

GALAGO ENVIRONMENTAL

Biodiversity & Aquatic Specialists

638 Turf Street

Wingate Park, 0180

Tel: 012-345 4891

Fax: 086 675 6136

Cell: 082 322 5688

vanessam@lantic.net

www.galagoenvironmental.co.za



Mammal Habitat Assessment

of

**Magagula Heights on the Remainder
of Portion 52 of the farm
TAMBOEKIESFONTEIN 173 IR**

May 2017

Report author: **Mr. J.C.P van Wyk** (Pr.Sci.Nat: M.Sc)

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Declaration of Independence:

I, Jacobus Casparus Petrus van Wyk (68080450410845) declare that I:

- hold an MSc in the Biological Sciences, which allows registration by SACNASP (SA Council for National Scientific Professions) as a Professional Zoologist and sanctions me to function independently as a specialist scientific consultant
- as per prerequisite of the Natural Scientific Professions Act No. 27 of 2003, present this project as my work from inception and reflects exclusively my observations and unbiased scientific interpretations, executed to the best of my ability
- abide by the Code of Ethics of the SACNASP
- am committed to biodiversity conservation but concomitantly recognise the need for economic development. Even though I appreciate the opportunity to learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them
- abide by the Code of Ethics of the S.A. Council for Natural Scientific Professions
- act as an independent specialist consultant in the field of Zoology
- am subcontracted as specialist consultant by Galago Environmental CC for the project “Mammal Assessment of Magagula Heights, Gauteng Province” described in this report
- have no financial interest in the proposed development other than remuneration for work performed
- have or will not have any vested or conflicting interests in the proposed development
- undertake to disclose to Galago Environmental CC and its client as well as the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations, 2017
- Our intellectual property in this report will only be transferred to the client (the party/ company that commissioned the work) on full payment of the contract fee. Upon transfer of the intellectual property, we recognise that written consent of the client will be required for release of any part of this report to third parties.



J.C.P. van Wyk

1. INTRODUCTION

Galago Environmental CC. was appointed to undertake a Mammal Habitat Assessment on the Remainder of Portion 52 of the farm TAMBOEKIESFONTEIN 173IR, also known as Magagula Heights, scheduled for the establishment of a Residential Development.

This report focuses on the reigning status of threatened and sensitive mammals likely to occur on the proposed development site and whose conservation status should be considered in the decision-making process. Special attention was paid to the qualitative and quantitative habitat conditions for Red Data species deemed present on the site, and mitigation measures to ameliorate the effect of the proposed development. The secondary objective of the investigation was to gauge which mammals might still reside on the site and comment on the mammal diversity of the study area.

This assignment is in accordance with the 2017 EIA Regulations emanating from Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

2. SCOPE AND OBJECTIVES OF THE STUDY

- To qualitatively and quantitatively assess the significance of the mammal habitat components and current general conservation status of the property;
- Identify and comment on ecologically sensitive areas;
- To comment on connectivity with natural vegetation and habitats on adjacent sites;
- To provide a list of mammals which occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the proposed development on the mammals 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

This study site is situated in the quarter degree grid cell 2628AC (Alberton) just north of the R550 Klipriver Drive and bordering the D817 to the east. The entire area is 12.1351 hectares in extent and is spatially more accurately defined by 26°25'40.544"S; 28°11'42.1424"E. North and west of the study site lies the first development of the Magagula Heights Township. South-west of the site is a railway line and further to the south-west of the study site lies the Suikerbosrand Nature Reserve (Figure 1).

No really important topographical features are found on the study site, but two large drainages occur in the 500 metre surrounding area near the site, namely the Rietspruit and a tributary of the Rietspruit. Most of the study site slopes gently towards these drainage lines.

The site has been altered by dumping of builder's rubble and rubbish. Most of the terrestrial habitat is currently used for grazing by herds of cattle, flocks of sheep and goats. Invasive plants grow in many areas. The site has also been disturbed in some parts by veld fires, gravel roads, vegetable gardens (Figure 2), a soccer field (Figure 3),

footpaths and pedestrian thoroughfare between townships and the freeway and other roads, which cross the study site and are in constant use. A few diggings and hunting dogs have also been observed on the study site.

The study site lies inside the Tsakane Clay Grassland (Gm 9) vegetation type (Mucina & Rutherford, 2006).

Exotic plants such as tall khaki weed, castor-oil plant and giant reed grow on the site. The substrate is mostly sandy red soil.

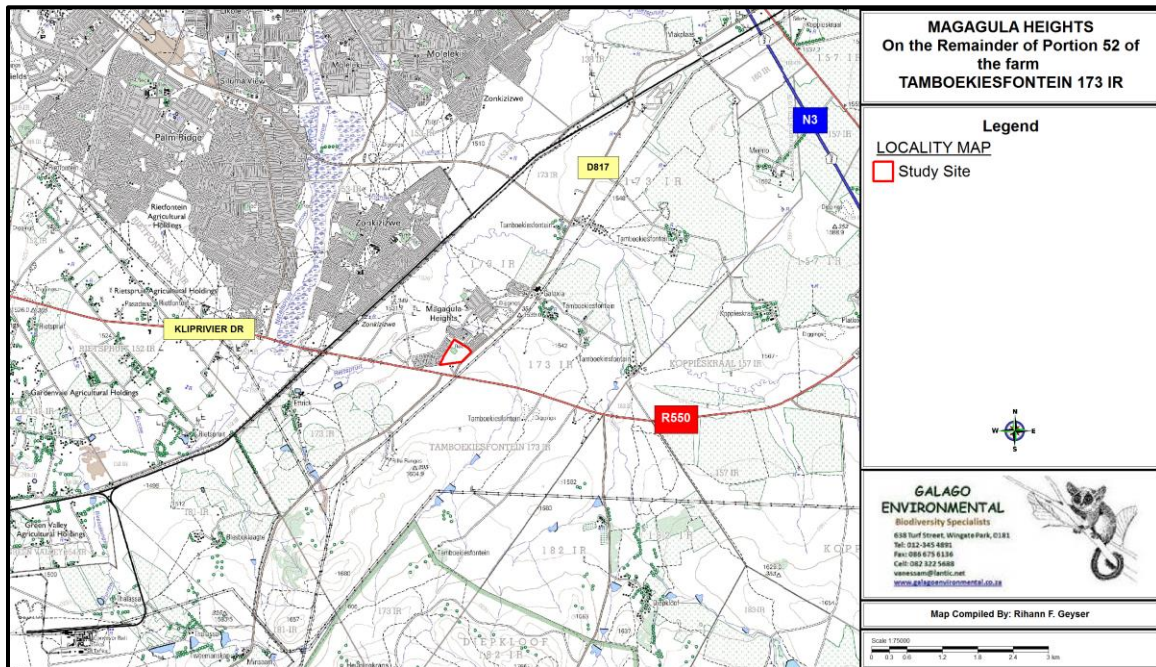


Figure 1: Locality map of the study area



Figure 2: A north-easterly view of the study site showing the burned grassveld and gravel road.



Figure 3: A southerly view of the study site showing the soccer field.

4. METHOD

The site visit was conducted on 20 May 2017. During this visit the observed and derived presence of mammals 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 mammals, coupled with the qualitative and quantitative nature of recognised habitats.

The 50-500 metres of adjoining properties were scanned for important faunal habitats.

4.1 Field Surveys

During the site visit mammals were identified by visual sightings through random transect walks. No trapping or mist netting was conducted, as the terms of reference did not require such intensive work. In addition, mammals were also identified by means of spoor, droppings, burrows or roosting sites.

Three criteria were used to gauge the probability of occurrence of mammals on the study site. These include known distribution range, habitat preference and the qualitative and quantitative presence of suitable habitat.

4.2 Desktop Surveys

As the majority of mammals are secretive, nocturnal, hibernators and/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. During the field work phase of the project, this derived list of occurrences is audited.

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.

Based on the impressions gathered during the site visit, as well as publications, such as The Complete Book of Southern African Mammals (Mills & Hes, 1997), The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005), Smithers' Mammals of Southern Africa; A Field Guide (2012) and Stuarts' Field Guide to Mammals of Southern Africa (Stuart & Stuart, 2015), a list of species which may occur on the site was compiled. The latest taxonomic nomenclature was used. The vegetation type was defined according to the standard handbook by Mucina and Rutherford (eds) (2006).

4.3 Specific Requirements

During the visit 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*), Highveld golden mole (*Amblysomus septentrionalis*), Rough-haired golden mole (*Chrysospalax villosus*), African marsh rat (*Dasymys incomtus*), Angoni vlei rat (*Otomys angoniensis*), Vlei rat (*Otomys irroratus*), White-tailed rat (*Mystromys albicaudatus*), a number of shrews such as the Forest shrew (*Myosorex varius*), Southern African hedgehog (*Atelerix frontalis*), a number of bats such as the Short-eared trident bat (*Cloeotis percivali*), African clawless otter (*Aonyx capensis*), Spotted-necked otter (*Hydrictis maculicollis*), Marsh mongoose (*Atilax paludinosus*), Brown hyena (*Hyaena brunnea*), etc.

5. RESULTS

Acocks (1988), Mucina and Rutherford (2006), Low & Rebelo (1996), SANBI & DEAT (2009) discuss the peculiar natural plant associations of the study area in broad terms. It should be noted that botanical geographers have made immense strides in defining plant associations (particularly assemblages denoted as veld types), whereas this cannot be said of zoologists. The reason is that vertebrate distributions are not very dependent on the minutiae of plant associations. Rautenbach (1978 & 1982) found that mammal assemblages can at best be correlated with botanically defined biomes, such as those by Low and Rebelo (1996 & 1998), and latterly by Mucina and Rutherford (2006). Hence, although the former's work has been superseded by the work of the latter two, the definitions of biomes are similar and both remain valid for mammals and are therefore recognised as a reasonable determinant of mammal distribution. The vegetation types of the site were analysed according to Mucina and Rutherford (2006).

Mammal Habitat Assessment:

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.

From a mammal habitat perspective, it was established that mainly one of the four major habitats is naturally present on the actual study site, namely terrestrial.

Most of the study site consists of transformed grassland. The natural grasslands were first transformed for agricultural purposes and later by other anthropogenic influences such as invasive plants, veld fires, gravel roads, foot paths, dumping, a soccer field, vegetable gardens and diggings. The study site is thus ecologically disturbed in many parts. A few moribund termitaria were recorded on the study site. These structures are generally good indicators of the occurrence of small mammals. Accordingly, it is estimated that the mammal population density for the study site is higher. At the time of the site visit the basal cover was very good in many places after good rains (Figure 4) and would provide adequate nourishment and cover for small terrestrial mammals.



Figure 4: A southerly view of the study site showing the good grass cover.

There are no natural rupicolous habitats on the actual study site, but good manmade rupicolous habitat exists in the form of rock dumping (Figure 5). Due to the absence of natural rupicolous habitat, some species such as the eastern rock elephant shrew, dassies and Jameson's red rock rabbit were omitted from the species list in Table 1. Good natural rupicolous habitats occur in the surrounding area north of the Rietspruit (Figure 6), but connectivity from the study site to this area is poor due to an existing residential development.



Figure 5: Manmade rupicolous habitat.



Figure 6: Natural rupicolous habitat outside the site north of the Rietspruit.

There are no trees to provide arboreal habitat and there are no dead logs, which could have provided shelter and food for some small mammals. Due to the absence of natural arboreal habitat, some species such as woodland dormouse were omitted from the species list in Table 1.

No permanent or temporary water sources occur on the study site. Two large drainage areas occur in the surrounding area, namely the Rietspruit (Figure 7) and a tributary of the Rietspruit. Connectivity from the study site to the drainages lines is poor due to an existing residential development.



Figure 7: The Rietspruit north of the study site.

Due to the busy Klipriver Drive (R550) south of the site, the D817 Road, as well as the railway line and the first phase of the Magagula Heights Townships, connectivity is poor to fair.

The site has no caves suitable for cave-dwelling bats, although some of the buildings may act as substitute daytime roosts. It is likely that common bats commute from roosting sites elsewhere to hawk for insects over the wetlands in the area.

Sight records were also used to compile this mammal report.

Expected and Observed Mammal Species Richness:

All charismatic mammals (like buffaloes, blue wildebeest, black wildebeest, red hartebeest, white and black rhinos, lions, leopards, hyenas) have long since been extirpated for sport and later to favour cattle and sheep farming. Later medium-sized mammals such as aardwolf, armadillo, common duiker and steenbok were displaced. Retentive but widespread species such as black-backed jackal, Cape fox, white-tailed mongoose and African wild cat have also come under pressure due to encroachment by civilisation, in this instance the extent and intensity of the destructive forces of illegal hunting and encroaching urbanisation.

The species richness is poor due to the small study site and disturbed nature of some parts. Most of the species of the resident diversity on the study site are common and widespread (viz. scrub hares, multimammate mice, pygmy mice, yellow mongooses and African mole rats).

Of 42 mammal species expected to occur on the study site (Table 1), two were confirmed during the site visit. It should be noted that potential occurrences are interpreted as being possible over a period of time as a result of environmentally induced expansions and contractions of population densities and ranges which stimulate migration.

Table 1 lists the mammals which are deemed as probable residents on the study site and the 500 metres extended study area. All feral mammal species expected to occur on the study site (e.g. house mice, house rats, cattle, dogs and cats) were omitted from Table 1 since these species are normally associated with human settlements.

The bats listed are mostly common on the Highveld wherever they can find daytime roosts in manmade structures. Many bat species commute over considerable distances in search of rich feeding patches, such as insects that swarm over the study site and nearby wetlands at dusk.

Threatened and Red Listed Mammal Species:

All Red Data species listed in Table 1 as Critically Endangered, Vulnerable, Near Threatened or Data Deficient are discerning species and became endangered as a result of the deterioration of their preferred habitats.

It is amazing how many local mammals have never been studied in nature. As a result, the conservation status of the shrew species listed in Table 1 is unknown and they are ranked as “Data Deficient” as a precautionary measure. These include all shrew species.

Due to the absence of especially wetland-associated vegetation cover on the study site, the possibility of more Red listed mammal species decreases dramatically. The presence of the Rietspruit in the surrounding area increases the possibility of encountering some water-dependent species. However the water level of the Rietspruit near the study site is too low and the water quality too poor to support spotted-necked otters near the study site.

The rough-haired golden mole prefers dry, sandy ground on the fringes of marshes or vleis (Skinner & Chimimba, 2005) but the banks of the Rietspruit near the study site are too disturbed for this species to occur on this site. The study site is too disturbed for the Highveld golden mole and this species should not occur.

The White-tailed mouse is often found in rocky areas with good grass cover, which is not present at the actual study site.

The Southern African hedgehog occurs in a wide variety of habitat types, but must have vegetation. The possibility exists that some individuals occur on the study site.

Due to their ability to fly and to cover large distances, the distribution information on some bat species is insufficient. This resulted in Red Data status for some bats species as a precautionary measurement.

No other Red Data or sensitive species are deemed present on the site, either since the site is too disturbed, falls outside the distributional ranges of some species, or does not offer suitable habitat(s).

The species richness is fair due to the two habitat types occurring on the study site.

Table 1: The mammals which were observed or deduced to occupy the site

	SCIENTIFIC NAME	ENGLISH NAME
	Class:MAMMALIA	
	Order:TUBULIDENTATA	
	Family: Orycteropodidae	
?	<i>Orycteropus afer</i>	Aardvark
	Order: LAGOMORPHA	
	Family: Leporidae	Hares, Rabbits and Rock Rabbits
√	<i>Lepus saxatilis</i>	Scrub hare
	Order: RODENTIA	
	Family: Bathyergidae	Mole-rats
√	<i>Cryptomys hottentotus</i>	African mole rat
	Family: Hystricidae	Porcupines
√	<i>Hystrix africaeaustralis</i>	Cape porcupine
	Family: Pedetidae	
?	<i>Pedetes capensis</i>	Springhare
	Family: Sciuridae	Squirrels
√	<i>Xerus inauris</i>	South African ground squirrel
	Family: Myoxidae	Dormice
?	<i>Graphiurus platyops</i>	Rock dormouse
	Family: Muridae	Rats and Mice
√	<i>Rhabdomys pumilio</i>	Four-striped grass mouse
?	<i>Mus indutus</i>	Desert pygmy mouse
√	<i>Mastomys coucha</i>	Southern multimammate mouse
?	<i>Aethomys ineptus</i>	Tete veld rat
?	<i>Micaelamys namaquensis</i>	Namaqua rock mouse
?	<i>Otomys angoniensis</i>	Angoni vlei rat
√	<i>Otomys irroratus</i>	Vlei rat
?	<i>Tatera brantsii</i>	Highveld gerbil
?	<i>Dendromus melanotis</i>	Grey pygmy climbing mouse
?	<i>Dendromus mystacalis</i>	Chestnut climbing mouse
	ORDER: EULIPOTYPHILA	
	Family: Soricidae	Shrews
?DD	<i>Myosorex varius</i>	Forest shrew
?DD	<i>Suncus varilla</i>	Lesser dwarf shrew
?DD	<i>Suncus infinitesimus</i>	Least dwarf shrew
?DD	<i>Crociduna mariquensis</i>	Swamp musk shrew
*DD	<i>Crocidura cyanea</i>	Reddish-grey musk shrew
?DD	<i>Crocidura silacea</i>	Lesser grey-brown musk shrew
?DD	<i>Crocidura hirta</i>	Lesser red musk shrew
	Family: Erinaceidae	Hedgehog
√NT	<i>Atelerix frontalis</i>	Southern African hedgehog
	ORDER: CHIROPTERA	Bats
	Family: Pteropodidae	Fruit-eating bats
?	<i>Eidolon helvum</i>	Straw-coloured fruit bat
	Family: Emballonuridae	Sheath-tailed bats
*	<i>Taphozous mauritanus</i>	Muaritian tomb bat
	Family: Molossidae	Free-tailed bats

	SCIENTIFIC NAME	ENGLISH NAME
√	<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat
	Family: Vespertilionidae	Vesper bats
?NT	<i>Miniopterus natalensis</i>	Natal long-fingered bat
√	<i>Neoromicia capensis</i>	Cape serotine bat
?NT	<i>Myotis tricolor</i>	Temminck's hairy bat
	Family: Nycteridae	Slit-faced bats
*	<i>Nycteris thebaica</i>	Egyptian slit-faced bat
	Family: Rhinolophidae	Horseshoe bats
?NT	<i>Rhinolophus clivosus</i>	Geoffroy's horseshoe bat
	ORDER: CARNIVORA	
	Family: Felidae	
?	<i>Felis silvestris</i>	African wild cat
	Family: Viverridae	Civets and genets
*	<i>Genetta genetta</i>	Small-spotted genet
	Family: Herpestidae	Suricates and Mongooses
?	<i>Suricata suricatta</i>	Suricate or Meerkat
√	<i>Cynictis penicillata</i>	Yellow mongoose
?	<i>Ichneumia albicauda</i>	White-tailed mongoose
*	<i>Atilax paludinosus</i>	Marsh mongoose
	Family: Canidae	Foxes, Wild dogs and Jackals
?	<i>Canis mesomelas</i>	Black-backed jackal
?	<i>Vulpes chama</i>	Cape fox
	Family: Mustelidae	Otters, Honey Badger, Weasel and Polecat
*	<i>Ictonyx striatus</i>	Striped polecat

(Systematics, taxonomy and Red Data status as proposed by Skinner & Chimimba [2005], Apps [2012] and Stuart & Stuart [2015])

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

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

?*Low* probability to occur based on ecological and distributional parameters.

Red Data species rankings as defined in Friedmann and Daly's S.A. Red Data Book / IUCN (World Conservation Union) (2004) are indicated in the first column: **CR**= Critically Endangered, **En** = Endangered, **Vu** = Vulnerable, **LR/cd** = Lower risk conservation dependent, **LR/nt** = Lower Risk near threatened, **DD** = Data Deficient. All other species are deemed of **Least Concern**.

Table 2: Mammal species positively confirmed from the study site, observed indicators and habitat.

SCIENTIFIC NAME	ENGLISH NAME	OBSERVATION INDICATOR	HABITAT
<i>Cryptomys hottentotus</i>	African mole rat	Tunnel systems	Universal/Grassveld
<i>Cynictis penicillata</i>	Yellow mongoose	Sight record of a few adults in the buffer area.	Universal/Grassveld

The African mole rat has an exceptionally wide distributional range. Because of their subterranean lifestyle they are relatively immune to predation and prosecution, with the result that they occur at near-natural population densities, even in urban settings. The yellow mongoose is common throughout their range.

6. FINDINGS AND POTENTIAL IMPLICATIONS

The study site has no really important topographical features, but two drainage lines occur near the site (the Rietspruit and a tributary of the Rietspruit). The study site contains one natural herpetofaunal habitat, namely terrestrial.

Species richness: Due to the presence of only one of the four habitat types and the severely altered nature of the site, the study site should have a poor to fair number of species. It must be emphasised that the species richness is for the general area and **NOT** for the study site itself.

Endangered species: The Endangered Species treat the site as part of their home ranges / territories. There is a possibility that about 11 species of mammals with a Red Data status may occur on the study site. Most of these species include bats, which move over huge distances, and a few shrew species. It is very difficult to confirm whether any of these species are present on any study site, but there is a possibility that some individuals of these two groups of species do occur on the study site, especially near the Rietspruit and a tributary of the Rietspruit.

In optimum conditions the possibility exists that the Southern African hedgehog may occur on the study site.

Sensitive species and/or areas (Conservation ranking): The study site has no important sensitive ecological systems. The two drainage lines, which occur near the site (Rietspruit and a tributary of the Rietspruit), are very sensitive areas. The study site falls in the Tsakane Clay Grassland (Gm 9) vegetation type, which is considered endangered (Mucina and Rutherford, 2006), but the site is too disturbed and too small to have any important conservation value.

Habitat(s) quality and extent: The terrestrial habitat quality has been jeopardised by the dumping of building rubble and rubbish. Most of the terrestrial habitat is currently used for grazing by herds of cattle, flocks of sheep and goats. Invasive plants grow in many areas. The site has also been disturbed in some parts by veld fires, gravel roads, a soccer field, vegetable gardens, footpaths and pedestrian thoroughfare between townships and the freeway and other roads, which cross the study site and are in constant use. A few diggings have also taken place on the study site and dogs were observed on the site. Water pollution and invasive plants threaten the aquatic habitat of the Rietspruit and its tributary.

Impact on species richness and conservation: The proposed development will have a significant and lasting effect on species richness and conservation, because of the construction of buildings and new roads carrying more vehicles. These structures, buildings and roads will form an even larger barrier for mammal movement and it will result in a decrease in connectivity.

If the development should go ahead, a very important indirect effect would be the likely impact that the proposed development might have on the water quality of the drainage lines (Rietspruit and a tributary of the Rietspruit) due to surface water runoff. This could have a negative impact on the water-dependent mammals if not mitigated.

Connectivity: Due to the busy Klipriver Drive (R550) south of the site, the D817 Road, as well as the railway line and the first phase of the Magagula Heights Townships, connectivity is poor to fair.

Management recommendation: Measures will have to be taken to stop water pollution of the drainage lines (Rietspruit and a tributary of the Rietspruit). The removal of exotic plants and rubble will increase the quality of the habitat.

General: The integrity of the drainage lines should not be jeopardised in any way by the development. The unique ambience of the nearby Suikerbosrand Nature Reserve must not be affected at all.

7. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

Galago Biodiversity and Aquatic Specialists are committed to the conservation of biodiversity but concomitantly recognise the need for economic development. Even though we appreciate the opportunity to learn through the processes of constructive criticism and debate, we reserve the right to form and hold our own opinions and therefore will not willingly submit to the interest of other parties or change statements to appease them.

Even though every care is taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time and budget. To some extent, conclusions are drawn and proposed mitigation measures suggested based on reasonable and informed assumptions built on *bone fide* information sources, as well as deductive reasoning. Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems, additional information may come to light at a later stage. Galago Biodiversity and Aquatic Specialists can therefore not accept responsibility for conclusions drawn and mitigation measures suggested 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.

8. RECOMMENDED MITIGATION MEASURES

Protection of the Rietspruit and a tributary:

- Every effort should be made to retain the linear integrity, flow dynamics and water quality of the Rietspruit and a tributary.

The following mitigation measures are proposed by the specialist:

- If the South African hedgehog or any mammal species are encountered or exposed during the construction phase, they should be removed and relocated to natural areas in the vicinity.
- Alien and invasive plants must be removed.
- During the construction phase there will be increased surface runoff and a decreased water quality (with increased silt load and pollution). Completing construction during the winter months would mitigate the environmental impact.
- The unique ambience of the nearby Suikerbosrand Nature Reserve must not be affected at all.

9. CONCLUSION

The drainage lines near the study site (Rietspruit and a tributary of the Rietspruit), as well as their buffer zones should be considered as ecologically sensitive.

The Endangered Species listed treat the site as part of their home ranges / territories. There is a possibility that about 11 species of mammals with a Red Data status may occur on the study site. Most of these species include bats, which move over huge distances, and a few shrew species. It is very difficult to confirm whether any of these species are present on any study site, but there is a possibility that individual members some of these two groups of species do occur on this particular study site, especially near the Rietspruit and a tributary of the Rietspruit.

In optimum conditions the possibility exists that the Southern African hedgehog may occur on the study site.

The removal of exotic plants and rubble will increase the quality of the habitat.

If the development should go ahead, a very important indirect effect would be the likely impact that the proposed development might have on the water quality of the drainage lines due to the waste water and surface water runoff. This could have a negative impact on the mammal populations if not mitigated.

The unique ambience of the nearby Suikerbosrand Nature Reserve must be maintained at all costs.

From a mammal perspective the site has a low sensitivity.

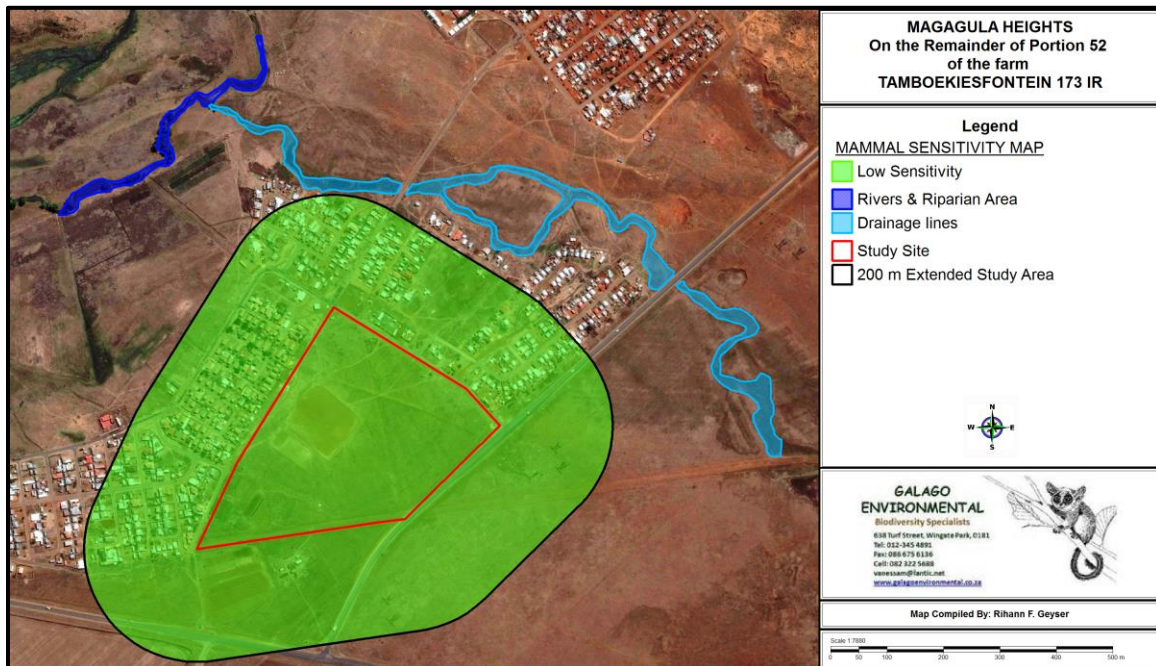


Figure 8: Mammal Sensitivity Map.

10. LITERATURE SOURCES

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