.
- Forage and host plants required by pollinator species in the area should be recommended and used in landscaped areas.
- Should hedgehogs be encountered during the development, these should be relocated to natural grassland areas in the neighbouring Onderstepoort Nature Reserve.

- The contractor must ensure that no fauna species are 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.
- Some areas with natural *Acacia* woodland vegetation should be kept natural and should form part of the landscaping to ensure future bird biodiversity for the area.
- Where possible the development should be restricted to the disturbed areas.
- Where possible **work should be restricted to one area at a time**. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- 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.

## 10. CONCLUSIONS

### **Flora:**

The vegetation of the study area is only partly disturbed. There is sufficient natural vegetation left for connectivity with neighbouring grassland communities, especially the Onderstepoort Nature Reserve to the north. It should be endeavoured to maintain this connection. Special measures should be taken to conserve the *Hypoxis*, *Eucomis* and *Aloe* specimens on this site. It should also be a priority to prevent exotic tree seedlings to establish in this grassland. Dumping of rubble, fuel and oil pollution and making of unattended fires are hazardous to the environment and should receive proper supervision and care during development of the site.

### **Mammals:**

Depending on the intensity and rate of development, most or all of the mammal assemblage will be displaced. The ensuing loss of extended habitat and home ranges for the Red Data species are regrettable, but at least these species will be able to retract to and survive in their stronghold in the reserve. On a global scale, this loss may be statistically insignificant but is nevertheless a continuation of a process of habitat destruction. The displacement of the more common mammals will not have an effect on their conservation status.

### **Birds:**

The development should not have a negative affect on the Red Data bird species recorded for the 2528CA q.d.g.c. The site is surrounded by development, which results in disturbance and human presence on site is high. In addition, there is also a lack of sufficient breeding and foraging habitat on the study site. The only negative affect that the development will have on the bird species that occur or that are likely to occur on site is the destruction of habitat for development which will result in the decline in bird species diversity. However, suitable habitat is found for these birds within the Onderstepoort Nature Reserve that borders the study site to the north.

### **Reptiles and Amphibians:**

This site appears to have the potential to support a relatively high species diversity. Although no agricultural activities have taken place on the site, some disturbance has been caused by the building of a road and some tracks. Most species will be present in normal densities. Unfortunately, any development will disturb the present situation and the local herpetofauna will be seriously diminished. If houses with gardens and walls or even factories are being built here, a number of reptile species, such as the Speckled Skink, the Cape Dwarf Gecko, the Tropical House Gecko and the Brown House Snake will reinvade the suburb. These species are referred to as commensals which utilise human structures and are able to live in association with man.

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