

# BIODIVERSITY IMPACT ASSESSMENT

FOR PROPOSED TOWNSHIP ESTABLISHMENT ON THE  
REMAINDER OF PORTION 3 OF THE FARM  
NABOOMSPRUIT 348 KR , LIMPOPO PROVINCE

## DOCUMENT CONTROL

Report Name	MOLEPO, M. MAKHUBELA, D. & MOTHWA, R. 2022. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR PROPOSED TOWNSHIP ESTABLISHMENT ON THE REMAINDER OF PORTION 3 OF THE FARM NABOOMSPRUIT 348 KR , LIMPOPO PROVINCE
Reference	TBIA-RDPC/22
Revision	00
Date	06 May 2022
Submitted to	Real Development Planning Company
Authors	Mokgatla Molepo <i>Pr. Nat. Sci</i> (009509) Ramokone Mothwa (SAAB) Makhubela Dineo

## EXECUTIVE SUMMARY

MORA Ecological Services (Pty) Ltd has been appointed to conduct a biodiversity impact assessment for the proposed township development in Mookgophong Town within Mogalakwena Local Municipality, Limpopo Province. The site was investigated to determine the potential impacts on the immediate natural environment.

Below are some of the potential impacts that have been identified.

- (i) Local loss of protected and local plant species
- (ii) Loss of micro habitat
- (iii) Introduction of alien invasive plant species

Floral species of conservation concern (SCC) which were observed along the project site footprint site include individuals of Marula. These species are to be avoided throughout all the phases of the project. Where avoidance is inevitable, the applicant must apply for a permit.

The proposed development and associated activities are likely to cause minimal vegetation disturbance as majority of the habitats have already been disturbed as a result of subsistence farming, illegal dumping and settlement nearby.

In terms of fauna, the project site has a low mammal and reptile diversity. This may be due to the clearance of vegetation. Furthermore, no amphibians were observed during the field surveys. Their absence may be due to no availability of perennial standing water.

The impacts associated with the township establishment are likely to be from Moderate to Low after implementation of mitigation measures.

It is therefore the opinion of the specialist that the proposed township development be considered. However, it is important that the mitigations and recommendations provided by this study are adhered to in order to reduce the impacts.

## TABLE OF CONTENTS

DOCUMENT CONTROL .....	
EXECUTIVE SUMMARY .....	i
List of figures .....	iii
List of tables .....	iii
DECLARATION OF INDEPENDENCE .....	iv
INDEMNITY .....	iv
Project Team .....	1
INTRODUCTION AND PROJECT LOCATION AND DESCRIPTION .....	2
TERMS OF REFERENCES .....	4
ASSUMPTIONS, LIMITATIONS, UNCERTAINTIES, AND GAP ANALYSIS .....	4
SURVEY METHODS AND REPORTING .....	5
General .....	5
Climate .....	5
Methodology .....	7
Vegetation of the study site .....	7
LEGAL REQUIREMENTS .....	11
Provincial legislation .....	12
Limpopo Conservation Plan .....	12
Red Data Analysis and Floral Assessment .....	15
Ecological function .....	17
Sensitivity scale .....	17
Conservation status of the vegetation .....	17
RESULTS .....	19
Plants .....	20
Reptiles .....	21
Birds .....	21
Mammals .....	22
The main impacts .....	22
Impact Assessment and Mitigations .....	23
REHABILITATION .....	26
CONCLUSION .....	27
REFERENCES .....	28
APPENDIX .....	29
Appendix A: Site photos .....	29

Appendix B: Historical mammal species records from the broader study area .....	30
Appendix C: Historical reptile species records from the broader study area .....	33
Appendix D: Historical frog species records from the broader study area .....	37
Appendix E: SABAP 2 bird list of the area.....	39

### List of figures

Figure 1: Location of the study site.....	3
Figure 2: Climatic figures of the study area.....	5
Figure 3: World map of Köppen -Geiger Climate Classification.....	6
Figure 4: Vegetation map of the study site.....	10
Figure 5: Conservation Plan of the study site.....	14
Figure 6: Site sensitivity of the area.....	19

### List of tables

Table 1: Project Team.....	1
Table 2: Red Data Status definitions (SANBI, 2010).....	15
Table 3: Plant species observed at the study area.....	20
Table 4: Weeds and invasive plant species observed at the study area.....	21
Table 5: List of bird species recorded at the study site.....	21
Table 6: General impacts and mitigations for the entire site.....	25

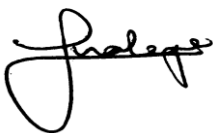
## DECLARATION OF INDEPENDENCE

I, Mokgatla Molepo, in my capacity as a lead specialist consultant, hereby declare that I:

- Act/acted as an independent specialist to Real Development Planning Company for this project.
- Do not have any personal, business or financial interest in the project expect for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2017.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion regarding the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2017.

## INDEMNITY

- This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data related to the site to be affected, *in situ* fieldwork, surveys and assessments and the specialists best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of study.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgement of these terms and liabilities.



Mokgatla Molepo *Pr. Nat. Sci* (009509)

06 May 2022

## Project Team

Table 1: Project Team

Project Role	Name	Qualifications
Ecologist & Floral Specialist	Ramokone Mothwa	BSc. Botany & Microbiology (University of Venda), BSc. Hons. Botany (University of Limpopo) MSc. Botany (University of Pretoria – Current)
Ecologist & Faunal Specialist	Mokgatla Molepo	BSc. Botany & Zoology (University of Venda), BSc. Hons. Zoology (University of Limpopo) MSc. Zoology (Nelson Mandela University)
Junior Ecologist	Dineo Makhubela	NDip. Environmental Science (Tshwane of Technology)

## **INTRODUCTION AND PROJECT LOCATION AND DESCRIPTION**

Humans alter their environment to suit their needs, to improve their quality of life, and to encourage economic growth. Generally, it is now accepted that development should be planned to make the best possible use of natural resources and to avoid degradation of the environment. Hence the need to pay explicit attention to environmental factors in the decision-making process. This should entail an accurate prediction and assessment of the impact of any development on the environment. It is essential for such assessment procedures to be developed alongside development planning, with the necessary mitigation that could inform development projects to conserve the natural environment.

MORA Ecological Services (Pty) Ltd has been appointed as independent specialists to undertake a biodiversity impact assessment for the proposed township establishment on Remainder of Portion 3 of the Farm Naboomspruit 348 KR, in Limpopo Province. The proposed development site is located between Mookgophong Town and the Township. The site is located roughly at the following GPS coordinates: 28°43'01.59"E; 24°31'25.52"S as shown in Figure 1.

The ecological sensitivity of the entire study area was assessed, however, during the field survey, the ecological impacts from the proposed development were narrowed down to the receiving environment.

The proposed development entails the following:

- 85 Residential 1 (dwelling house)
- 2 Institutional (orphanage and early childhood development centre)
- 1 Business 1 (shops and other business related uses)
- 1 Place of Public Worship
- 1 Municipal (municipal commonage)
- 1 Government (social services offices)



Figure 1: Location of the study site.



## **TERMS OF REFERENCES**

It is required that the assessment provides technical advice on the following information, applicable to the proposed project on the site: a brief discussion on the vegetation types in which the study area is situated using available literature in order to place the study in context was summarized as follows;

- A broad-scale map of the vegetation of the proposed site.
- A description of the dominant and characteristic species within the broad-scale plant communities;
- A list of Red Data plant and animal species previously recorded within the site which the study area is situated, obtained from the relevant authorities and literature reviews;
- Identification of sensitive habitats and plant communities;
- Preliminary investigation of the impacts of the project and the provision of recommended mitigation measures;
- Identify and assess any cumulative impacts arising from the project where there is major uncertainty, low levels of confidence in predictions and poor data or information. Recommend practicable mitigation measures to minimize or eliminate negative impacts and or enhance potential project benefits; and
- Recommend appropriate monitoring measures.

## **ASSUMPTIONS, LIMITATIONS, UNCERTAINTIES, AND GAP ANALYSIS**

The findings, results, observations, conclusions, and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the perceived impacts on terrestrial environment.

A description of vegetation was based on the physical field surveys and site walkthrough and investigations as performed on site. Limited time and access to other private properties was a constraint during field surveys.

The site assessment did not include the adjacent properties.

Results presented in this report are based on a snapshot investigation of the study site and not on detailed and long-term investigations of all environmental attributes and the varying degrees of biological diversity that may be present in the study site.

Once-off assessments such as this may potentially miss certain ecological information, thus limiting accuracy, detail and confidence.

The assessment of impacts and recommendation of mitigation measures were informed by the site-specific ecological issues arising from the field survey and based on the assessor’s working knowledge and experience with similar projects.

## SURVEY METHODS AND REPORTING

### General

The report relies on aerial images and ortho photos to gather background information on a variety of features and vegetation communities occurring on the study site. On site data was collected through walkthrough transects in April 2021 that covered the whole study site. All literature used in this study is listed in the reference section.

### Climate

The area is influenced by the local steppe climate. In Mookgophong, there is little rainfall throughout the year. The average temperature in Mookgophong is 19.5 °C. Precipitation here is about 599 mm per year.

According to Köppen -Geiger system (Kottek *et al.* 2006), the study site falls within the BSh (Local steppe) climatic region (Fig. 3).

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	22.9 °C (73.3) °F	23.1 °C (73.6) °F	21.8 °C (71.3) °F	19 °C (66.2) °F	16.2 °C (61.2) °F	13.5 °C (56.3) °F	13.2 °C (55.7) °F	16.4 °C (61.6) °F	20.1 °C (68.2) °F	22 °C (71.6) °F	22.3 °C (72.1) °F	22.8 °C (73) °F
Min. Temperature °C (°F)	17.7 °C (63.8) °F	17.7 °C (63.9) °F	16.4 °C (61.5) °F	13.2 °C (55.8) °F	9.7 °C (49.4) °F	6.7 °C (44) °F	6 °C (42.8) °F	8.6 °C (47.5) °F	12.1 °C (53.8) °F	14.6 °C (58.3) °F	16.1 °C (61) °F	17.4 °C (63.4) °F
Max. Temperature °C (°F)	28.2 °C (82.8) °F	28.5 °C (83.4) °F	27.4 °C (81.4) °F	24.9 °C (76.9) °F	23.1 °C (73.6) °F	20.7 °C (69.3) °F	20.6 °C (69) °F	24.3 °C (75.8) °F	28 °C (82.4) °F	29.3 °C (84.8) °F	28.6 °C (83.4) °F	28.3 °C (82.9) °F
Precipitation / Rainfall mm (in)	112 (4.4)	78 (3.1)	73 (2.9)	41 (1.6)	13 (0.5)	4 (0.2)	3 (0.1)	4 (0.2)	14 (0.6)	47 (1.9)	96 (3.8)	114 (4.5)
Humidity(%)	63%	60%	60%	61%	52%	51%	45%	38%	36%	43%	54%	63%
Rainy days (d)	10	7	7	4	2	1	0	1	2	5	9	11
avg. Sun hours (hours)	9.6	9.5	9.0	8.5	9.1	8.9	9.0	9.6	9.8	10.1	9.8	9.7

Figure 2: Climatic figures of the study area.

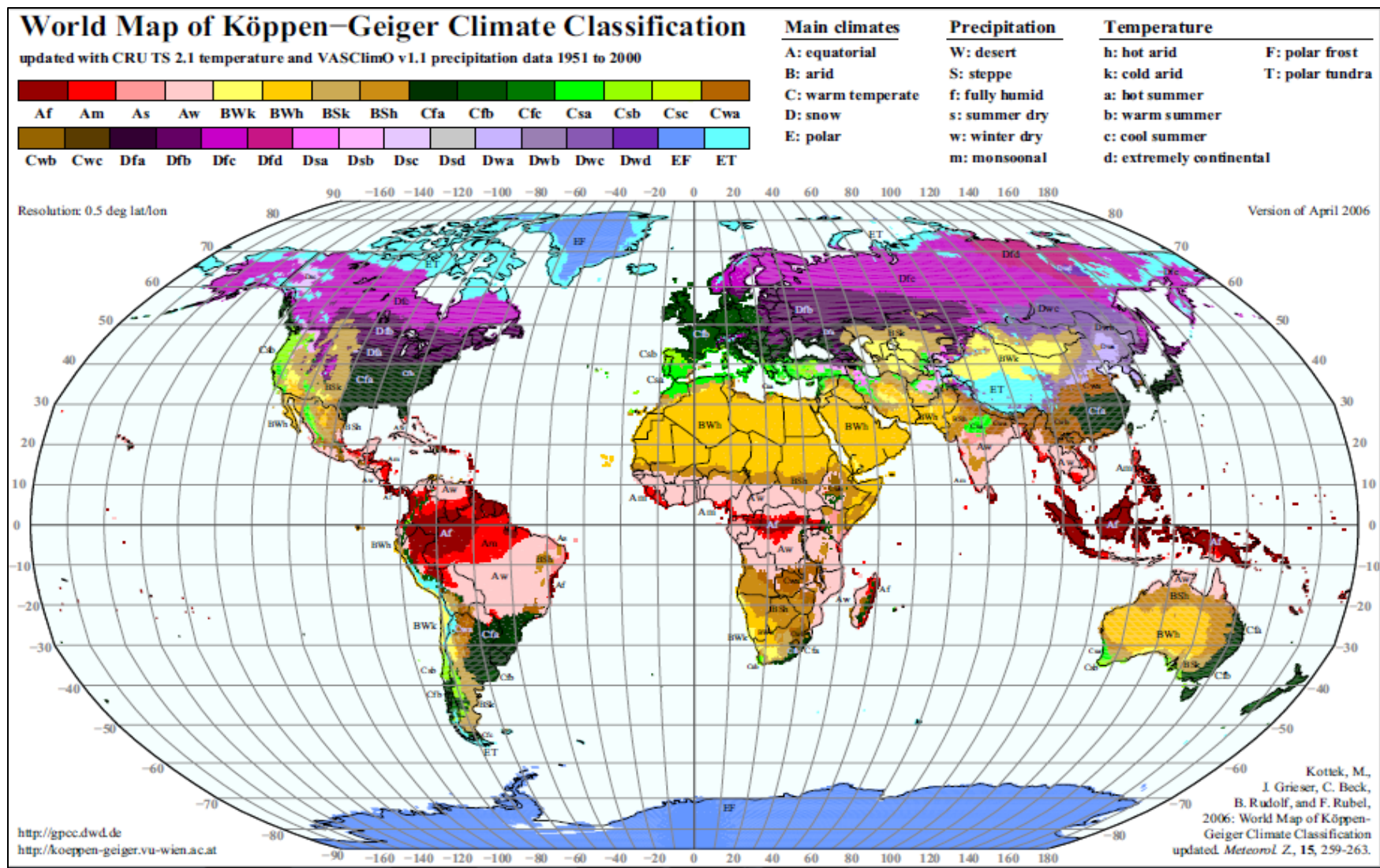


Figure 3: World map of Köppen -Geiger Climate Classification.

## **Methodology**

### ***Floral Assessment***

Prior to site visit, a list of species that could potentially occur at the site was downloaded from “New Plants of Southern Africa” (POSA) on the South African Biodiversity Institute’s (SANBI) website at <http://posa.sanbi.org>. This list is provided at the quarter degree square (QDS) level of accuracy for the QDS 2330 BA.

A visual reconnaissance of the study area was done before the survey commenced. Different homogenous vegetation units were identified and subsequently surveyed on foot and by vehicle in order to determine the floristic composition of each.

A plotless sampling method was used to record data. Plant species observed in the study area during the time of the study were recorded and included in the plant species lists. Other specialists were consulted in order to assist in plant species identification. No formal consultation process was conducted as part of this floristic study as it was not deemed necessary at the time of the study.

### ***Faunal Assessment***

Prior to the initial visit, satellite images (Google Earth) of the site were studied and the different habitat types identified (uniform features from an aerial perspective). The sites were then ground-truthed upon arrival.

No formal consultation process was conducted as part of this faunal study as it was not deemed necessary at the time of the study.

### **Vegetation of the study site**

The vegetation units of Mucina and Rutherford (2006) were used as references but where necessary communities are named according to the recommendations of a standardised South African Syntaxonomic nomenclature system. By combining the available literature with the survey results, stratification of vegetation communities was possible.

The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The veld types are described on a local level.

### **Vegetation types and biophysical descriptions**

Vegetation units are broadly classed and may include several distinct vegetation communities within a unit. The dominant vegetation type found on the study site is Springbokvlakte Thornveld (Fig. 4).

## **Springbokvlakte Thornveld**

### **Vegetation & Landscape Features**

Open to dense, low thorn savanna dominated by Acacia species or shrubby grassland with a very low shrub layer. Occurs on flat to slightly undulating plains.

### **Geology & Soils**

The geology and soils are described according to DWAF (2003). Rocks are part of the volcano-sedimentary Karoo Supergroup. Most abundant in the area are the mafic volcanics (tholeiitic and olivine basalts and nephelinites) of the Letaba Formation, then the mudstones of the Irrigasie Formation and the shale, with sandstone units, of the Ecca Group. Soils are red-yellow apedal, freely drained with high base status and self-mulching, black, vertic clays. The vertic soils, with a fluctuating water table, experience prolonged periods of swelling and shrinking during wet and dry periods, considerable soil cracking when dry, a loose soil surface, high calcium carbonate content and gilgai micro-relief. Land types mainly Ae and Ea. (Mucina & Rutherford 2006).

### **Distribution**

This vegetation type is found in Limpopo, Mpumalanga, North-West and Gauteng Provinces: Flats from Zebediela in the northeast to Hammanskraal and Assen in the southwest as well as from Bela-Bela and Mookgophong in the northwest to Marble Hall and Rust de Winter in the southeast. It occurs on a varying altitude ranging between 900–1 200 m (Mucina & Rutherford 2006).

### **Occurrence of important flora**

Small Trees: *Vachellia karroo* (d), *V. luederitzii* var. *retinens* (d), *V. mellifera* subsp. *detinens* (d), *V. nilotica* (d), *Ziziphus mucronata* (d), *V. tortilis* subsp. *heteracantha*, *Boscia foetida* subsp. *rehmanniana*.

Tall Shrubs: *Euclea undulata* (d), *Rhus engleri* (d), *Dichrostachys cinerea*, *Diospyros lycioides* subsp. *lycioides*, *Grewia flava*, *Tarchonanthus camphoratus*.

Low Shrubs: *Vachellia tenuispina* (d), *Ptycholobium plicatum*.

Succulent Shrub: *Kleinia longiflora*.

Herbaceous Climbers: *Momordica balsamina*, *Rhynchosia minima*. Graminoids: *Aristida bipartita* (d), *Dichanthium annulatum* var. *papillosum* (d), *Ischaemum afrum* (d), *Setaria incrassata* (d), *Aristida canescens*, *Brachiaria eruciformis*.

Herbs: *Aspilia mossambicensis*, *Indigostrum parviflorum*, *Nidorella hottentotica*, *Orthosiphon suffrutescens*, *Senecio apiifolius*.

## **Conservation**

This vegetation type is Endangered. Conservation Target is 19% but only 1% is statutorily conserved, mainly in the Mkombo Nature Reserve. Roughly three times this area is conserved in several other reserves. At least 49% transformed, including about 45% cultivated and 3% urban and built-up. Dense rural populations in parts of the southern and eastern side of the unit. Very scattered alien plants over wide areas include *Cereus jamacaru*, *Eucalyptus species*, *Lantana camara*, *Melia azedarach*, *Opuntia ficus-indica* and *Sesbania punicea*. Erosion is very low to moderate

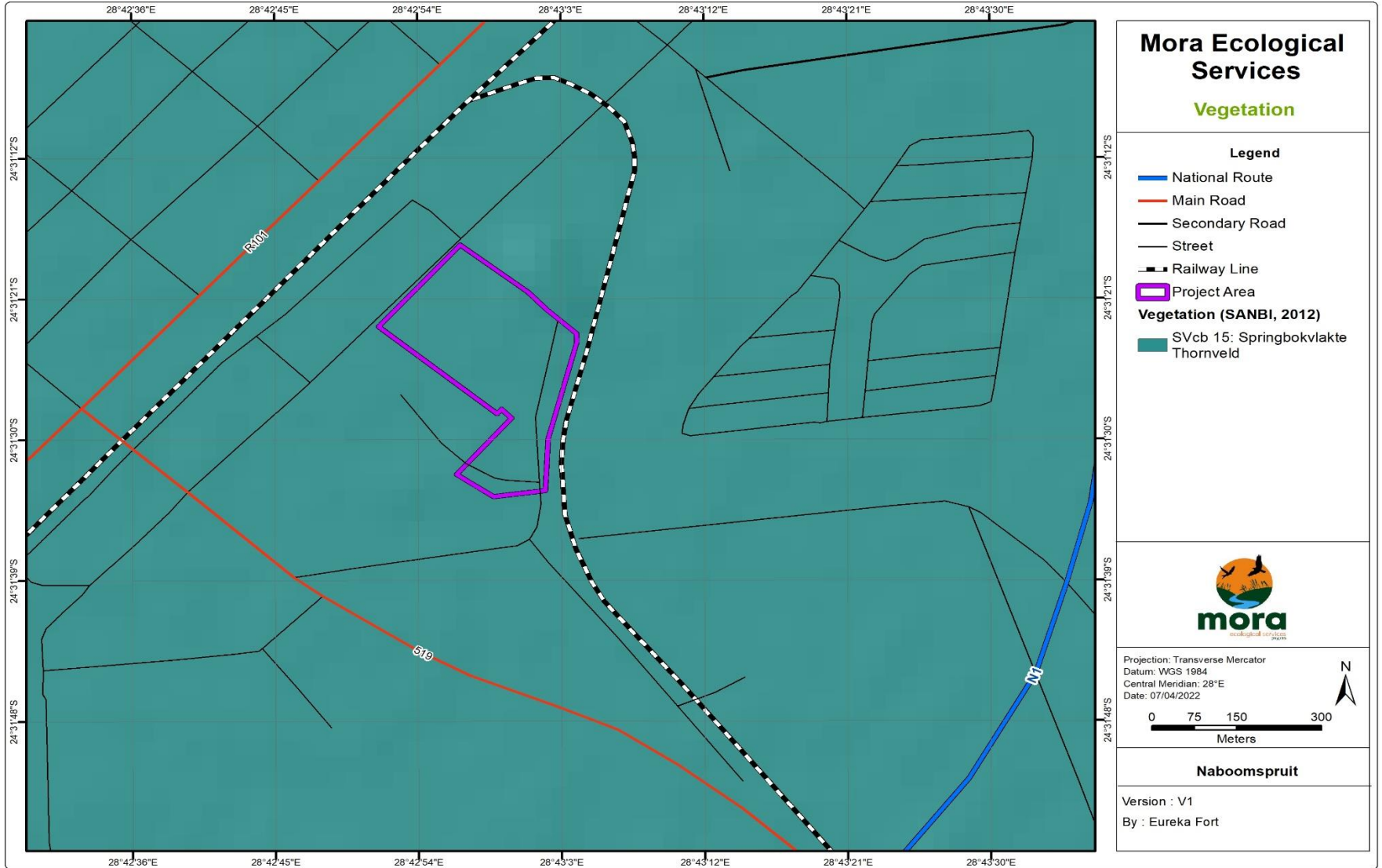


Figure 4: Vegetation map of the study site.

## **LEGAL REQUIREMENTS**

*The Constitution of the Republic of South Africa Act (Act No. 108 of 1996) – Section 24.*

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.

*National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended.*

NEMA replaces a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that "sustainable development requires the consideration of all relevant factors including aspects specifically relevant to biodiversity":

*National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA).*

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bio-prospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA.

*National Forests Act (No. 84 of 1998):*

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: "no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated".



### *Conservation of Agricultural Resources Act (Act 43 of 1983):*

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

### **Provincial legislation**

In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

### **Limpopo Conservation Plan**

Limpopo Conservation Plan was initiated by Limpopo Department of Economic Development, Environment and Tourism. This Conservation Plan v3.3 delineates on a map, commonly known as a Critical Biodiversity Areas (CBA), biodiversity priority areas called Critical Biodiversity Areas, Ecological Support Areas and Protected Areas. These areas are the portfolio of sites that are required to meet the region's biodiversity targets and need to be maintained in the appropriate condition for their category. It is highly recommended that this Conservation Plan be a primary biodiversity consideration in Environmental Impact Assessments.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of

restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

In terms of Limpopo Conservation Plan, the proposed project falls within Ecological Support Area 1 and 2 (see Fig. 5).

During the fieldwork, the study site was assessed in terms of its sensitivity, and the level of sensitivity was mapped.

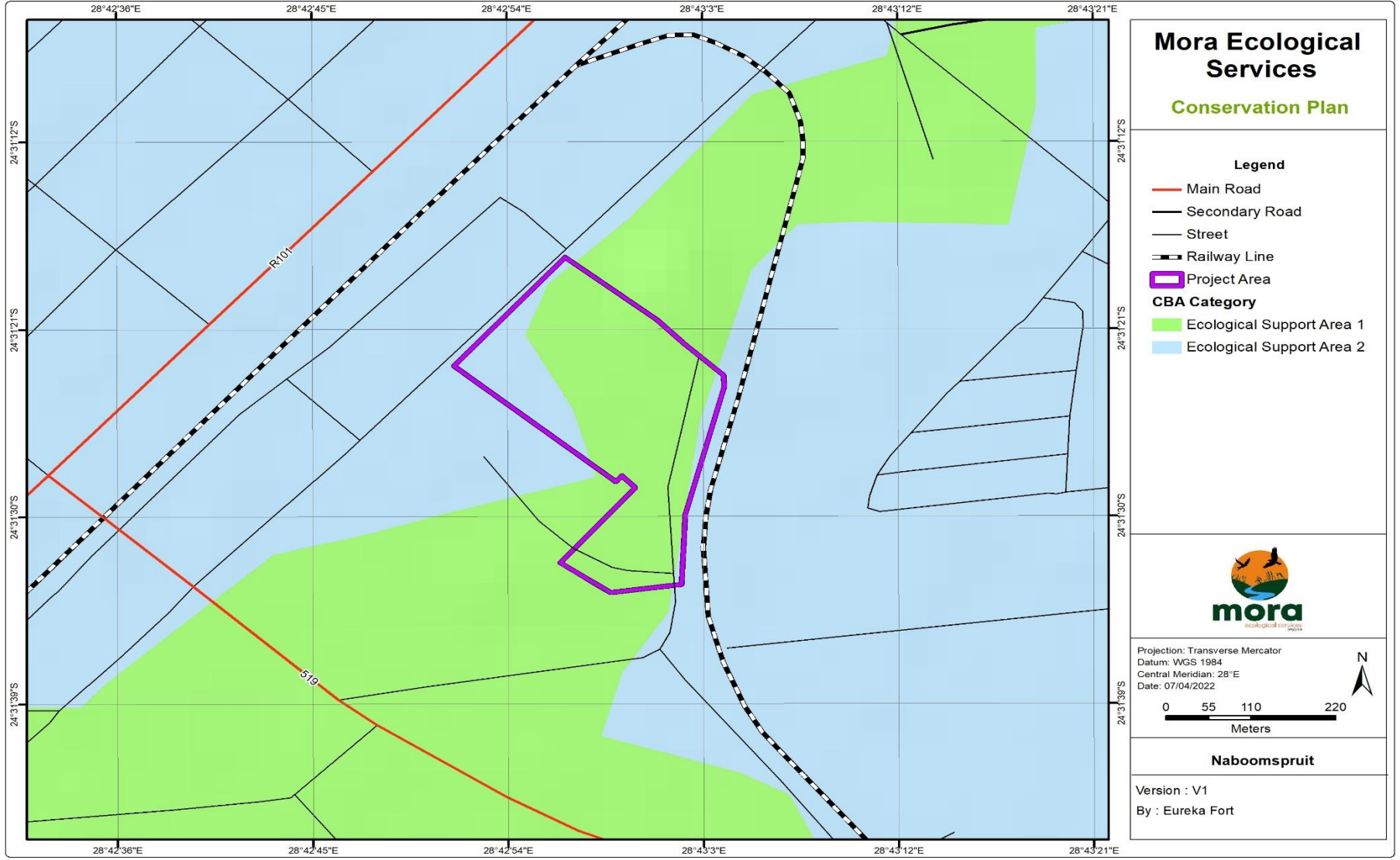


Figure 5: Conservation Plan of the study site.

## Red Data Analysis and Floral Assessment

South African National Biodiversity Institute (SANBI) RedList website was used to determine the conservation status of the species. This is done in order to conserve sensitive species and their immediate environment. The status is determined in Table 2 below.

Table 2: Red Data Status definitions (SANBI, 2010).

<b>p- protected Species</b>		
<b>M- Medicinal species</b>		
<b>EX</b>	<b>Extinct</b>	A taxon is Extinct when there is no reasonable doubt that the last individual has died. Taxa should be listed as extinct only once exhaustive surveys throughout the historic range have failed to record an individual.
<b>EW</b>	<b>Extinct in the Wild</b>	A taxon is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
<b>CR PE</b>	<b>Critically Endangered (Possibly Extinct)</b>	Critically Endangered (Possibly Extinct) taxa are those that are, on the balance of evidence, likely to be extinct, but for which there is a small chance that they may be extant. Hence, they should not be listed as Extinct until adequate surveys have failed to record the taxon.
<b>CR</b>	<b>Critically Endangered</b>	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Critically Endangered and is therefore facing an extremely high risk of extinction in the wild.
<b>EN</b>	<b>Endangered</b>	A taxon is Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Endangered and is therefore facing a very high risk of extinction in the wild.
<b>VU</b>	<b>Vulnerable</b>	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five IUCN criteria for Vulnerable and is therefore facing a high risk of extinction in the wild.
<b>NT</b>	<b>Near Threatened</b>	A taxon is Near Threatened when available evidence indicates that it nearly meets any of the five IUCN criteria for Vulnerable and is therefore likely to qualify for a threatened category in the near future.
<b>CRITICALLY RARE</b>		A taxon is Critically Rare when it is known to occur only at a single site but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
<b>RARE</b>		A taxon is Rare when it meets any of the four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.

<b><i>DECLINING</i></b>		A taxon is Declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.
<b><i>DDD</i></b>	<b><i>Data Deficient— Insufficient Information</i></b>	A taxon is DDD when there is inadequate information to make an assessment of its risk of extinction, but the taxon is well defined. Data Deficient is not a category of threat. However, listing of taxa in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
<b><i>LC</i></b>	<b><i>Least Concern</i></b>	A taxon is Least Concern when it has been evaluated against the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, and it is not rare, and the population is not declining.

## **Ecological function**

Ecological function relates to the degree of ecological connectivity between systems within a landscape matrix. Therefore, systems with a high degree of landscape connectivity amongst one another are perceived to be more sensitive and will be those contributing to ecosystem service (for example wetlands) or overall preservation of biodiversity. Conservation importance relates to species diversity, endemism (unique species or unique processes) and the high occurrence of threatened and protected species or ecosystems protected by legislation.

## **Sensitivity scale**

- **High ecological function:** Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystems integrity for example pristine grasslands, pristine wetlands and pristine ridges.
- **Medium ecological function:** Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem.
- **Low ecological function:** Degraded and highly disturbed systems with little or no ecological function.
- **No Go Areas:** Areas that have irreplaceable biodiversity or important ecosystem function values which may be lost permanently if these ecosystems are transformed, with a high potential of also affecting adjacent and/or downstream ecosystems negatively

## **Conservation status of the vegetation**

- **High conservation importance:** Ecosystems with high species richness which usually provide suitable habitat for several threatened species. Usually termed 'no-go' areas and unsuitable for development and should be conserved.
- **Medium conservation importance:** Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be accommodated, provided the current species diversity is conserved.
- **Low conservation importance:** Areas with little or no conservation potential and usually species poor (most species are usually exotic).

## **Cognizance was taken of the following environmental attributes and general information:**

- Regional and local vegetation
- Current status of habitats
- Red Data habitat suitability, and
- Digital photographs

***Phytosociological data accumulated include the following:***

- Plant species and growth forms
- Dominant plant species
- Cover abundance values, and
- Samples or digital images of unidentified plant species

The system ecological function is **Low**.

## RESULTS

Biological diversity everywhere is at great risk as a direct result of an ever-expanding human population and its associated needs for energy, water, food and minerals. Landscape transformation that is needed to accommodate these activities inevitably leads to habitat loss and habitat fragmentation, resulting in the mosaical appearance of undisturbed habitat within a matrix of transformed areas. These remaining areas of natural habitat are frequently too small to support the biodiversity that previously occupied the area, and the region loses its ecological integrity (Kamffer 2004).

Majority of habitats within the proposed project site have been disturbed, as a result they are categorized under **Low Sensitivity** and **Low Ecological Function** (Fig. 6).

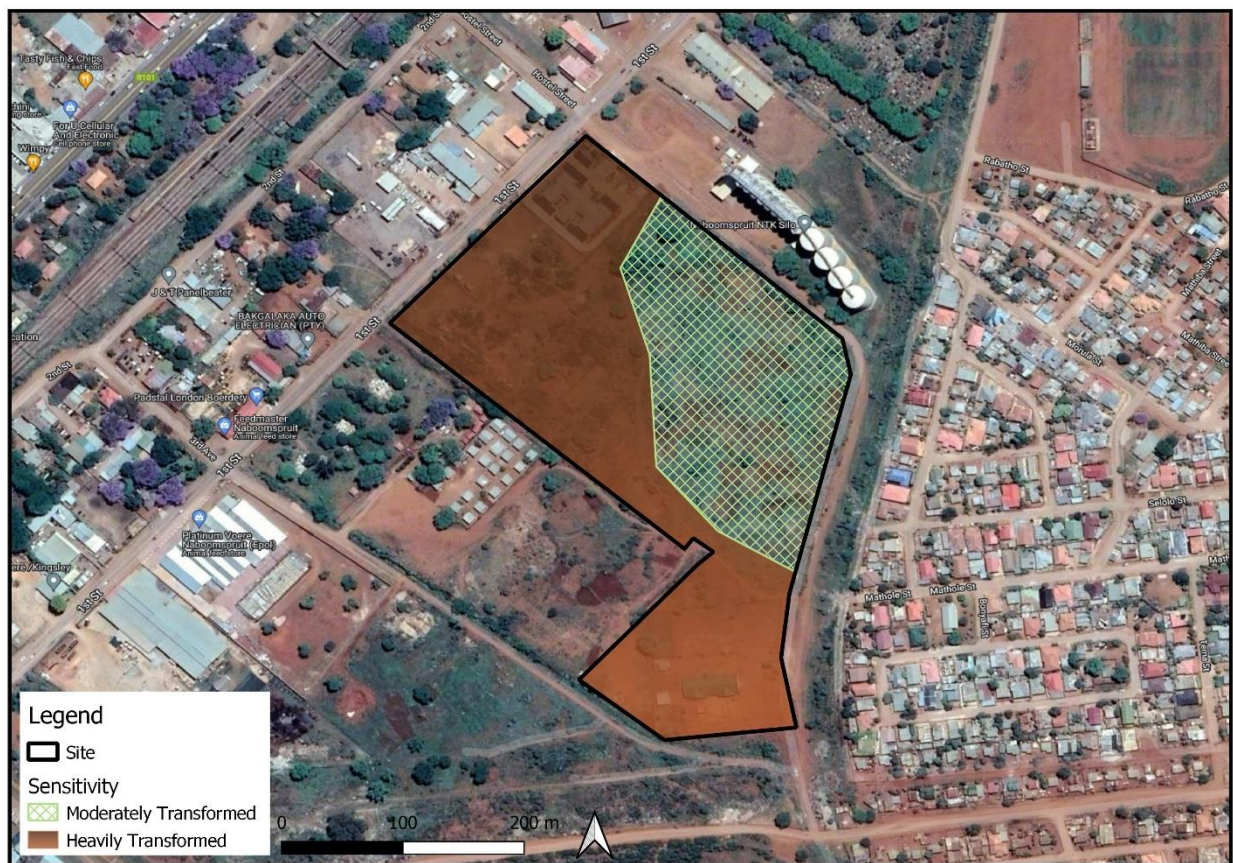


Figure 6: Site sensitivity of the area.



Below are tables containing species recorded on site during the survey.

## Plants

Majority of the natural vegetation has been removed for small subsistence farming purposes.

Table 3: Plant species observed at the study area.

Species	Common Name	Growth Form	IUCN Conservation Status
<i>Vachellia karoo</i>	Sweet thorn	Tree	LC
<i>Sclerocarya birrea</i> subsp. <i>Caffra</i> p	Marula	Tree	LC (Protected)
<i>Terminalia sericea</i>	Silver Cluster Leaf	Tree	LC
<i>Ziziphus mucronata</i>	Buffalo Thorn	Tree	LC
<i>Dichrostachys cinerea</i>	Sickle Bush	Shrub	LC
<i>Urochloa mosambicensis</i>	Bushveld Signal Grass	Grass	LC
<i>Panicum schinzii</i>	Sweet Grass	Grass	LC
<i>Aristida congesta</i> subsp. <i>Congesta</i>	Tassel Three-awn	Grass	LC
<i>Hyparrhenia hirta</i>	Common Thatching Grass	Grass	LC

Invasive alien plants are known to threaten three main components of the landscape: agricultural potential of the land, biodiversity value of the land, and water quality and quantity. Alien invasive plants impact water resources negatively by reducing surface water flow. Several studies have investigated the impact of these plants on water resources (see Bignaut et al. 2007). These studies concurred that invasive alien plants including forest plantations have a significant negative impact on stream flow. Le Maitre et al. (2016) reported that species such as *Acacia mearnsii* account for more than 30% of the total flow reductions, followed by pines (18.9%) and eucalyptus (15.0%).

Table 4: Weeds and invasive plant species observed at the study area.

Species	Common Name	Growth Form	Category (NEMBA)
<i>Lantana camara</i>	Lantana	Shrub	(Declared Category 1b)
<i>Melia azedarach</i>	Syringa	Tree	(Declared Category 2)
<i>Amaranthus spp</i>	Pigweed	Herb	Weed

### Reptiles

Herpetofauna are specialized in habitat requirements, are sensitive to habitat modification and face global extinction crises. While herpetofauna are important components of ecosystems they are little studied especially in human-modified landscapes. Herpetofauna do occur in human modified landscapes, so encouraging appropriate matrix land uses could contribute to their conservation. No reptiles were observed during the survey, but they are likely to be encountered during the excavations and construction activities. List of reptile species that may be found at the study area have been listed in the appendix.

### Birds

Birds are regarded as one of the most useful bioindicators, and they have been used extensively as models to determine ecosystem function (see review Koskimies 1989; Potts et al. 2014; Bregman et al. 2016). High levels of human disturbance as well as habitat transformation and degradation on the study site and adjacent areas would result in the disappearance of the more elusive bird species.

Table 5: List of bird species recorded at the study site.

Species	Common Name	IUCN Conservation Status
<i>Motacilla aguimp</i>	African Wagtail	LC
<i>Pycnonotus tricolor</i>	Dark capped Bulbul	LC
<i>Vanellus armatus</i>	Blacksmith Lapwing	LC
<i>Cisticola fulvicapilla</i>	Neddicky	LC
<i>Apalis thoracica</i>	Bar-throated Apalis	LC
<i>Quelea quelea</i>	Red-billed Quelea	LC
<i>Crithagra mozambicus</i>	Yellow-fronted Canary	LC

<i>Bostrychia hagedash</i>	Hadedda Ibis	LC
<i>Ardea melanocephala</i>	Black-headed Heron	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Ploceus cucullatus</i>	Village Weaver	LC
<i>Passer domesticus</i>	House Sparrow	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Vidua macroura</i>	Pin-tailed Whydah	LC
<i>Turtur chalcospilos</i>	Emerald Dove	LC
<i>Prionops plumatus</i>	White-crested Helmeted Shrike	LC
<i>Corvus albus</i>	Pied Crow	LC
<i>Charadrius tricollaris</i>	Three-banded Plover	LC
<i>Lamprotornis bicolor</i>	Pied Starling	LC
<i>Scopus umbrette</i>	Hamerkop	LC
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC
<i>Lamprotornis nitens</i>	Cape Glossy Starling	LC

## Mammals

Local mammalian communities in Africa present the highest species richness in the world, only paralleled by some communities in the Oriental biogeographic region. South Africa contains the majority of southern Africa's endemic mammals and hence is an important area for mammal conservation (Gelderblom & Bronner 1995). The majority of larger mammal species are likely to have been displaced or have moved away from the area due to daily human presence.

### The main impacts

- Local loss of plant species
- Loss of micro habitat
- Further introduction of alien species

## Impact Assessment and Mitigations

<b>Impact Phase: Construction</b>							
<b>Potential impact description:</b> Impacts on vegetation The major impact during this phase will result from vegetation clearance for infrastructure and internal roads.							
	<b>Extent</b>	<b>Duration</b>	<b>Intensity</b>	<b>Status</b>	<b>Significance</b>	<b>Probability</b>	<b>Confidence</b>
Without Mitigation	M	M	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	M	M	H
Can the impact be reversed?	No, once vegetation is cleared, it would be possible to return it to its previous state.						
Will impact cause irreplaceable loss or resources?	Yes. Species of Conservation Concern are likely to be impacted by the development.						
Can impact be avoided, managed or mitigated?	Partly. Although mitigations will be provided, vegetation loss would be inevitable.						
Mitigation measures: <ul style="list-style-type: none"> <li>• Marula should not be removed. Where avoidance is impossible, Tree permit will need to be applied for.</li> <li>• Sparsely vegetated areas should be cleared first, with densely vegetated areas being cleared last.</li> <li>• All vegetation not required to be removed should be protected against damage.</li> </ul>							

<b>Impact Phase: Construction</b>							
<b>Potential impact description:</b> Introduction of alien invasive plants Cleared areas which are not rehabilitated are likely to be invaded by aliens and pioneer plants.							
	<b>Extent</b>	<b>Duration</b>	<b>Intensity</b>	<b>Status</b>	<b>Significance</b>	<b>Probability</b>	<b>Confidence</b>
Without Mitigation	M	H	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?	This impact can be prevented through appropriate mitigation measures.						
Will impact cause irreplaceable loss or resources?	No. If this impact is correctly addressed, then no loss of resources will occur.						
Can impact be avoided, managed or mitigated?	Yes. This impact can be avoided if appropriate mitigation measures are followed.						

Mitigation measures:

- Any extensive cleared areas that are no longer or not required for construction activities should be re-seeded with locally sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion.
- Alien management plan to be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring.

Impact Phase: Construction							
<b>Potential impact description:</b> Direct and indirect and faunal Impacts Slow-moving species such as the tortoises are likely to be killed by construction machinery.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	L	M	Negative	M	H	H
With Mitigation	L	L	M	Negative	M	M	H
Can the impact be reversed?	Yes, Construction phase disturbance is short term.						
Will impact cause irreplaceable loss or resources?	No. No Species of Conservation Concern are likely to be impacted by the development.						
Can impact be avoided, managed or mitigated?	Yes. Contractors should be informed about slow moving species that are likely to be crushed by construction vehicles.						
Mitigation measures:							
<ul style="list-style-type: none"> <li>• No animal may be hunted, trapped, snared or captured for any purpose whatsoever.</li> <li>• Speed of vehicles should be limited to allow for sufficient safety margins.</li> </ul>							

Table 6: General impacts and mitigations for the entire site.

Impact Description	Impact significance before mitigations	Recommendations and mitigations	Impact(s) significance after mitigations	Score
Vegetation clearance	High	<p>Marula trees should be avoided as far as possible. Where avoidance is inevitable, a permit to disturb should be applied.</p> <p>Sparsely vegetated areas should be cleared first, with densely vegetated areas being cleared last.</p> <p>All vegetation not required to be removed should be protected against damage.</p>	Medium	4
Animals and birds displacement	Medium	<p>No animal may be hunted, trapped, snared or captured for any purpose whatsoever.</p> <p>Watercourse and associated vegetation should be avoided.</p> <p>Speed of vehicles should be limited to allow for sufficient safety margins.</p>	Low	2
Possible introduction of alien species due to increased human related activities	High	<p>Avoid translocating stockpiles of topsoil from one place to another in order to avoid translocating soil seed banks of alien species.</p> <p>Any extensive cleared areas that are no longer or not required for construction activities should be re-seeded with locally sourced seed of suitable species.</p> <p>Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion.</p> <p>Invasive Alien Plant eradication and control program should be developed.</p>	Medium	4
<b>Total</b>				<b>10</b>

## **RECOMMENDATIONS AND CONCLUSIONS**

The proposed township development will result in severe vegetation clearance. Possible impacts to the receiving environment have been identified as being medium-high.

Recommendations below will further help to lower the said impacts.

### *Recommendations:*

- No collection of firewood, protected species or medicinal floral species must be allowed by construction personnel.
- No painting or marking of vegetation to identify locality or other information shall be allowed, as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required.
- Avoid translocating topsoil stockpiles from one place to another or importing topsoil from other sources that may contain alien plant propagules.
- Only necessary damage must be caused: for example, unnecessary driving around in the veld should not take place.
- It is imperative that the mitigation measures outlined in this report are implemented during construction and operational phases.

## **REHABILITATION**

The traditional definition of rehabilitation aims at returning the land in a given area to some degree of its former state after a particular process has resulted in its damage.

Rehabilitation requires that there is an attempt to imitate natural processes and reinstate natural ecological driving forces in such a way that it aids the recovery (or maintenance) of dynamic systems so that, although they are unlikely to be identical to their natural counterparts, they will be comparable in critical ways so as to function similarly (Jordan et al.1987).

Rehabilitation should be based on an understanding of both the ecological starting point and on a defined goal endpoint and should accept that it is not possible to predict exactly how the environment is likely to respond to the rehabilitation interventions. A rehabilitation plan should be compiled and implemented. This should be done using indigenous vegetation.

## **CONCLUSION**

The biodiversity assessment revealed that the proposed township establishment will be located on moderate-severely disturbed areas. As a result, the ecological integrity of the site is in a poor condition, and it cannot maintain the ecological processes.

In terms of fauna, the project site has a low mammal and reptile diversity. Furthermore, no amphibians were observed during the field surveys. Their absence may be due to no availability of perennial standing water.

The impacts associated with the project are likely to be from Moderate to Low after implementation of mitigation measures.

It is therefore the opinion of the specialist that the proposed township establishment be considered. However, it is important that the mitigations and recommendations provided by this study are adhered to.



## REFERENCES

- Branch, B. 1998. Field guide to snakes and other reptiles of southern Africa. Struik Nature, Cape Town.
- Bredenkamp, G., Granger, J.E. & van Rooyen, N. 1996. Moist Sandy Highveld Grassland. In: Low, A.B. & Robelo, A.G. (eds) *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs and Tourism, Pretoria.
- Kamffer, D. 2004. Community-level effects of fragmentation of the Afromontane grassland in the escarpment region of Mpumalanga, South Africa. M.Sc. Theses, University of Pretoria, Pretoria.
- Kottek, M., Grieser, J., Beck, C., Rudolf, B. & Rubel, F. 2006. World Map of Köppen Geiger Climate Classification updated. *Meteorology. Z.* **15**. 259-263.
- Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.S. & Collins, N.B., 2007, Wet EcoServices: A technique for rapidly assessing ecosystem services supplied by wetlands, WRC Report No. TT 339/09, Water Research Commission, Pretoria.
- Mucina, L., Hoare, D.B., Lötter, M.C., Du Preez, P.J., Rutherford, M.C., Scott Shaw, C.R., Bredenkamp, G.J., Powrie, L.W., Scott, L., Camp, K.G.T., Cilliers, S.S. Bezuidenhout, H., Mostert, T.H., Siebert, S.J., Winter, P.J.D., Burrows, J.E., Dobson, L., Ward, R.A., Stalmans, M., Oliver, E.G.H., Siebert, F., Schmidt, E., Kobisi, K., Kose, L. 2006. Grassland Biome. In: Mucina, L. & Rutherford, M.C. (eds.). *Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide*. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Raap, T., Pinxten, R. & Eens, M. 2015. Light pollution disrupts sleep in free-living animals. *Scientific Report*, 5.
- Sinclair, I., Hockey, P., Tarboton, W. & Ryan, R. 2011. Birds of Southern Africa. Struik Nature, Cape Town.
- Trimble, M.J. & Van Aarde. 2014. Amphibian and reptile communities and functional groups over a land-use gradient in a coastal tropical forest landscape of high richness and endemism. *Animal Conservation*.

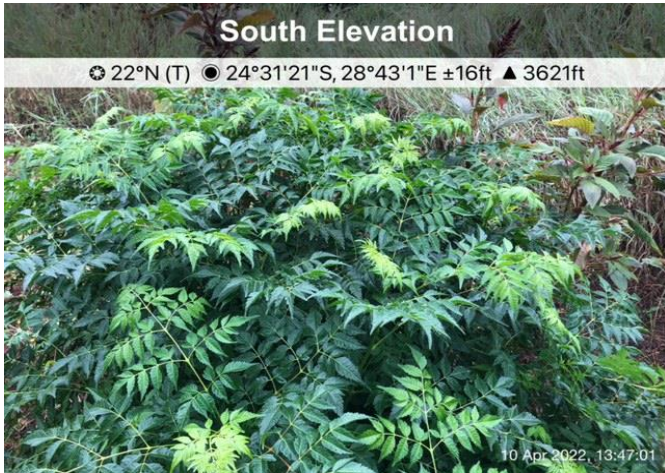
## APPENDIX

### Appendix A: Site photos

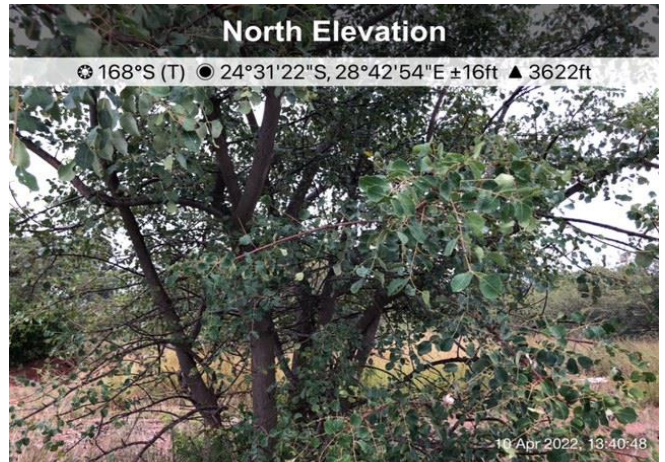
Patches of disturbed areas within the site



Seringa seedling (alien)



Marula tree



Wild medlar



Appendix B: Historical mammal species records from the broader study area

NO.	Family	Scientific name	Common name	Red list category	Last recorded
1	Bovidae	<i>Aepyceros melampus</i>	Impala	Least Concern	2015-07-27
2	Bovidae	<i>Connochaetes taurinus</i>	Blue Wildebeest	Least Concern (ver 3.1, 2017)	2018-06-18
3	Bovidae	<i>Connochaetes taurinus taurinus</i>		Least Concern (2016)	2016-11-26
4	Bovidae	<i>Damaliscus lunatus lunatus</i>	(Southern African) Tsessebe	Vulnerable (2016)	2021-03-21
5	Bovidae	<i>Hippotragus equinus</i>	Roan Antelope	Endangered (2016)	2019-09-13
6	Bovidae	<i>Kobus ellipsiprymnus</i>	Waterbuck	Least Concern (ver 3.1, 2016)	2019-09-13
7	Bovidae	<i>Kobus ellipsiprymnus ellipsiprymnus</i>		Least Concern (2016)	
8	Bovidae	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern (2016)	2016-09-03
9	Bovidae	<i>Raphicerus campestris</i>	Steenbok	Least Concern (2016)	2019-09-13
10	Bovidae	<i>Redunca sp.</i>	Reedbuck		
11	Bovidae	<i>Redunca arundinum</i>	Southern Reedbuck	Least Concern (2016)	2008-11-15
12	Bovidae	<i>Sylvicapra grimmia</i>	Bush Duiker	Least Concern (2016)	
13	Bovidae	<i>Taurotragus oryx</i>	Common Eland	Least Concern (2016)	
14	Bovidae	<i>Tragelaphus angasii</i>	Nyala	Least Concern (2016)	2012-11-12
15	Bovidae	<i>Tragelaphus scriptus</i>	Bushbuck	Least Concern	
16	Bovidae	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Least Concern (2016)	2015-12-05
17	Canidae	<i>Canis sp.</i>	Jackals and Wolves		
18	Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern (2016)	
19	Emballonuridae	<i>Taphozous (Taphozous) mauritanus</i>	Mauritian Tomb Bat	Least Concern	2010-02-19
20	Equidae	<i>Equus quagga</i>	Plains Zebra	Least Concern (2016)	2018-03-21
21	Felidae	<i>Acinonyx jubatus</i>	Cheetah	Vulnerable (2016)	

22	Felidae	<i>Felis silvestris</i>	Wildcat	Least Concern (2016)	2015-07-20
23	Felidae	<i>Panthera pardus</i>	Leopard	Vulnerable (2016)	
24	Galagidae	<i>Galago sp.</i>	Lesser Galagos		2005-07-14
25	Giraffidae	<i>Giraffa giraffa giraffa</i>	South African Giraffe	Least Concern (2016)	2019-08-09
26	Gliridae	<i>Graphiurus (Graphiurus) murinus</i>	Forest African Dormouse	Least Concern	1987-03-18
27	Herpestidae	<i>Atilax paludinosus</i>	Marsh Mongoose	Least Concern (2016)	1979-10-28
28	Herpestidae	<i>Mungos mungo</i>	Banded Mongoose	Least Concern (2016)	2015-12-05
29	Hyaenidae	<i>Hyaena brunnea</i>	Brown Hyena	Near Threatened (2015)	2011-10-20
30	Hyaenidae	<i>Proteles cristata</i>	Aardwolf	Least Concern (2016)	1980-11-14
31	Hystricidae	<i>Hystrix africaeaustralis</i>	Cape Porcupine	Least Concern	2017-05-20
32	Leporidae	<i>Lepus saxatilis</i>	Scrub Hare	Least Concern	2020-10-03
33	Macroscelididae	<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant Shrew	Least Concern (2016)	1986-07-13
34	Muridae	<i>Aethomys ineptus</i>	Tete Veld Aethomys	Least Concern (2016)	1993-10-20
35	Muridae	<i>Gerbilliscus brantsii</i>	Highveld Gerbil	Least Concern (2016)	1966-03-28
36	Muridae	<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	Least Concern (2016)	1993-10-20
37	Muridae	<i>Gerbilliscus paeba</i>	Paeba Hairy-footed Gerbil	Least Concern (2016)	1966-04-15
38	Muridae	<i>Mastomys natalensis</i>	Natal Mastomys	Least Concern (2016)	1993-10-20
39	Muridae	<i>Mus (Nannomys) minutoides</i>	Southern African Pygmy Mouse	Least Concern	1987-03-13
40	Muridae	<i>Otomys angoniensis</i>	Angoni Vlei Rat	Least Concern (2016)	1975-06-25
41	Muridae	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	Least Concern (2016)	1957-10-30
42	Nesomyidae	<i>Dendromus melanotis</i>	Gray African Climbing Mouse	Least Concern (2016)	1987-03-14

43	Nesomyidae	<i>Saccostomus campestris</i>	Southern African Pouched Mouse	Least Concern (2016)	1987-02-20
44	Nesomyidae	<i>Steatomys pratensis</i>	Common African Fat Mouse	Least Concern (2016)	1987-12-03
45	Nycteridae	<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	Least Concern (2016)	1989-11-28
46	Pedetidae	<i>Pedetes capensis</i>	South African Spring Hare	Least Concern (2016)	1994-01-10
47	Sciuridae	<i>Paraxerus cepapi</i>	Smith's Bush Squirrel	Least Concern (2016)	2017-09-30
48	Soricidae	<i>Crocidura hirta</i>	Lesser Red Musk Shrew	Least Concern (2016)	1986-02-23
49	Soricidae	<i>Crocidura mariquensis</i>	Swamp Musk Shrew	Near Threatened (2016)	1975-06-25
50	Soricidae	<i>Suncus lixus</i>	Greater Dwarf Shrew	Least Concern (2016)	
51	Suidae	<i>Phacochoerus africanus</i>	Common Warthog	Least Concern (2016)	2019-08-09
52	Thryonomyidae	<i>Thryonomys swinderianus</i>	Greater Cane Rat	Least Concern (2016)	
53	Vespertilionidae	<i>Neoromicia capensis</i>	Cape Serotine	Least Concern (2016)	1987-09-03
54	Vespertilionidae	<i>Pipistrellus (Pipistrellus) rusticus</i>	Rusty Pipistrelle	Near Threatened	1975-06-25
55	Vespertilionidae	<i>Scotophilus dinganii</i>	Yellow-bellied House Bat	Least Concern (2016)	2012-11-09
56	Viverridae	<i>Genetta genetta</i>	Common Genet	Least Concern (2016)	2014-08-12
57	Viverridae	<i>Genetta tigrina</i>	Cape Genet (Cape Large-spotted Genet)	Least Concern (2016)	1986-07-25
					1989-11-28* 1975-06-25**



Appendix C: Historical reptile species records from the broader study area

NO.	Family	Scientific name	Common name	Red list category	Last recorded
1	Agamidae	<i>Acanthocercus atricollis</i>	Southern Tree Agama	Least Concern (SARCA 2014)	2022-02-26
2	Agamidae	<i>Agama aculeata distanti</i>	Distant's Ground Agama	Least Concern (SARCA 2014)	1978-11-28
3	Amphisbaenidae	<i>Monopeltis infuscata</i>	Dusky Worm Lizard	Least Concern (SARCA 2014)	1900-06-15
4	Chamaeleonidae	<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	Least Concern (SARCA 2014)	2006-12-01
5	Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	Least Concern (SARCA 2014)	1900-06-15
6	Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Least Concern (SARCA 2014)	2017-03-04
7	Colubridae	<i>Dispholidus typus viridis</i>	Northern Boomslang	Not evaluated	2022-01-08
8	Colubridae	<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	Least Concern (SARCA 2014)	1975-07-22
9	Colubridae	<i>Philothamnus occidentalis</i>	Western Natal Green Snake	Least Concern (SARCA 2014)	1900-06-15
10	Colubridae	<i>Philothamnus semivariiegatus</i>	Spotted Bush Snake	Least Concern (SARCA 2014)	1980-03-25
11	Colubridae	<i>Telescopus semiannulatus semiannulatus</i>	Eastern Tiger Snake	Least Concern (SARCA 2014)	1975-03-28
12	Colubridae	<i>Thelotornis capensis capensis</i>	Southern Twig Snake	Least Concern (SARCA 2014)	1975-03-28
13	Cordylidae	<i>Cordylus vittifer</i>	Common Girdled Lizard	Least Concern (SARCA 2014)	1982-03-25
14	Cordylidae	<i>Platysaurus minor</i>	Waterberg Flat Lizard	Least Concern (SARCA 2014)	1900-06-15
15	Elapidae	<i>Aspidelaps scutatus scutatus</i>	Speckled Shield Cobra	Least Concern (SARCA 2014)	1900-06-15

16	Elapidae	<i>Dendroaspis polylepis</i>	Black Mamba	Least Concern (SARCA 2014)	1977-03-23
17	Elapidae	<i>Naja annulifera</i>	Snouted Cobra	Least Concern (SARCA 2014)	2016-11-26
18	Elapidae	<i>Naja mossambica</i>	Mozambique Spitting Cobra	Least Concern (SARCA 2014)	1975-04-20
19	Gekkonidae	<i>Chondrodactylus turneri</i>	Turner's Gecko	Least Concern (SARCA 2014)	2017-03-04
20	Gekkonidae	<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	Least Concern (SARCA 2014)	2015-10-24
21	Gekkonidae	<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko	Least Concern (SARCA 2014)	1973-08-31
22	Gekkonidae	<i>Lygodactylus capensis</i>	Common Dwarf Gecko	Least Concern (SARCA 2014)	2022-02-26
23	Gekkonidae	<i>Pachydactylus affinis</i>	Transvaal Gecko	Least Concern (SARCA 2014)	1900-06-15
24	Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	Least Concern (SARCA 2014)	1923-11-03
25	Gerrhosauridae	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	1975-11-25
26	Gerrhosauridae	<i>Matobosaurus validus</i>	Common Giant Plated Lizard	Least Concern (SARCA 2014)	1976-06-15
27	Lacertidae	<i>Ichnotropis capensis</i>	Ornate Rough-scaled Lizard	Least Concern (SARCA 2014)	2016-11-15
28	Lacertidae	<i>Meroles squamulosus</i>	Common Rough-scaled Lizard	Least Concern (SARCA 2014)	1900-06-15
29	Lacertidae	<i>Nucras holubi</i>	Holub's Sandveld Lizard	Least Concern (SARCA 2014)	2014-11-15
30	Lacertidae	<i>Nucras intertexta</i>	Spotted Sandveld Lizard	Least Concern (SARCA 2014)	1924-08-26
31	Lacertidae	<i>Pedioplanis lineocellata</i> <i>lineocellata</i>	Spotted Sand Lizard	Least Concern (SARCA 2014)	1974-08-29
32	Lacertidae	<i>Pedioplanis lineocellata pulchella</i>	Common Sand Lizard	Least Concern (SARCA 2014)	1986-09-20

33	Lamprophiidae	<i>Amblyodipsas polylepis polylepis</i>	Common Purple-glossed Snake	Least Concern (SARCA 2014)	1981-02-02
34	Lamprophiidae	<i>Aparallactus capensis</i>	Black-headed Centipede-eater	Least Concern (SARCA 2014)	1905-04-09
35	Lamprophiidae	<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	Least Concern (SARCA 2014)	1980-03-25
36	Lamprophiidae	<i>Atractaspis duerdeni</i>	Duerden's Stiletto Snake	Least Concern (SARCA 2014)	1900-06-15
37	Lamprophiidae	<i>Boaedon capensis</i>	Brown House Snake	Least Concern (SARCA 2014)	2016-12-23
38	Lamprophiidae	<i>Gracililima nyassae</i>	Black File Snake	Least Concern (SARCA 2014)	1975-11-11
39	Lamprophiidae	<i>Limaformosa capensis</i>	Common File Snake	Least Concern (SARCA 2014)	1980-01-21
40	Lamprophiidae	<i>Lycodonomorphus inornatus</i>	Olive House Snake	Least Concern (SARCA 2014)	1900-06-15
41	Lamprophiidae	<i>Lycophidion capense capense</i>	Cape Wolf Snake	Least Concern (SARCA 2014)	2017-11-14
42	Lamprophiidae	<i>Prosymna bivittata</i>	Two-striped Shovel-snout	Least Concern (SARCA 2014)	1946-10-20
43	Lamprophiidae	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Least Concern (SARCA 2014)	1900-06-15
44	Lamprophiidae	<i>Psammophis angolensis</i>	Dwarf Sand Snake	Least Concern (SARCA 2014)	1900-06-15
45	Lamprophiidae	<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	Least Concern (SARCA 2014)	2016-12-20
46	Lamprophiidae	<i>Psammophis jallae</i>	Jalla's Sand Snake	Least Concern (SARCA 2014)	1975-07-07
47	Lamprophiidae	<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	Least Concern (SARCA 2014)	1900-06-15
48	Lamprophiidae	<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	Least Concern (SARCA 2014)	2016-11-11
49	Lamprophiidae	<i>Pseudaspis cana</i>	Mole Snake	Least Concern (SARCA 2014)	1900-06-15



50	Lamprophiidae	<i>Xenocalamus bicolor australis</i>	Waterberg Quill-snouted Snake	Least Concern (SARCA 2014)	1900-06-15
51	Leptotyphlopidae	<i>Leptotyphlops distanti</i>	Distant's Thread Snake	Least Concern (SARCA 2014)	1976-08-30
52	Pelomedusidae	<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	2018-04-07
53	Pelomedusidae	<i>Pelusios sinuatus</i>	Serrated Hinged Terrapin	Least Concern (SARCA 2014)	2022-02-26
54	Pythonidae	<i>Python natalensis</i>	Southern African Python	Least Concern (SARCA 2014)	2018-02-17
55	Scincidae	<i>Acontias occidentalis</i>	Western Legless Skink	Least Concern (SARCA 2014)	1942-08-26
56	Scincidae	<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	Least Concern (SARCA 2014)	1977-08-21
57	Scincidae	<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	Least Concern (SARCA 2014)	1900-06-15
58	Scincidae	<i>Trachylepis damarana</i>	Damara Variable Skink		2007-10-14
59	Scincidae	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	Least Concern (SARCA 2014)	2022-02-26
60	Scincidae	<i>Trachylepis sp. (Transvaal varia)</i>	Skink sp. 1		1900-06-15
61	Scincidae	<i>Trachylepis varia sensu lato</i>	Common Variable Skink Complex	Least Concern (SARCA 2014)	2018-02-17
62	Testudinidae	<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	Least Concern (SARCA 2014)	1900-06-15
63	Testudinidae	<i>Psammobates oculifer</i>	Serrated Tent Tortoise	Least Concern (SARCA 2014)	2006-11-02
64	Testudinidae	<i>Stigmochelys pardalis</i>	Leopard Tortoise	Least Concern (SARCA 2014)	2022-01-09
65	Typhlopidae	<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	Least Concern (SARCA 2014)	1900-06-15
66	Typhlopidae	<i>Afrotyphlops schlegelii</i>	Schlegel's Beaked Blind Snake	Least Concern (SARCA 2014)	1900-06-15

67	Typhlopidae	<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)	2018-12-07
68	Varanidae	<i>Varanus albigularis albigularis</i>	Rock Monitor	Least Concern (SARCA 2014)	2018-12-18
69	Varanidae	<i>Varanus niloticus</i>	Water Monitor	Least Concern (SARCA 2014)	2022-02-26
70	Viperidae	<i>Bitis arietans arietans</i>	Puff Adder	Least Concern (SARCA 2014)	2016-10-08
71	Viperidae	<i>Causus defilippii</i>	Snouted Night Adder	Least Concern (SARCA 2014)	2007-02-03
72	Viperidae	<i>Causus rhombeatus</i>	Rhombic Night Adder	Least Concern (SARCA 2014)	1900-06-15

Appendix D: Historical frog species records from the broader study area

NO.	Family	Scientific name	Common name	Red list category	Last recorded
1	Brevicipitidae	<i>Breviceps adspersus</i>	Bushveld Rain Frog	Least Concern	2014-11-15
2	Bufo	<i>Poyntonophrynus fenoulheti</i>	Northern Pygmy Toad	Least Concern	1974-03-29
3	Bufo	<i>Schismaderma carens</i>	Red Toad	Least Concern	2022-01-08
4	Bufo	<i>Sclerophrys sp.</i>			2008-03-13
5	Bufo	<i>Sclerophrys garmani</i>	Olive Toad	Least Concern (IUCN, 2016)	2017-03-04
6	Bufo	<i>Sclerophrys gutturalis</i>	Guttural Toad	Least Concern (IUCN, 2016)	2011-12-16
7	Bufo	<i>Sclerophrys pusilla</i>	Flatbacked Toad	Least Concern (IUCN, 2016)	1996-12-06
8	Hyperoliidae	<i>Hyperolius marmoratus</i>	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)	2017-03-04

9	Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	Least Concern	2017-03-04
10	Microhylidae	<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	Least Concern	2018-12-08
11	Phrynobatrachidae	<i>Phrynobatrachus mababiensis</i>	Dwarf Puddle Frog	Least Concern (IUCN, 2014)	1979-12-16
12	Phrynobatrachidae	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	Least Concern (IUCN, 2013)	1996-12-06
13	Pipidae	<i>Xenopus laevis</i>	Common Platanna	Least Concern	2017-03-04
14	Ptychadenidae	<i>Ptychadena anchietae</i>	Plain Grass Frog	Least Concern	2017-03-04
15	Ptychadenidae	<i>Ptychadena mossambica</i>	Broadbanded Grass Frog	Least Concern	2011-12-16
16	Pyxicephalidae	<i>Amietia delalandii</i>	Delalande's River Frog	Least Concern (2017)	2017-03-04
17	Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	Least Concern (2013)	2022-03-05
18	Pyxicephalidae	<i>Pyxicephalus adspersus</i>	Giant Bull Frog	Near Threatened	2021-02-13
19	Pyxicephalidae	<i>Pyxicephalus edulis</i>	African Bull Frog	Least Concern	2022-03-05
20	Pyxicephalidae	<i>Strongylopus fasciatus</i>	Striped Stream Frog	Least Concern	
21	Pyxicephalidae	<i>Tomopterna sp.</i>			2017-03-04
22	Pyxicephalidae	<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	Least Concern	2011-12-16
23	Pyxicephalidae	<i>Tomopterna krugerensis</i>	Knocking Sand Frog	Least Concern	1976-01-16
24	Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog	Least Concern	1999-01-30

Appendix E: SABAP 2 bird list of the area.

NO.	Common group	Common species	Genus	Species
1		Brubru	<i>Nilaus</i>	<i>afer</i>
2		Hamerkop	<i>Scopus</i>	<i>umbretta</i>
3		Neddicky	<i>Cisticola</i>	<i>fulvicapilla</i>
4		Quailfinch	<i>Ortygospiza</i>	<i>atricollis</i>
5		Secretarybird	<i>Sagittarius</i>	<i>serpentarius</i>
6		Shikra	<i>Accipiter</i>	<i>badius</i>
7	Babbler	Arrow-marked	<i>Turdoides</i>	<i>jardineii</i>
8	Barbet	Acacia Pied	<i>Tricholaema</i>	<i>leucomelas</i>
9	Barbet	Black-collared	<i>Lybius</i>	<i>torquatus</i>
10	Barbet	Crested	<i>Trachyphonus</i>	<i>vallantii</i>
11	Batis	Chinspot	<i>Batis</i>	<i>molitor</i>
12	Bee-eater	European	<i>Merops</i>	<i>apiaster</i>
13	Bee-eater	Little	<i>Merops</i>	<i>pusillus</i>
14	Bee-eater	White-fronted	<i>Merops</i>	<i>bullockoides</i>
15	Bishop	Southern Red	<i>Euplectes</i>	<i>orix</i>
16	Bishop	Yellow-crowned	<i>Euplectes</i>	<i>afer</i>
17	Bittern	Dwarf	<i>Ixobrychus</i>	<i>sturmii</i>
18	Bittern	Little	<i>Ixobrychus</i>	<i>minutus</i>
19	Boubou	Southern	<i>Laniarius</i>	<i>ferrugineus</i>
20	Bulbul	Dark-capped	<i>Pycnonotus</i>	<i>tricolor</i>
21	Bunting	Cinnamon-breasted	<i>Emberiza</i>	<i>tahapisi</i>
22	Bunting	Golden-breasted	<i>Emberiza</i>	<i>flaviventris</i>
23	Bushshrike	Grey-headed	<i>Malaconotus</i>	<i>blanchoti</i>
24	Bushshrike	Orange-breasted	<i>Chlorophoneus</i>	<i>sulfureopectus</i>
25	Buzzard	Common	<i>Buteo</i>	<i>buteo</i>
26	Camaroptera	Grey-backed	<i>Camaroptera</i>	<i>brevicaudata</i>
27	Canary	Black-throated	<i>Crithagra</i>	<i>atrogularis</i>
28	Canary	Yellow-fronted	<i>Crithagra</i>	<i>mozambica</i>
29	Cisticola	Levaillant's	<i>Cisticola</i>	<i>tinniens</i>
30	Cisticola	Rattling	<i>Cisticola</i>	<i>chiniana</i>
31	Cisticola	Zitting	<i>Cisticola</i>	<i>juncidis</i>
32	Coot	Red-knobbed	<i>Fulica</i>	<i>cristata</i>
33	Cormorant	Reed	<i>Microcarbo</i>	<i>africanus</i>
34	Cormorant	White-breasted	<i>Phalacrocorax</i>	<i>lucidus</i>
35	Coucal	Burchell's	<i>Centropus</i>	<i>burchellii</i>

36	Crake	African	<i>Crecoptis</i>	<i>egregia</i>
37	Crake	Black	<i>Zapornia</i>	<i>flavirostra</i>
38	Crane	Grey Crowned	<i>Balearica</i>	<i>regulorum</i>
39	Crombec	Long-billed	<i>Sylvietta</i>	<i>rufescens</i>
40	Crow	Pied	<i>Corvus</i>	<i>albus</i>
41	Cuckoo	African	<i>Cuculus</i>	<i>gularis</i>
42	Cuckoo	Black	<i>Cuculus</i>	<i>clamosus</i>
43	Cuckoo	Diederik	<i>Chrysococcyx</i>	<i>caprius</i>
44	Cuckoo	Jacobin	<i>Clamator</i>	<i>jacobinus</i>
45	Cuckoo	Klaas's	<i>Chrysococcyx</i>	<i>klaas</i>
46	Cuckoo	Levaillant's	<i>Clamator</i>	<i>levaillantii</i>
47	Cuckoo	Red-chested	<i>Cuculus</i>	<i>solitarius</i>
48	Darter	African	<i>Anhinga</i>	<i>rufa</i>
49	Dove	Cape Turtle	<i>Streptopelia</i>	<i>capicola</i>
50	Dove	Emerald-spotted Wood	<i>Turtur</i>	<i>chalcospilos</i>
51	Dove	Laughing	<i>Spilopelia</i>	<i>senegalensis</i>
52	Dove	Namaqua	<i>Oena</i>	<i>capensis</i>
53	Dove	Red-eyed	<i>Streptopelia</i>	<i>semitorquata</i>
54	Dove	Rock	<i>Columba</i>	<i>livia</i>
55	Drongo	Fork-tailed	<i>Dicrurus</i>	<i>adsimilis</i>
56	Duck	African Black	<i>Anas</i>	<i>sparsa</i>
57	Duck	Fulvous Whistling	<i>Dendrocygna</i>	<i>bicolor</i>
58	Duck	Knob-billed	<i>Sarkidiornis</i>	<i>melanotos</i>
59	Duck	Maccoa	<i>Oxyura</i>	<i>maccoa</i>
60	Duck	White-backed	<i>Thalassornis</i>	<i>leuconotus</i>
61	Duck	White-faced Whistling	<i>Dendrocygna</i>	<i>viduata</i>
62	Duck	Yellow-billed	<i>Anas</i>	<i>undulata</i>
63	Eagle	African Fish	<i>Haliaeetus</i>	<i>vocifer</i>
64	Eagle	Black-chested Snake	<i>Circaetus</i>	<i>pectoralis</i>
65	Eagle	Brown Snake	<i>Circaetus</i>	<i>cinereus</i>
66	Eagle	Tawny	<i>Aquila</i>	<i>rapax</i>
67	Eagle-Owl	Spotted	<i>Bubo</i>	<i>africanus</i>
68	Egret	Great	<i>Ardea</i>	<i>alba</i>
69	Egret	Intermediate	<i>Ardea</i>	<i>intermedia</i>

70	Egret	Little	<i>Egretta</i>	<i>garzetta</i>
71	Egret	Western Cattle	<i>Bubulcus</i>	<i>ibis</i>
72	Eremomela	Burnt-necked	<i>Eremomela</i>	<i>usticollis</i>
73	Falcon	Amur	<i>Falco</i>	<i>amurensis</i>
74	Finch	Cut-throat	<i>Amadina</i>	<i>fasciata</i>
75	Finch	Red-headed	<i>Amadina</i>	<i>erythrocephala</i>
76	Firefinch	African	<i>Lagonosticta</i>	<i>rubricata</i>
77	Firefinch	Jameson's	<i>Lagonosticta</i>	<i>rhodopareia</i>
78	Firefinch	Red-billed	<i>Lagonosticta</i>	<i>senegala</i>
79	Fiscal	Southern	<i>Lanius</i>	<i>collaris</i>
80	Flycatcher	African Paradise	<i>Terpsiphone</i>	<i>viridis</i>
81	Flycatcher	Fiscal	<i>Melaenornis</i>	<i>silens</i>
82	Flycatcher	Marico	<i>Melaenornis</i>	<i>mariquensis</i>
83	Flycatcher	Pale	<i>Melaenornis</i>	<i>pallidus</i>
84	Flycatcher	Southern Black	<i>Melaenornis</i>	<i>pammelaina</i>
85	Flycatcher	Spotted	<i>Muscicapa</i>	<i>striata</i>
86	Francolin	Coqui	<i>Peliperdix</i>	<i>coqui</i>
87	Francolin	Crested	<i>Dendroperdix</i>	<i>sephaena</i>
88	Gallinule	Allen's	<i>Porphyrio</i>	<i>alleni</i>
89	Go-away-bird	Grey	<i>Crinifer</i>	<i>concolor</i>
90	Goose	Egyptian	<i>Alopochen</i>	<i>aegyptiaca</i>
91	Goose	Spur-winged	<i>Plectropterus</i>	<i>gambensis</i>
92	Goshawk	Pale Chanting	<i>Melierax</i>	<i>canorus</i>
93	Grebe	Great Crested	<i>Podiceps</i>	<i>cristatus</i>
94	Grebe	Little	<i>Tachybaptus</i>	<i>ruficollis</i>
95	Greenbul	Yellow-bellied	<i>Chlorocichla</i>	<i>flaviventris</i>
96	Greenshank	Common	<i>Tringa</i>	<i>nebularia</i>
97	Guineafowl	Helmeted	<i>Numida</i>	<i>meleagris</i>
98	Harrier	African Marsh	<i>Circus</i>	<i>ranivorus</i>
99	Harrier-Hawk	African	<i>Polyboroides</i>	<i>typus</i>
100	Heron	Black	<i>Egretta</i>	<i>ardesiaca</i>
101	Heron	Black-crowned Night	<i>Nycticorax</i>	<i>nycticorax</i>
102	Heron	Black-headed	<i>Ardea</i>	<i>melanocephala</i>
103	Heron	Grey	<i>Ardea</i>	<i>cinerea</i>
104	Heron	Purple	<i>Ardea</i>	<i>purpurea</i>
105	Heron	Squacco	<i>Ardeola</i>	<i>ralloides</i>
106	Heron	Striated	<i>Butorides</i>	<i>striata</i>

107	Honeyguide	Greater	<i>Indicator</i>	<i>indicator</i>
108	Honeyguide	Lesser	<i>Indicator</i>	<i>minor</i>
109	Hoopoe	African	<i>Upupa</i>	<i>africana</i>
110	Hornbill	African Grey	<i>Lophoceros</i>	<i>nasutus</i>
111	Hornbill	Southern Red-billed	<i>Tockus</i>	<i>rufirostris</i>
112	Hornbill	Southern Yellow-billed	<i>Tockus</i>	<i>leucomelas</i>
113	Ibis	African Sacred	<i>Threskiornis</i>	<i>aethiopicus</i>
114	Ibis	Glossy	<i>Plegadis</i>	<i>falcinellus</i>
115	Ibis	Hadada	<i>Bostrychia</i>	<i>hagedash</i>
116	Indigobird	Dusky	<i>Vidua</i>	<i>funerea</i>
117	Indigobird	Purple	<i>Vidua</i>	<i>purpurascens</i>
118	Indigobird	Village	<i>Vidua</i>	<i>chalybeata</i>
119	Jacana	African	<i>Actophilornis</i>	<i>africanus</i>
120	Kestrel	Lesser	<i>Falco</i>	<i>naumanni</i>
121	Kingfisher	African Pygmy	<i>Ispidina</i>	<i>picta</i>
122	Kingfisher	Brown-hooded	<i>Halcyon</i>	<i>albiventris</i>
123	Kingfisher	Pied	<i>Ceryle</i>	<i>rudis</i>
124	Kingfisher	Woodland	<i>Halcyon</i>	<i>senegalensis</i>
125	Kite	Black	<i>Milvus</i>	<i>migrans</i>
126	Kite	Black-winged	<i>Elanus</i>	<i>caeruleus</i>
127	Kite	Yellow-billed	<i>Milvus</i>	<i>aegyptius</i>
128	Korhaan	Northern Black	<i>Afrotis</i>	<i>afraoides</i>
129	Korhaan	Red-crested	<i>Lophotis</i>	<i>ruficrista</i>
130	Lapwing	African Wattled	<i>Vanellus</i>	<i>senegallus</i>
131	Lapwing	Blacksmith	<i>Vanellus</i>	<i>armatus</i>
132	Lapwing	Crowned	<i>Vanellus</i>	<i>coronatus</i>
133	Lark	Flappet	<i>Mirafra</i>	<i>rufocinnamomea</i>
134	Lark	Rufous-naped	<i>Mirafra</i>	<i>africana</i>
135	Lark	Sabota	<i>Calendulauda</i>	<i>sabota</i>
136	Longclaw	Cape	<i>Macronyx</i>	<i>capensis</i>
137	Mannikin	Bronze	<i>Spermestes</i>	<i>cucullata</i>
138	Martin	Brown-throated	<i>Riparia</i>	<i>paludicola</i>
139	Martin	Rock	<i>Ptyonoprogne</i>	<i>fuligula</i>
140	Masked-weaver	Lesser	<i>Ploceus</i>	<i>intermedius</i>
141	Moorhen	Common	<i>Gallinula</i>	<i>chloropus</i>

142	Moorhen	Lesser	<i>Paragallinula</i>	<i>angulata</i>
143	Mousebird	Red-faced	<i>Urocolius</i>	<i>indicus</i>
144	Mousebird	Speckled	<i>Colius</i>	<i>striatus</i>
145	Myna	Common	<i>Acridotheres</i>	<i>tristis</i>
146	Oriole	Black-headed	<i>Oriolus</i>	<i>larvatus</i>
147	Ostrich	Common	<i>Struthio</i>	<i>camelus</i>
148	Owl	Marsh	<i>Asio</i>	<i>capensis</i>
149	Owl	Western Barn	<i>Tyto</i>	<i>alba</i>
150	Owlet	Pearl-spotted	<i>Glaucidium</i>	<i>perlatum</i>
151	Oxpecker	Red-billed	<i>Buphagus</i>	<i>erythrorynchus</i>
152	Pigeon	African Green	<i>Treron</i>	<i>calvus</i>
153	Pigeon	Speckled	<i>Columba</i>	<i>guinea</i>
154	Pipit	African	<i>Anthus</i>	<i>cinnamomeus</i>
155	Plover	Three-banded	<i>Charadrius</i>	<i>tricoloris</i>
156	Pochard	Southern	<i>Netta</i>	<i>erythrophthalma</i>
157	Pratincole	Black-winged	<i>Glareola</i>	<i>nordmanni</i>
158	Prinia	Black-chested	<i>Prinia</i>	<i>flavicans</i>
159	Prinia	Tawny-flanked	<i>Prinia</i>	<i>subflava</i>
160	Puffback	Black-backed	<i>Dryoscopus</i>	<i>cubla</i>
161	Pytilia	Green-winged	<i>Pytilia</i>	<i>melba</i>
162	Quelea	Red-billed	<i>Quelea</i>	<i>quelea</i>
163	Rail	African	<i>Rallus</i>	<i>caerulescens</i>
164	Robin-Chat	Cape	<i>Cossypha</i>	<i>caffra</i>
165	Robin-Chat	White-throated	<i>Cossypha</i>	<i>humeralis</i>
166	Roller	Lilac-breasted	<i>Coracias</i>	<i>caudatus</i>
167	Roller	Purple	<i>Coracias</i>	<i>naevius</i>
168	Sandpiper	Wood	<i>Tringa</i>	<i>glareola</i>
169	Scrub Robin	White-browed	<i>Cercotrichas</i>	<i>leucophrys</i>
170	Seedeater	Streaky-headed	<i>Crithagra</i>	<i>gularis</i>
171	Shoveler	Cape	<i>Spatula</i>	<i>smithii</i>
172	Shrike	Crimson-breasted	<i>Laniarius</i>	<i>atrococcineus</i>
173	Shrike	Magpie	<i>Urolestes</i>	<i>melanoleucus</i>
174	Shrike	Red-backed	<i>Lanius</i>	<i>collurio</i>
175	Shrike	Southern White-crowned	<i>Eurocephalus</i>	<i>anguitimens</i>
176	Snipe	African	<i>Gallinago</i>	<i>nigripennis</i>
177	Sparrow	Cape	<i>Passer</i>	<i>melanurus</i>



178	Sparrow	House	<i>Passer</i>	<i>domesticus</i>
179	Sparrow	Southern Grey-headed	<i>Passer</i>	<i>diffusus</i>
180	Sparrow-Weaver	White-browed	<i>Plocepasser</i>	<i>mahali</i>
181	Sparrowhawk	Little	<i>Accipiter</i>	<i>minullus</i>
182	Sparrowhawk	Ovambo	<i>Accipiter</i>	<i>ovampensis</i>
183	Spoonbill	African	<i>Platalea</i>	<i>alba</i>
184	Spurfowl	Natal	<i>Pternistis</i>	<i>natalensis</i>
185	Spurfowl	Swainson's	<i>Pternistis</i>	<i>swainsonii</i>
186	Starling	Burchell's	<i>Lamprotornis</i>	<i>australis</i>
187	Starling	Cape	<i>Lamprotornis</i>	<i>nitens</i>
188	Starling	Red-winged	<i>Onychognathus</i>	<i>morio</i>
189	Starling	Violet-backed	<i>Cinnyricinclus</i>	<i>leucogaster</i>
190	Starling	Wattled	<i>Creatophora</i>	<i>cinerea</i>
191	Stilt	Black-winged	<i>Himantopus</i>	<i>himantopus</i>
192	Stonechat	African	<i>Saxicola</i>	<i>torquatus</i>
193	Stork	Abdim's	<i>Ciconia</i>	<i>abdimii</i>
194	Stork	Black	<i>Ciconia</i>	<i>nigra</i>
195	Stork	Marabou	<i>Leptoptilos</i>	<i>crumenifer</i>
196	Stork	White	<i>Ciconia</i>	<i>ciconia</i>
197	Stork	Yellow-billed	<i>Mycteria</i>	<i>ibis</i>
198	Sunbird	Amethyst	<i>Chalcomitra</i>	<i>amethystina</i>
199	Sunbird	Marico	<i>Cinnyris</i>	<i>mariquensis</i>
200	Sunbird	White-bellied	<i>Cinnyris</i>	<i>talatala</i>
201	Swallow	Barn	<i>Hirundo</i>	<i>rustica</i>
202	Swallow	Greater Striped	<i>Cecropis</i>	<i>cucullata</i>
203	Swallow	Lesser Striped	<i>Cecropis</i>	<i>abyssinica</i>
204	Swallow	Pearl-breasted	<i>Hirundo</i>	<i>dimidiata</i>
205	Swallow	Red-breasted	<i>Cecropis</i>	<i>semirufa</i>
206	Swallow	White-throated	<i>Hirundo</i>	<i>albigularis</i>
207	Swamphen	African	<i>Porphyrio</i>	<i>madagascariensis</i>
208	Swift	African Black	<i>Apus</i>	<i>barbatus</i>
209	Swift	African Palm	<i>Cypsiurus</i>	<i>parvus</i>
210	Swift	Alpine	<i>Tachymarptis</i>	<i>melba</i>
211	Swift	Common	<i>Apus</i>	<i>apus</i>
212	Swift	Little	<i>Apus</i>	<i>affinis</i>
213	Swift	White-rumped	<i>Apus</i>	<i>caffer</i>

214	Tchagra	Black-crowned	<i>Tchagra</i>	<i>senegalus</i>
215	Tchagra	Brown-crowned	<i>Tchagra</i>	<i>australis</i>
216	Teal	Blue-billed	<i>Spatula</i>	<i>hottentota</i>
217	Teal	Red-billed	<i>Anas</i>	<i>erythrorhyncha</i>
218	Tern	Whiskered	<i>Chlidonias</i>	<i>hybrida</i>
219	Thick-knee	Spotted	<i>Burhinus</i>	<i>capensis</i>
220	Thrush	Groundscraper	<i>Turdus</i>	<i>litsitsirupa</i>
221	Thrush	Karoo	<i>Turdus</i>	<i>smithi</i>
222	Thrush	Kurrichane	<i>Turdus</i>	<i>libonyana</i>
223	Tinkerbird	Yellow-fronted	<i>Pogoniulus</i>	<i>chrysoconus</i>
224	Tit	Southern Black	<i>Melaniparus</i>	<i>niger</i>
225	Vulture	Cape	<i>Gyps</i>	<i>coprotheres</i>
226	Wagtail	African Pied	<i>Motacilla</i>	<i>aguimp</i>
227	Wagtail	Cape	<i>Motacilla</i>	<i>capensis</i>
228	Warbler	African Reed	<i>Acrocephalus</i>	<i>baeticatus</i>
229	Warbler	Chestnut-vented	<i>Curruca</i>	<i>subcoerulea</i>
230	Warbler	Garden	<i>Sylvia</i>	<i>borin</i>
231	Warbler	Lesser Swamp	<i>Acrocephalus</i>	<i>gracilirostris</i>
232	Warbler	Little Rush	<i>Bradypterus</i>	<i>baboecala</i>
233	Warbler	Marsh	<i>Acrocephalus</i>	<i>palustris</i>
234	Warbler	Sedge	<i>Acrocephalus</i>	<i>schoenobaenus</i>
235	Warbler	Willow	<i>Phylloscopus</i>	<i>trochilus</i>
236	Waxbill	Black-faced	<i>Brunhilda</i>	<i>erythronotos</i>
237	Waxbill	Blue	<i>Uraeginthus</i>	<i>angolensis</i>
238	Waxbill	Common	<i>Estrilda</i>	<i>astrild</i>
239	Waxbill	Orange-breasted	<i>Amandava</i>	<i>subflava</i>
240	Waxbill	Violet-eared	<i>Granatina</i>	<i>granatina</i>
241	Weaver	Cape	<i>Ploceus</i>	<i>capensis</i>
242	Weaver	Red-headed	<i>Anaplectes</i>	<i>rubriceps</i>
243	Weaver	Scaly-feathered	<i>Sporopipes</i>	<i>squamifrons</i>
244	Weaver	Southern Masked	<i>Ploceus</i>	<i>velatus</i>
245	Weaver	Thick-billed	<i>Amblyospiza</i>	<i>albifrons</i>
246	Weaver	Village	<i>Ploceus</i>	<i>cucullatus</i>
247	Wheatear	Capped	<i>Oenanthe</i>	<i>pileata</i>
248	White-eye	Cape	<i>Zosterops</i>	<i>virens</i>
249	Whydah	Long-tailed Paradise	<i>Vidua</i>	<i>paradisaea</i>

250	Whydah	Pin-tailed	<i>Vidua</i>	<i>macroura</i>
251	Widowbird	Long-tailed	<i>Euplectes</i>	<i>progne</i>
252	Widowbird	White-winged	<i>Euplectes</i>	<i>albonotatus</i>
253	Wood Hoopoe	Green	<i>Phoeniculus</i>	<i>purpureus</i>
254	Woodpecker	Bearded	<i>Chloropicus</i>	<i>namaquus</i>
255	Woodpecker	Bennett's	<i>Campethera</i>	<i>bennettii</i>
256	Woodpecker	Cardinal	<i>Dendropicos</i>	<i>fuscescens</i>
257	Woodpecker	Golden-tailed	<i>Campethera</i>	<i>abingoni</i>
258	Wren-Warbler	Barred	<i>Calamonastes</i>	<i>fasciolatus</i>