

TENBOSCH

TERRESTRIAL ECOLOGICAL ASSESSMENT



OCTOBER 2020

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TABLE OF CONTENTS

LIST OF TABLES.....	3
LIST OF FIGURES.....	3
ABBREVIATIONS.....	5
TERMINOLOGY.....	5
DECLARATION OF INDEPENDENCE.....	6
1. INTRODUCTION.....	7
2. OBJECTIVES.....	8
3. STUDY AREA & PROJECT DESCRIPTION.....	9
4. METHODS.....	11
4.1 FLORA.....	11
4.2 FAUNA.....	12
4.3 METHOD FOR THE DETERMINATION OF SITE ECOLOGICAL IMPORTANCE (SEI).....	13
4.4 ASSUMPTIONS, LIMITATIONS AND KNOWLEDGE GAPS.....	18
4.4.1 Seasonality.....	18
4.4.2 Overlooked Species.....	18
5. BIODIVERSITY BASELINE DESCRIPTION.....	19
5.1 FLORA.....	19
5.1.1 Regional Context.....	19
5.1.2 Local Context – Plant Species Richness and Description of Development Sites.....	19
5.1.3 Conservation-Important Flora.....	27
5.1.4 Endemic Species.....	29
5.1.5 Invasive Alien Species.....	29
5.2 TERRESTRIAL FAUNA.....	35
5.2.1 Mammals.....	35
5.2.2 Birds.....	38
5.2.3 Reptiles.....	44
5.2.4 Frogs.....	45
5.3 ECOLOGICAL SENSITIVITY.....	46
5.3.1 Environmental Screening Tool.....	46
5.3.2 Mpumalanga Biodiversity Sector Plan.....	48
5.3.3 Site-specific Ecological Importance Analysis.....	51
6. KEY CURRENT AND POTENTIAL IMPACTS.....	54
7. CONCLUSION AND RECOMMENDATIONS.....	56
8. REFERENCES.....	59
9. APPENDICES.....	61
APPENDIX 1. CHECKLIST OF FLORA RECORDED DURING FIELDWORK.....	61
APPENDIX 2. CHECKLIST OF FAUNA RECORDED DURING FIELDWORK.....	71
APPENDIX 3. POTENTIALLY OCCURRING FAUNA OF CONSERVATION CONCERN.....	80
APPENDIX 4. CURRICULUM VITAE OF DUNCAN MCKENZIE.....	86
APPENDIX 5. SPECIALISTS DECLARATION.....	87

List of Tables

Table 1. Criteria for Determining Conservation Importance of a Receptor	14
Table 2. Criteria for Determining Functional Integrity of a Receptor.....	15
Table 3. Biodiversity Importance Two-way Matrix.....	15
Table 4. Criteria for Determining Receptor Resilience	16
Table 5. Site Ecological Importance Two-way Matrix.....	17
Table 6. Guidelines for interpreting Site Ecological Importance of Receptors in terms of project impacts	17
Table 7. Conservation-important plant species confirmed during fieldwork.....	30
Table 8. Potentially occurring plant SCC	32
Table 9. Co-ordinates of plant SCC and protected plants.....	34
Table 10. Ecological Sensitivity of Vegetation Communities in the Study Area	52

List of Figures

Figure 1. Location of Study Area.....	10
Figure 2. Historical comparison (2015, 2018 & 2019) of natural and cleared woody vegetation within the Study Area	Error! Bookmark not defined.
Figure 3. Photographs of vegetation communities present within the Study Area	24
Figure 4. Spatial representation of vegetation communities present within the Study Area.....	26
Figure 5. Photographs of <i>Ozoroa barbertonensis</i> (VU) recorded within the Study Area	28
Figure 6. Pentads covering the upper Kaap River Valley.....	43
Figure 7. Environmental Screening Tool assessment of Terrestrial Biodiversity Features in the Study Area	47
Figure 8. MBSP CBA Map of the Study Area.....	50
Figure 9. Site Ecological Importance of the vegetation communities within the study area	53

EIA REGULATIONS SPECIALISTS REPORT CHECKLIST

(1) A specialist report prepared in terms of the 2014 Environmental Impact Assessment Regulations (as amended in 2017) must contain-

	(a) details of-	
✓	(i) the specialist who prepared the report; and	page 07
✓	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	page 85
✓	(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	page 86
✓	(c) an indication of the scope of, and the purpose for which, the report was prepared;	page 07
✓	(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	page 11
✓	(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	page 11
✓	(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	page 50
✓	(g) an identification of any areas to be avoided, including buffers;	page 55
✓	(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	page 52
✓	(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	page 18
✓	(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	page 53
✓	(k) any mitigation measures for inclusion in the EMPr;	page 55
✓	(l) any conditions for inclusion in the environmental authorisation;	page 55
✓	(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	page 55
	(n) a reasoned opinion-	
✓	(i) as to whether the proposed activity or portions thereof should be authorised; and	page 57
✓	(ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	page 57
X	(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	n/a
X	(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	n/a
✓	(q) any other information requested by the competent authority.	none

Abbreviations

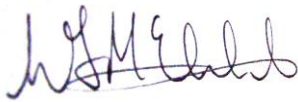
BODATSA	Botanical Database of Southern Africa
DEA	Department of Environmental Affairs
EST	Environmental Screening Tool
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
mamsl	Metres Above Mean Sea Level
MNCA	Mpumalanga Nature Conservation Act (No. 10 of 1998)
NEMBA ToPS	National Environmental Management: Biodiversity Act Threatened or Protected Species Lists (No. 10 of 2004)
NFA	National Forest Act (No. 30 of 1998)
PRECIS	National Herbarium Pretoria (PRE) Computerised Information System
QDGS	Quarter Degree Grid Square, for example 2530 BD
SABAP2	Southern African Bird Atlas Project 2
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern

Terminology

Alien	Introduced from elsewhere: neither endemic nor indigenous.
Biodiversity	The structural, functional and compositional attributes of an area, ranging from genes to landscapes.
Disturbed	An ecosystem that is a sub-climax ecological state, usually through impacts such as low levels invasion by alien or indigenous pioneer plants, moderate overgrazing, poor burning regimes, etc. These systems still contain a large proportion of indigenous flora.
Degraded	An ecosystem that is a poor ecological state, usually through impacts such as invasion by alien plants, severe overgrazing, poor burning regimes, etc. These systems still contain a moderate proportion of indigenous flora.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire.
Palearctic	The zoogeographical region comprising Eurasia north of the Himalayas, together with North Africa and the temperate part of the Arabian peninsula.
Transformed	Transformed ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.

Declaration of Independence

We declare that we have been appointed as independent consulting ecologists with no affiliation with or vested financial interests in the proponent, other than for work performed under the 2014 Environmental Impact Assessment Regulations (as amended in 2017). We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. Remuneration for our services by the proponent is not linked to approval by any decision-making authority responsible for authorising this development.



W.L. McClelland

26 October 2020



D.R. McKenzie

26 October 2020

1. INTRODUCTION

ECOREX Consulting Ecologists CC was appointed by Peter Velcich of NuLeaf Planning & Environmental to conduct the terrestrial ecology study for two adjoining Basic Assessment Reports (BAR's) for terrestrial ecosystems (flora, mammals, birds, reptiles and frogs) for a proposed tourism and housing development on a farm north of Komatipoort, Mpumalanga Province, South Africa. This study will provide a baseline description of the receiving environment, which will serve as a basis for the assessment of the potential impacts of the developments on terrestrial ecosystems.

The study team was as follows:

Duncan McKenzie (Terrestrial Ecologist). Duncan has been involved in biodiversity assessments for Ecorex for 12 years and countries of work experience include Lesotho, Swaziland, Mali, Mozambique, Sierra Leone, Guinea, South Africa, Tanzania and Democratic Republic of the Congo. Duncan has previously worked as a Regional Coordinator for the Mondi Wetlands Project and has lectured on many aspects of conservation in Mbombela and the Kruger National Park. He is currently the Mpumalanga Regional Co-ordinator for the South African Bird Atlas Project, formerly served on the KZN Bird Rarities Committee, is co-author of The Birds of Mbombela and is lead author on the Wildflowers of the Kruger National Park and Birds of the Northern Escarpment projects. A more detailed CV is presented in Appendix 4.

Linda McKenzie (GIS Specialist). Linda is a GIS Specialist/GIS Analyst with over 14 years' experience in the industry. For the last five years she has operated her own GIS Consultancy called Digital Earth. She has extensive experience in both the private and public sector, as has worked on a wide variety of projects and GIS applications. These include, most recently, vegetation and sensitivity mapping, landcover data capture, municipal roads master planning, hydroelectric scheme and wind farm feasibility mapping and town planning, land surveyor and engineering support services. Linda formerly served as Vice Chairperson and Treasurer for GISSA Mpumalanga and is a registered Professional GISc Practitioner (PGP0170).

2. OBJECTIVES

The objectives of the Ecology Survey are to:

- Provide a baseline ecological description of the terrestrial ecosystems that are likely to be impacted by the proposed developments;
- Provide an assessment of the ecological importance of potentially affected ecosystems; this would incorporate an assessment of the conservation importance and functional importance of the ecosystems;
- Provide an overview of key potential impacts of the projects on terrestrial ecosystems;
- Make recommendations regarding infrastructure layout, where appropriate.

The primary deliverable will be a report on Terrestrial Ecosystems, including:

- Biodiversity Baseline Description;
- Ecological Importance Assessment;
- Broad-scale Vegetation Map;
- Ecological Importance Map;
- Overview of the key potential impacts on the environment;
- Recommendations regarding infrastructure layout, where relevant.

3. STUDY AREA & PROJECT DESCRIPTION

The affected properties, namely Portion 2 and Portion 3 of the farm Tenbosch 661 JU as well as Erf 814 of the Komatipoort Townlands, are situated within the Nkomazi Local Municipality, in the Ehlanzeni District Municipality, approximately 3 Km north of the town of Komatipoort, Mpumalanga Province, South Africa. The Crocodile River, situated within the adjacent Kruger National Park (KNP), forms the northern and eastern boundaries of the property (Figure 1).

The two BAR's, which are covered by one ecological study in this report, entail the following developments:

- Creation of a Nature Estate with a number of chalets and a safari lodge in a nature area (northern portion of the study area).
- Creation of a Nature Estate with a number of residences in a nature area (southern portion of the study area).
- Creation of an access road and entrance gate north of Komatipoort town
- All associated civil infrastructure (water, electricity and waste treatment) will be included.

Most of the study area is covered in natural vegetation, although invasion by the indigenous tree *Dichrostachys cinerea* is evident in many areas. A farm residence is situated in the far southern portion of the study area, adjacent to the town of Komatipoort. Two small tourist camps are also present on the northern boundary, along the Crocodile River and overlooking the KNP, and a large network of tracks is also found throughout. At least five small dams are present within riparian zones, and two of these are fed by an old but functional water canal origination on the western boundary. The entire area to the west contains irrigated sugarcane fields, while the northern and eastern boundaries are shared with the KNP. The town of Komatipoort lies to the south of the study area. The general topography is mostly gently undulating, with rocky ridges found throughout the site. A number of game species are either naturally occurring or have been introduced, and include approximately 40 Southern Savanna Buffalo *Syncerus caffer*, South African Giraffe *Giraffa camelopardalis giraffe* and Greater Kudu *Tragelaphus strepsiceros*. Hunting presumably occurs infrequently. The total area surveyed measured 330 ha.

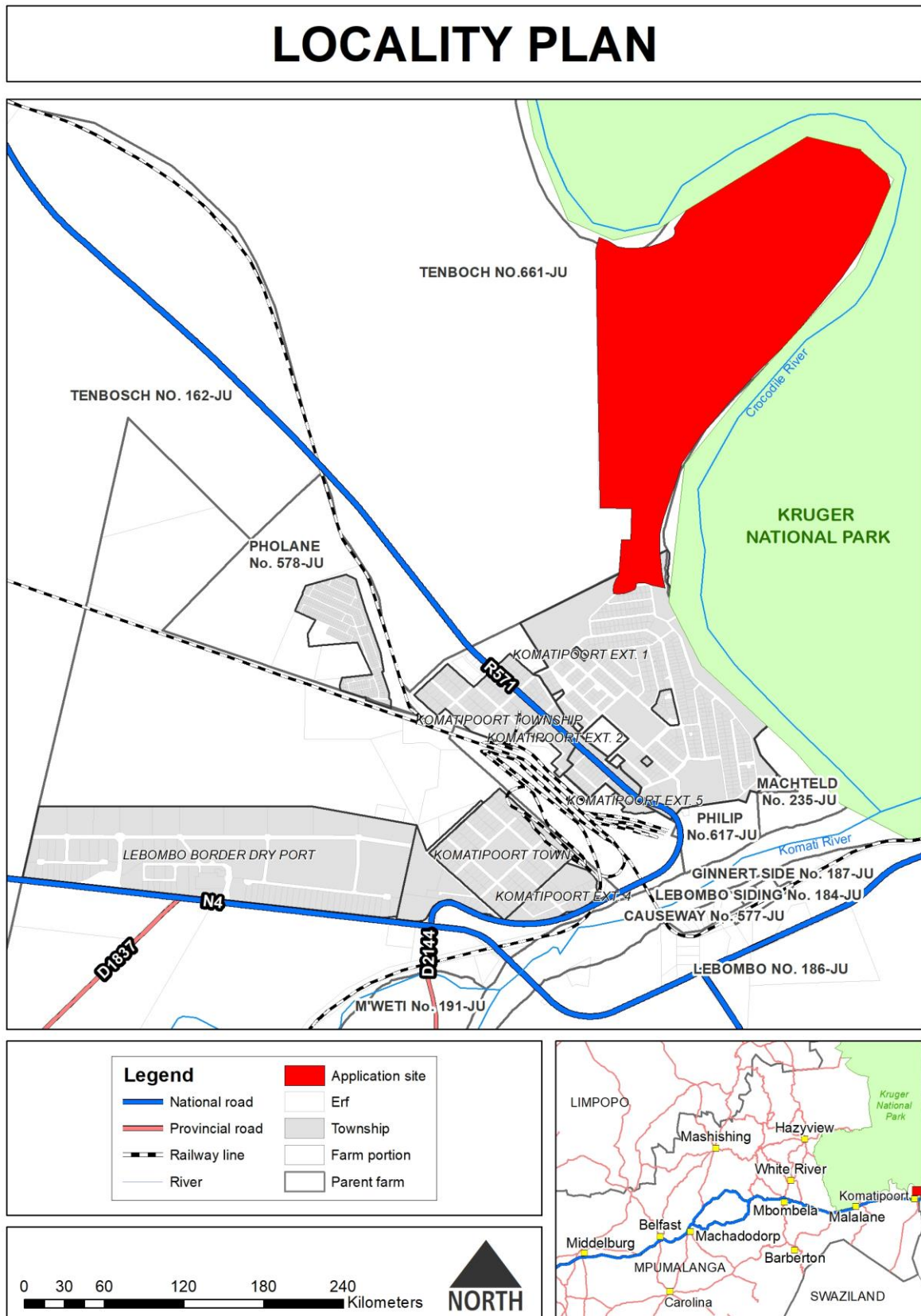


Figure 1. Location of Study Area

4. METHODS

An initial screening of the study area was undertaken using the Environmental Screening Tool (EST) of the Department of Environmental Affairs (DEA). This indicated that the study area had a Very High Terrestrial Biodiversity theme. More detail in this regard is provided in section 5.3.1 of this report.

4.1 Flora

Desktop

Vegetation communities were identified prior to fieldwork using satellite imagery supplied by Digital Earth. Red Data plant species listed for the 2531 DB present within the study area in the threatened species database of the Mpumalanga Tourism & Parks Agency (MTPA), as well as PRECIS data from the South African National Biodiversity Institute (SANBI), were used to produce a list of the most likely threatened species, which were searched for during fieldwork.

Fieldwork

Vegetation communities identified in the desktop phase were ground-truthed on the 19th and 20th August 2020. The boundary and layout of the proposed developments was supplied by NuLeaf and pre-loaded onto a Samsung S10 phone using LocusMap Pro™ software. This area was surveyed on foot and all visible plant species were recorded. The locations of any Species of Conservation Concern¹ (SCC) and additional species of conservation-importance were loaded onto the Samsung S10 phone using LocusMap Pro™ software. These include species listed under SANBI's Red List of South African Plants, as well as the website of the International Union for the Conservation of Nature (IUCN). The following relevant South African legislation was referred to with regard to protected species:

- Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA)
- National Forests Act (No. 30 of 1998) (NFA)
- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) (NEMBA ToPS)

¹ Raimondo et al. (2009), includes those with a status of Critically Rare, Rare, Near Threatened and Data Deficient as well as threatened species (Vulnerable, Endangered and Critically Endangered)

4.2 Fauna

Desktop

Lists of mammal, bird, reptile and frog SCC potentially occurring within the study area were prepared using data from the MTPA's threatened species database, Child *et al.* (2016), the Southern African Bird Atlas Project 2 <http://sabap2.adu.org.za/>, Taylor *et al.* (2016), Minter *et al.* (2004), Bates *et al.* (2014), Tolley *et al.* (2019) and the IUCN Red List of Threatened Species <https://www.iucnredlist.org/>. In addition, the protected status of fauna species was provided by the following two relevant Acts:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) (NEMBA ToPS)
- Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA)

The above data were captured mostly at a quarter-degree spatial resolution, but were refined by excluding species unlikely to occur within the study area due to unsuitable habitat characteristics (e.g. altitude and land-use). Bat species thought to only forage over the study area (i.e. mostly cave-roosting species) were not included in the assessment due to the lack of suitable caves within the study area. Potential occurrence of fauna in the study area was predicted based on the specialist's knowledge of habitat requirements of local fauna species.

Fieldwork

Birds were identified audially and visually using Nikon 10x42 binoculars. Observations were made incidentally during the time that the vegetation survey was conducted, and limited to birds seen and heard within the application sites and immediate surrounds. Mammals, reptiles and frogs were recorded incidentally as they were encountered during the survey through direct evidence (sightings) and indirect evidence (spoor, dung).

4.3 Method for the determination of Site Ecological Importance (SEI)

A standardised method for assessing site-specific ecological importance in relation to a proposed project (including the project footprint and project activities) is currently in draft format and will form part of the future guidelines for biodiversity specialists in ESIA's (SANBI, 2020). This assessment does not replace the output of the National Web-based Environmental Screening Tool but is complementary to it, providing a more site-specific assessment that is linked to the proposed project footprints / activities.

SEI is one of the most important outcomes of a specialist ecological study and provides a basis for assessing the significance of impacts that a project may have on the receiving environment. SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g. the species of conservation concern, vegetation/fauna community or habitat type) and its resilience to impacts (Receptor Resilience) as follows:

$$SEI = BI + RR$$

BI in turn is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

$$BI = CI + FI$$

Conservation Importance is defined as “the importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, Range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes” (SANBI, 2020). The fulfilling criteria for CI are presented in Table 1.

Table 1. Criteria for Determining Conservation Importance of a Receptor

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species Any area of natural habitat of a CR ecosystem type or large area (> 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type Globally significant populations of congregatory species (>10% of global population)
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global Extent of Occurrence of > 10 km ² . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (>0.01% but < 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1 %) of natural habitat of VU ecosystem type Presence of Rare species Globally significant populations of congregatory species (>1% but <10% of global population)
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under A criterion only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU Presence of range-restricted species > 50 % natural habitat with potential to support SCC
Low	No confirmed or highly likely populations of Species of Conservation Concern No confirmed or highly likely populations of range-restricted species < 50 % of natural habitat with limited potential to support SCC
Very Low	No confirmed and highly unlikely populations of SCC No confirmed and highly unlikely populations of range-restricted species No natural habitat remaining

Functional Integrity (FI) of the receptor (e.g. the vegetation/fauna community or habitat type) is defined here as “a measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts”. Fulfilling criteria for determining FI are given in Table 2.

Table 2. Criteria for Determining Functional Integrity of a Receptor

Functional Integrity	Fulfilling Criteria
Very High	Very large (>100 ha) intact area for any conservation status of regional vegetation type or >5 ha for CR regional vegetation types High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current ecological impacts with no signs of major past disturbance (e.g. ploughing)
High	Large (>20 ha but <100 ha) intact area for any conservation status of regional vegetation type or >10 ha for EN regional vegetation types Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches Only minor current ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential
Medium	Medium (>5 ha but <20 ha) semi-intact area for any conservation status of regional vegetation type or > 20 ha for VU regional vegetation types Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches Mostly minor current ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential
Low	Small (>1 ha but <5 ha) area Almost no habitat connectivity but migrations still possible across some transformed or degraded natural habitat; a very busy used road network surrounds the area. Low rehabilitation potential Several minor and major current ecological impacts
Very Low	Very small (<1 ha) area No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current ecological impacts

BI can be derived from a simple matrix of CI and FI as indicated in Table 3.

Table 3. Biodiversity Importance Two-way Matrix

Biodiversity Importance		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Receptor Resilience (RR) is defined as “*the intrinsic capacity of the receptor to resist major damage from disturbance and / or to recover to its original state with limited or no human intervention*”. The fulfilling criteria for RR are presented in Table 4.

Table 4. Criteria for Determining Receptor Resilience

Receptor Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed
High	Habitat that can recover relatively quickly (~ 5-10 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed
Medium	Will recover slowly (~more than 10 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~less than 50 % of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed

Once BI and RR have been calculated through the use of the above two matrices, SEI can be determined using the matrix in Table 5.

Table 5. Site Ecological Importance Two-way Matrix

SEI		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very Low	Very High	Very High	High	Medium	Low
	Low	Very High	High	Medium	Low	Low
	Medium	High	Medium	Medium	Low	Very Low
	High	Medium	Low	Low	Low	Very Low
	Very High	Low	Low	Very Low	Very Low	Very Low

Guidelines for how to interpret SEI of a project in terms of impact mitigation are given in Table 6.

Table 6. Guidelines for interpreting Site Ecological Importance of Receptors in terms of project impacts

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages. Destructive impacts for species/ecosystems where <persistence target remains.
High	Avoidance mitigation wherever possible. Minimization mitigation – Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities
Low	Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities
Very Low	Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required

The SEI values for each vegetation community / proposed development site are indicated spatially in Figure 9.

4.4 Assumptions, Limitations and Knowledge Gaps

4.4.1 Seasonality

The assessment was based on fieldwork covering two days in the dry season. It is highly likely that plants which flower at other times of the year are underrepresented and this may be seen as a limitation that could affect the Record of Decision, despite the extensive experience of local flora that the specialist has. Follow-up surveys are recommended during the flowering period of the potentially occurring SCC (February to April) to search for potentially occurring threatened plant species such as *Barleria oxyphylla* (Endangered) and Listed Sensitive Species No.3 (Vulnerable).

4.4.2 Overlooked Species

Certain plant species, particularly geophytes, will only flower in seasons when conditions are optimal and may thus remain undetected, even over a survey that encompasses several seasons. Other plant species may be overlooked because of very small size and / or extreme rarity. A sampling strategy will always represent merely a subset of the true diversity of the study area. However, the level of sampling effort for this study was appropriate for the objectives of the study.

5. BIODIVERSITY BASELINE DESCRIPTION

5.1 Flora

5.1.1 Regional Context

5.1.1.1 National Vegetation Types

According to the National Vegetation Map (SANBI, 2018), the study area is situated within **Tshokwane-Hlane Basalt Lowveld**. This vegetation type occurs from the Balule and Satara Camps in the central KNP in the north, through the Park down to Komatipoort and then south to Big Bend in eSwatini. Altitude varies between 180–400 mamsl. It is usually found on fairly flat plains with open tree savanna. The geology is basalts of the Karoo Supergroup resulting in black, brown or red clayey soils, such as Arcadia (Mucina & Rutherford, 2004).

Typical Tshokwane-Hlane Basalt Lowveld is dominated by the tall trees *Acacia nigrescens*, *Sclerocarya birrea* and *Philenoptera violacea*. Smaller trees include *Acacia borleae*, *A. gerrardii*, *A. nilotica*, *A. tortilis*, *Albizia harveyi*, *Combretum hereroense*, *C. imberbe*, *Lannea schweinfurthii* and *Peltophorum africanum*. Shrubs include *Dichrostachys cinerea*, *Grewia bicolor*, *Gymnosporia maranguensis* and *Searsia gueinzii*. Dominant herbs include *Dicoma tomentosa*, *Hermannia glanduligera*, *Justicia flava*, *J. protracta*, *Seddera suffruticosa*, *Tragia dioica*, *Chamaecrista mimosoides*, *Gisekia africana* and *Thunbergia dregeana*. The grasses are dominated by *Bothriochloa radicans*, *Digitaria eriantha*, *Panicum coloratum*, *P. maximum*, *Themeda triandra* and *Urochloa mosambicensis*.

5.1.1.2 Centres of Plant Endemism

The study area is not situated within any centres of plant endemism as defined by Van Wyk & Smith (2001).

5.1.1.3 Threatened Ecosystems

Tshokwane - Hlane Basalt Lowveld is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

5.1.2 Local Context – Plant Species Richness and Description of Development Sites

SANBI's Botanical Database of Southern Africa (BODATSA) lists a moderately rich diversity of plants with 516 plant taxa from 92 families for a 10 km radius around the study area. A

total of 230 taxa from 66 families were recorded from the study area during August 2020 fieldwork, representing 45% of the BODATSA total (Appendix 1). The true plant species diversity of the sites is likely to be higher as few flowering herbs were visible during fieldwork, and many tree species were still leafless. The full list of 230 plant taxa confirmed to occur during fieldwork is presented in Appendix 1. The dominant plant families in the flora are Fabaceae (24 spp), Poaceae (22 spp), Malvaceae (19 spp) and Asteraceae (12 spp).

Vegetation communities were identified within the study area on the basis of distinctive vegetation structure (grassland, woodland, thicket, etc.), floristic composition (dominant and diagnostic species) and position in the landscape (mid-slopes, terrace, crest, etc.). Four communities are present within the study area, and are described briefly below. Alien plant species are indicated in these vegetation descriptions by use of an asterisk.

5.1.2.1 *Euphorbia confinalis* – *Sterculia rogersii* Outcrop Woodland

Euphorbia confinalis – *Sterculia rogersii* Outcrop Woodland occurs in relatively small, scattered pockets throughout the study area (Figure 4). This community covers 40 ha, or 12% of the entire study area. Vegetation structure is mostly Short to Tall Closed Woodland, becoming Open Woodland on the larger outcrops (*sensu* Edwards, 1983) (Figure 2). Many outcrops are too small to have been mapped, and are embedded within the Plains Woodland community. Two stone chalets and associated infrastructure are situated within this community the northern portion of the study area (Figure 3).

This community contains a high diversity of trees and shrubs, as well as many succulents. The canopy cover is dominated by a number of succulent and semi-succulent trees such as *Euphorbia confinalis*, *E. cooperi*, *E. ingens* and *Sterculia rogersii*. Other regularly encountered trees include *Acacia nigrescens*, *Ficus abutilifolia*, *Peltophorum africanum*, *Pappea capensis*, *Sclerocarya birrea*, *Lanea schweinfurthii* and *Strychnos madagascariensis*. Shrubs and dwarf shrubs found are *Dichrostachys cinerea* subsp. *africana*, *Xerophyta retinervis*, *Jasminum multipartitum* and *Ochna inermis*. Smaller succulents include *Aloe spicata*, *A. chabaudii*, *Pachypodium saundersii*, *Cynanchum viminalis*, *Cissus cactiformis* and *Sansevieria hyacinthoides*. Herbs are mostly confined to fissures and cracks within the rocks and include *Syncolostemon canescens*, *Emilia transvaalensis*, *Hibiscus engleri*, *Plumbago zeylanica* and *Indigofera vicioides*. Grasses are uncommon, but outcrop edges and fissures contain *Microchloa caffra*, *Melinis repens* and *Panicum maximum*.

A total of 105 species (46% of the entire list) was recorded from Outcrop Woodland during fieldwork; the highest of the four communities present (Appendix 1). This is a relatively high species richness given the relatively small area covered by this community and the timing of the survey. Species fidelity is very high, with 55 species (52% of the community list) not shared with the other three communities.

Nine conservation-important species were recorded from this community, with one of these considered to be Near Threatened (NT)¹, namely *Elaeodendron transvaalense*. This species is described in greater detail below. Three species are protected under the NFA, namely the trees *Sclerocarya birrea*, *Boscia albitrunca* and *Elaeodendron transvaalense*. Six confirmed species are protected under the MNCA, all of which are succulents, namely *Aloe chabaudii*, *A. marlothii*, *A. spicata*, *Eulophia petersii*, *Stapelia gigantea* and *Pachypodium saundersiii* (Table 7).

5.1.2.2 *Acacia nigrescens* – *Dichrostachys cinerea* Disturbed Plains Woodland

This vegetation community occurs across most of the study area (Figure 4). It covers 260 ha, or 79% of the area surveyed. Vegetation structure is mostly Short to Tall Closed Woodland (*sensu* Edwards, 1983) (Figure 2), but approaches Low Thicket in areas invaded by shrubs. Rock cover varies from low to moderate, especially in the portions adjacent to the Outcrop Woodland vegetation community. When present, rocks occur in the form of small to medium-sized boulders, as opposed to the larger, exposed boulders and sheetrock of the former community. Historical overgrazing is the most likely cause of large areas being invaded by the indigenous shrub *Dichrostachys cinerea* subsp. *africana*, leading to a disturbed state in this community. Extensive bush clearing has taken place within the northern portion of the study area, and a parkland-like vegetation structure is evident here.

The canopy is moderately diverse with *Acacia nigrescens*, *A. nilotica*, *Combretum hereroense*, *C. apiculatum*, *C. imberbe*, *Sclerocarya birrea*, *Ziziphus mucronata* and *Strychnos madagascariensis* frequently recorded. Dominant shrubs are *Dichrostachys cinerea* subsp. *africana*, *Commiphora africana*, *Grewia flavescens*, *G. bicolor*, *Gymnosporia maranguensis* and *Euclea daphnoides*. Herbs are infrequent due to the dry conditions, but include *Dicoma tomentosa*, *Polydora steetziana*, *Waltheria indica*, *Leucas sexdentata*, *Kyphocarpa angustifolia* and *Justicia flava*. Grasses are relatively diverse and dominate the ground layer. Dominant species are *Heteropogon contortus*, *Panicum maximum*, *Aristida congesta* subsp. *barbicollis*, *Eragrostis rigidior* and *Enneapogon cenchroides*.

¹ Raimondo *et al.*, 2009

Ninety-four species (41% of the entire list) was recorded from Disturbed Closed Woodland during fieldwork; the second-highest of the four communities present (Appendix 1). Species fidelity is high, with 33 species (35% of the community list) being restricted to this community.

Nine conservation-important species were recorded from this community, with one of these considered to be Vulnerable (VU)¹, namely *Aloe komatiensis*, and the tree *Dalbergia melanoxylon*, which is assessed as NT. Both of these are described in greater detail in section 5.1.3 below. Four confirmed species are protected under the NFA, namely the trees *Sclerocarya birrea*, *Boscia albitrunca*, *Philenoptera violacea* and *Combretum imberbe*. Four species are protected under the MNCA, namely the succulents *Aloe komatiensis*, *A. marlothii* and *Stapelia gigantea* and the tree *Spirostachys africana* (Table 7).

5.1.2.3 *Dichrostachys cinerea* – *Cynodon dactylon* Degraded Woodland

Degraded Woodland occurs in a few small, scattered pockets throughout the study area (Figure 4). It covers just more than 10 ha, or 3% of the entire study area. Vegetation structure is mostly Short Open to Closed Woodland (*sensu* Edwards, 1983) (Figure 2). Various anthropogenic factors have combined to degrade the ecological state of this community, including bush-clearing, alien plant invasion, grass mowing and other activities (Figure 3).

The invasive shrub *Dichrostachys cinerea* subsp. *africana* dominates the often low canopy of this community, with other trees and shrubs including *Sclerocarya birrea*, *Gymnanthemum coloratum*, *Strychnos madagascariensis*, *Acacia nigrescens*, *Ziziphus mucronata*, *Baccharoides adoensis*, *Grewia flavescens* and *Phyllanthus reticulatus*. Dwarf shrubs and herbs found are *Lippia javanica*, *Waltheria indica*, *Solanum campylacanthum*, * *Parthenium hysterophorus* and * *Alternanthera pungens*. Grasses are dominated by *Cynodon dactylon*, *Eragrostis superba*, *Tragus berteronianus* and *Panicum maximum*.

A total of 57 species (25% of the entire list) was recorded from Degraded Woodland during fieldwork; the lowest of the four communities present (Appendix 1). Species fidelity is high, with 20 species (35% of the community list) being restricted to this community. Many of these are alien invasive or pioneer species, reflecting the high level of degradation in this community.

¹ Raimondo *et al.*, 2009

Only three conservation-important species were recorded from this community, namely the trees *Sclerocarya birrea*, *Combretum imberbe* and *Philenoptera violacea* which are all protected under the NFA (Table 7).

5.1.2.4 *Diospyros mespiliformis* - *Acacia xanthophloea* Riparian Forest / Wetland

Mosaic

This vegetation community occurs in fairly narrow strips along a number of drainage lines across the study area (Figure 4). A very narrow strip has also established along an old but functional irrigation canal situated in the south-central portion of the study area (Figure 3). This community covers just more than 17 ha or just over 5% of the study area. Dams, which contain some wetland vegetation, are included in this community, and cumulatively measure approximately 2 ha in size. Vegetation structure is mostly Tall Forest, but smaller stretches contain rushes and reeds and become Tall to High Closed Grassland (*sensu* Edwards, 1983) (Figure 2). Significant alien plant infestation is present within the large, southern-most strip of this community, adjacent to the town of Komatipoort. The remaining stretches are mostly free of alien plants.

The canopy contains large specimens of *Diospyros mespiliformis*, *Acacia xanthophloea*, *Ficus sycomorus*, *Combretum imberbe*, *Bridelia micrantha*, *Trichilia emetica* and *Schotia brachypetala*. The understory contains the shrubs and small trees *Maclura africana*, *Kraussia floribunda*, *Gymnosporia senegalensis*, * *Chromolaena odorata*, *Tabernaemontana elegans*, *Bridelia cathartica* and *Phyllanthus reticulatus*. Rarer woody species include *Cordyla africana*, *Azelia quanzensis* and *Ziziphus rivularis*. The ground layer is dominated by various plants across the community, and include the fern *Christella dentata*, the herb * *Ageratum conyzoides*, the grass *Panicum maximum*, the reed *Phragmites mauritianus*, the sedge *Cyperus sexangularis* and the rush *Typha capensis*. Climbers feature strongly in this community, and include *Combretum microphyllum*, *Jasminum fluminense*, * *Passiflora subpeltata*, *Cocculus hirsutus* and * *Ipomoea alba*.

Seventy-four species (32% of the entire list) was recorded from Riparian Forest / Wetland Mosaic during fieldwork; the second-lowest of the four communities present (Appendix 1). Species fidelity is understandably very high, with 47 species (64% of the community list) being restricted to this community.

Six conservation-important species were recorded from this community, namely the trees *Sclerocarya birrea*, *Combretum imberbe*, *Azelia quanzensis* and *Philenoptera violacea*

which are protected under the NFA, and the trees *Spirostachys africana* and *Berchemia zeyheri* which are protected under the MNCA (Table 7).

The remaining 1 ha is transformed through various buildings and gardens.

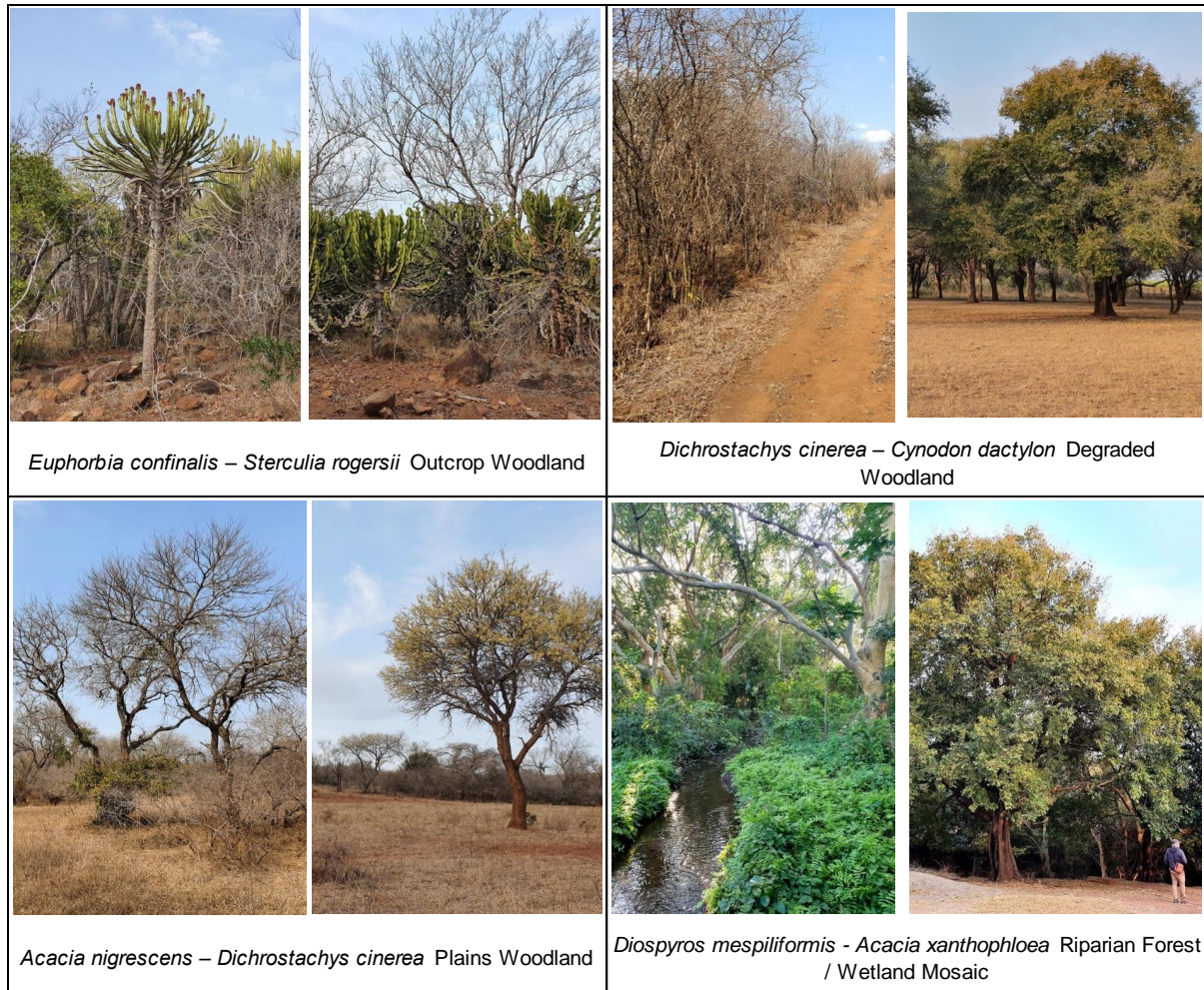


Figure 2. Photographs of Vegetation Communities present within the Study Area



Tourist Infrastructure within the Study Area

Dam and canal within the Study Area

Figure 3. Photographs of Man-made Structures present within the Study Area

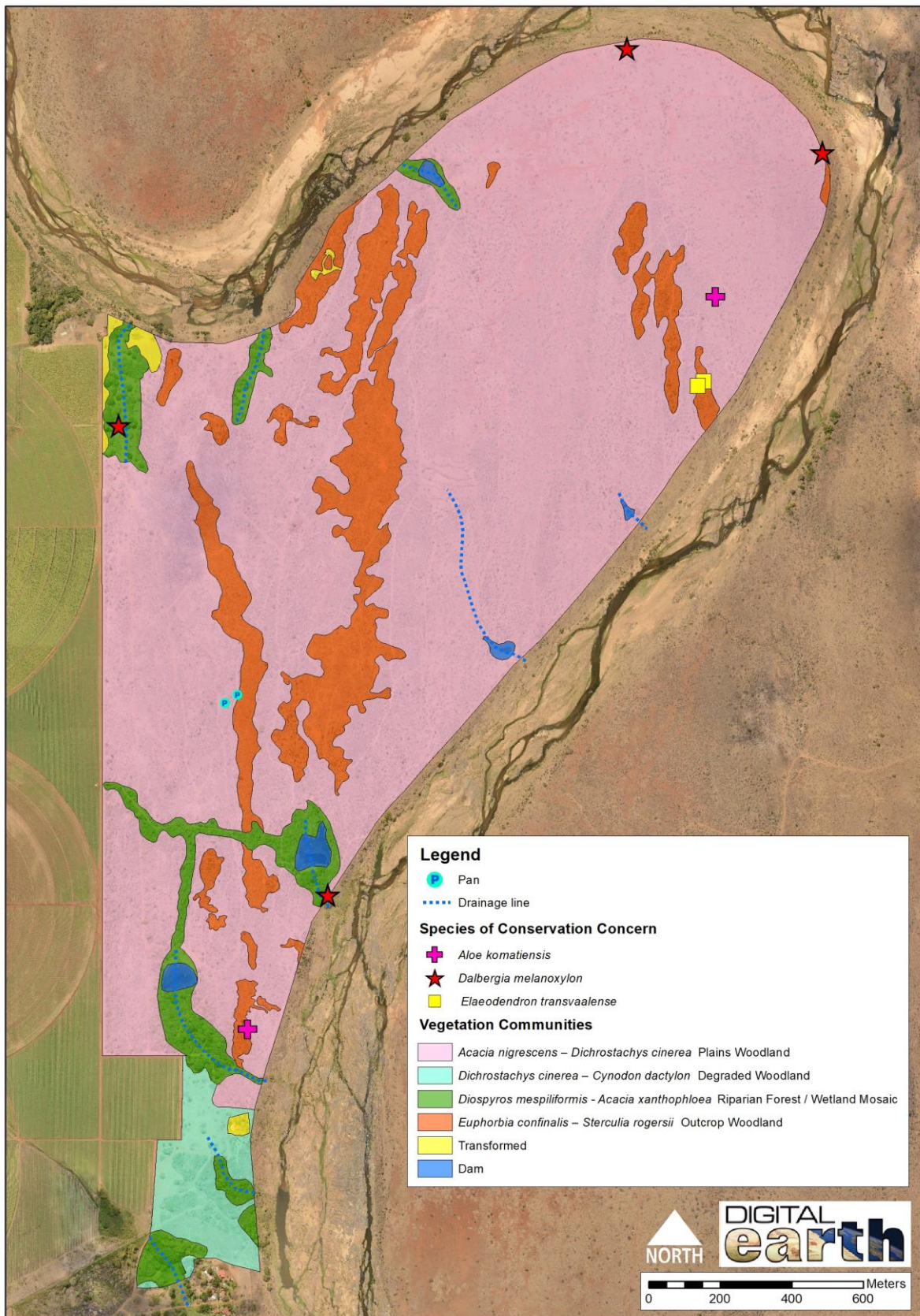


Figure 4. Spatial representation of vegetation communities present within the Study Area

5.1.3 Conservation-Important Flora

A total of 230 plant species in 66 families was recorded during fieldwork (Appendix 1). Three SCC were recorded from the study area, namely the succulent *Aloe komatiensis* which is classified as VU and the trees *Elaeodendron transvaalense* and *Dalbergia melanoxylon* which are classified as NT (Table 7). These three plants are discussed in greater detail below.

***Aloe komatiensis* Reynolds** Komatipoort Aloe

This succulent is listed as VU due to significant habitat loss within its small local distribution¹. Three sterile plants were recorded in two localities within the Plains Woodland vegetation community (Figure 5). This species flowers in February and March and would not yet have flowered at the time of the survey. When sterile, this taxon looks very similar to the winter-flowering, clump-forming *A. parvibracteata*, which was not recorded during fieldwork, and is best separated when in flower. *A. parvibracteata* would have been flowering at the time of the survey.

***Dalbergia melanoxylon* Guill. & Perr.** Zebra Wood

This species usually grows as a small to medium-sized tree and is found throughout the Lowveld and as far north and west as Senegal. Although not locally listed, it is assessed by the IUCN as NT due to over-collection for the wood carving industry and in the manufacturing of musical instruments². A few small colonies were located within the study area, mostly in the northern parts (Figure 5).

***Elaeodendron transvaalense* (Burt Davy) R.H.Archer** Bushveld Saffron

This is a small to medium-sized evergreen tree occurring in northern and eastern South Africa, and further afield through Namibia, Botswana, Zimbabwe, Mozambique and Zambia. The species is heavily harvested in South Africa for traditional medicine and some sub-populations have declined as a result; as such it has been assessed as NT (Williams *et al.*, 2008). Two plants were located within the study area (Figure 5).

¹ von Staden & McKenzie, 2019

² World Conservation Monitoring Centre. 1998

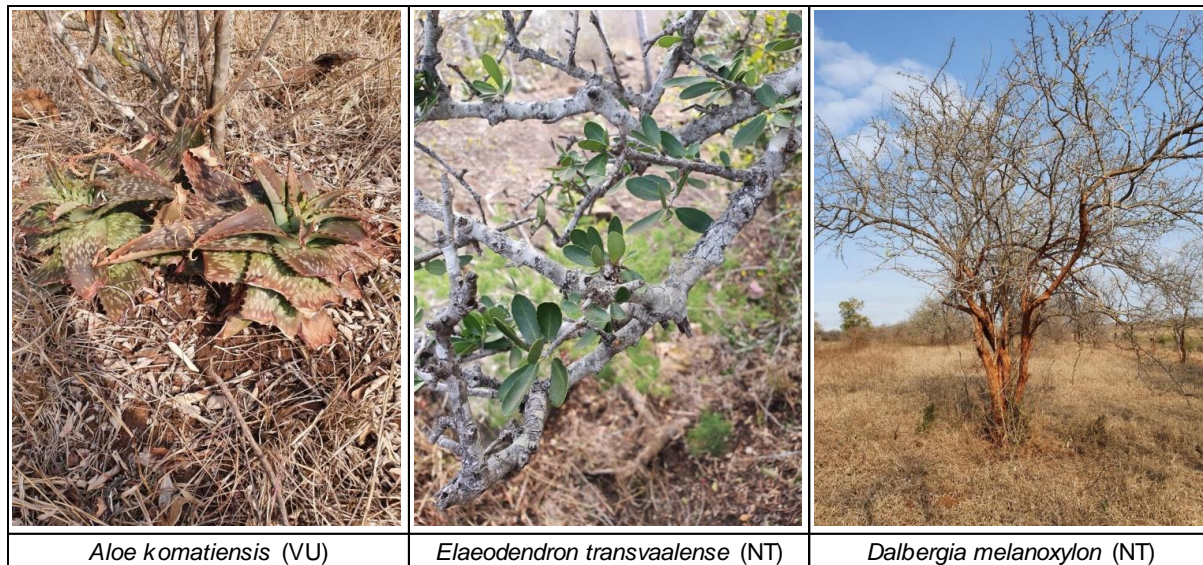


Figure 5. Photographs of SCC recorded within the Study Area

Ten additional plant SCC potentially occur in the general area around the study area, with three species having a moderate likelihood of occurrence. These species are described below.

***Barleria oxyphylla* Lindau**

This small herb is listed as EN due to habitat loss to urban and agricultural expansion, ongoing habitat degradation due to overgrazing, alien plant invasions and spreading informal settlements¹. This species flowers from summer to autumn and may have been overlooked during fieldwork as it is inconspicuous when not in flower. If present, it would most likely be found within the Outcrop Woodland vegetation community.

Listed Sensitive Species (No. 3)

This Sensitive Species is listed as VU due to rapid ongoing habitat loss to agriculture outside the Kruger National Park, habitat degradation due to overgrazing and over-collection from the wild for medicinal and horticultural use². It is a small, deciduous species which flowers in the summer months and may have been overlooked during fieldwork.

***Drimia sanguinea* (Schinz) Jessop Red Drimia**

This small bulb is invisible for most of the year either through dormancy or being inconspicuous due to its grass-like leaves. It is only in the flowering season that they are visible. This takes place in early spring and it is therefore likely that this bulb was not located

¹ von Staden & Lötter, 2018

² Lötter & von Staden, 2018

during fieldwork due to the timing of the survey. This plant is listed as NT due to over-collection for the medicinal plant trade¹.

The remaining potentially occurring SCC all have a low likelihood of occurring within the study area due to fieldwork coverage, unsuitable habitat present or regional rarity (Table 8).

Six species found are protected under the NFA, namely the trees *Sclerocarya birrea*, *Boscia albitrunca*, *Combretum imberbe*, *Azelia quanzensis*, *Philenoptera violacea* and *Elaeodendron transvaalense*. Nine confirmed species are protected under the MNCA, namely the succulents *Aloe chabaudii*, *A. marlothii*, *A. spicata*, *A. komatiensis*, *Eulophia petersii*, *Stapelia gigantea* and *Pachypodium saundersiae* and the trees *Spirostachys africana* and *Berchemia zeyheri* (Table 7).

The co-ordinates of the SCC located within the study area during fieldwork are presented in Table 9. These points are spatially presented in Figure 4.

5.1.4 Endemic Species

No plants endemic to Mpumalanga were recorded during fieldwork.

5.1.5 Invasive Alien Species

Twenty-eight alien plant species were recorded during fieldwork, with 18 of these being listed as invasive under the The National Environmental Management: Biodiversity Act (Act No. 10 OF 2004, NEMBA) Alien and Invasive Species Lists, 2016 (Appendix 1). The most significant invasion sites are within the Riparian Forest vegetation community, especially the section in the far southern portion of the study area. The bare or disturbed soil resulting from additional bush clearing activities and frequent human access may encourage the establishment of additional invasive alien species.

¹ Williams *et al.*, 2008

Table 7. Conservation-important plant species confirmed during fieldwork

Taxa	Growth Form	Red Data	Protected	Vegetation Communities			
				Outcrop Woodland	Disturbed Woodland	Degraded Woodland	Riparian Forest / Wetland Mosaic
Family Anacardiaceae <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA	u	r	u	r
Family Apocynaceae <i>Pachypodium saundersii</i> N.E.Br. <i>Stapelia gigantea</i> N.E.Br.	succulent succulent		MNCA MNCA	r r	r		
Family Asphodelaceae <i>Aloe chabaudii</i> Schönland <i>Aloe komatiensis</i> Reynolds <i>Aloe marlothii</i> A.Berger subsp. <i>marlothii</i> <i>Aloe spicata</i> L.f.	succulent succulent succulent succulent		MNCA MNCA MNCA MNCA	r r r u		r r	
Family Capparaceae <i>Boscia albitrunca</i> (Burch.) Gilg & Benedict	tree		NFA	r	r		
Family Celastraceae <i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	tree	NT	NFA	r			
Family Combretaceae <i>Combretum imberbe</i> Wawra	tree		NFA		u	r	f
Family Euphorbiaceae <i>Spirostachys africana</i> Sond.	tree		MNCA		r		r
Family Fabaceae <i>Afzelia quanzensis</i> Welw.	tree		NFA				r

<i>Dalbergia melanoxylon</i> Guill. & Perr.	tree	NT‡			r		
<i>Philenoptera violacea</i> (Klotzsch) Schrire	tree		NFA		r	r	u
Family Orchidaceae							
<i>Eulophia petersii</i> (Rchb.f.) Rchb.f.			MNCA	r			
Family Rhamnaceae							
<i>Berchemia zeyheri</i> (Sond.) Grubov	tree		MNCA				r
TOTAL	15	3	15	9	9	3	6

NFA - National Forests Act	
MNCA - Mpumalanga Nature Conservation Act	f - frequent
VU - Vulnerable	u - uncommon
NT - Near Threatened	r - rare
‡ - IUCN assessment	

Table 8. Potentially occurring plant SCC

Species	Red Data Status	Habitat Preference	Optimal Survey Time	Likelihood of Occurrence	Justification
Family Acanthaceae <i>Barleria oxyphylla</i>	EN	Lowveld savanna, often on sodic soils	Dec-May (flowering period, deciduous species)	Moderate	Suitable habitat present but possibly overlooked due to small size and dry conditions at the time of the survey
Family Apocynaceae Listed Sensitive Species (No. 3)	VU	Lowveld savanna, often on sodic soils	Dec-May (flowering period, deciduous species)	Moderate	Suitable habitat present but none located despite intensive searching. Deciduous species and easy to overlook when not in leaf or flower
Family Asphodelaceae <i>Aloe komatiensis</i>	VU	Lowveld savanna	Feb-Apr (Flowering period)	Confirmed	
Family Capparaceae <i>Cleome schlechteri</i>	DDD	Heavy clay soils in savanna	Dec-Apr (Flowering period)	Low	Poorly known species, no recent records, limited habitat present
Family Celastraceae <i>Elaeodendron transvaalense</i>	NT	Woodland	Throughout the year (even when sterile)	Confirmed	
Family Dioscoreaceae Listed Sensitive Species (No. 275)	VU	Wooded and relatively mesic places, such as the moister bushveld areas, coastal bush and wooded mountain kloofs	Usually throughout the year (even when sterile) although deciduous in dry environments	Low	Some suitable habitat present, but rare in the Lowveld.
Family Fabaceae <i>Dalbergia melanoxylon</i>	NT‡	Savanna	Throughout the year (even when sterile)	Confirmed	
	VU	Drainage lines in savanna	Throughout the year (even when	Low	Suitable habitat present

<i>Caesalpinia rostrata</i>			sterile)		but none located despite intensive searching
Family Hyacinthaceae <i>Bowiea volubilis</i> subsp. <i>volubilis</i>	VU	Scree slopes, rocky thickets	Oct-April (deciduous species)	Low	No suitable habitat present, very rare in the Lowveld
<i>Drimia sanguinea</i>	NT	Open veld and scrubby woodland in a variety of soil types.	Jul-Sep (spring-flowering, deciduous and grass-like species)	Moderate	Suitable habitat present
Family Lythraceae <i>Nesaea alata</i>	Rare	Edges of shallow pans in low-lying areas	Nov-Apr (flowering period)	Low	Limited suitable habitat present. Rare plant with widely scattered populations.
Family Orchidaceae <i>Ansellia africana</i>	VU‡	Riverine forest, tall woodland	Throughout the year (even when sterile)	Low	Suitable habitat present but none located despite intensive searching. May occur away from the development footprint
Family Rubiaceae <i>Pavetta zeyheri</i> subsp. <i>microlancea</i>	EN	Rocky slopes or loamy flats	Throughout the year (even when sterile)	Low	Suitable habitat present but none located despite intensive searching

DDD - Data Deficient Insufficient Information

NT - Near Threatened

VU - Vulnerable

EN - Endangered

‡ - IUCN assessment

Table 9. Co-ordinates of plant SCC

Species	Protected Status	Red Data	No. of Plants	GPS Co-ordinates	
				Latitude	Longitude
<i>Aloe komatiensis</i>	MNCA	VU	2	-25.398860	31.973108
<i>Aloe komatiensis</i>	MNCA	VU	1	-25.417400	31.960276
<i>Dalbergia melanoxylon</i>		NT‡	10	-25.392616	31.970597
<i>Dalbergia melanoxylon</i>		NT‡	1	-25.395209	31.976049
<i>Dalbergia melanoxylon</i>		NT‡	1	-25.414011	31.962467
<i>Dalbergia melanoxylon</i>		NT‡	3	-25.402215	31.956572
<i>Elaeodendron transvaalense</i>	NFA	NT	1	-25.400994	31.972813
<i>Elaeodendron transvaalense</i>		NT	1	-25.401115	31.972656

MNCA - Mpumalanga Nature Conservation Act
 NFA - National Forests Act
 NT - Near Threatened
 VU - Vulnerable
 ‡ - IUCN assessment

5.2 Terrestrial Fauna

5.2.1 Mammals

5.2.1.1 Regional Overview

The farm Tenbosch 661 JU is situated in the savanna biome adjacent to the KNP in the foothills of the Lebombo Mountains in the Lowveld of far eastern Mpumalanga. This area has high mammal diversity but relatively low numbers of endemics and Red Data species⁹. Most of the study area contains natural vegetation, and is currently managed as a hunting and conservation area with limited tourism facilities.

Eighty-eight mammal species have been recorded for the grid 2531 BD in the Fitzpatrick Institute of African Ornithology's Virtual Museum database¹⁰. This is a high total but true diversity will be somewhat higher as many mammals are either small, cryptic or nocturnal in habit and therefore difficult to photograph¹¹. The KNP is situated along the entire northern and eastern boundary, along the Crocodile River, and some mammals, such as Lion *Panthera leo*, may occasionally enter under or over the fence into the property.

5.2.2.2 Confirmed Species

Eighteen mammal species were recorded from within the study area during fieldwork (Appendix 2), excluding those seen within the adjacent KNP. Additional sampling, including small mammal trapping, bat sampling and camera traps, would result in additional species but are unlikely to have changed the findings of the report.

5.2.1.3 Conservation-Important Species

An estimated 30 conservation-important mammals potentially occur within the study area (Appendix 3). Several cave-roosting bat species of conservation concern such as the Short-eared Trident Bat (*Cloeotis percivali* – EN) could potentially occur overhead but these species are only likely to feed over the site because of the shortage of suitable roosting sites and have been excluded from this assessment.

⁹ Friedmann & Daly, 2004

¹⁰ http://vmus.adu.org.za/vm_sp_list.php accessed 14/09/2020

¹¹ All virtual museum submissions require the inclusion of at least one photograph of the organism

No SCC were recorded from within the study area¹², although some such as Spotted Hyaena *Crocuta crocuta* and Leopard *Panthera pardus* may infrequently enter from the adjacent KNP. These are unlikely to remain for long durations due to human disturbance as these would probably be discouraged due to undesirable predation on existing, valuable game species such as Southern Savanna Buffalo.

Of the 30 potentially occurring species, 19 are considered to be SCC¹³ with nine considered threatened (Appendix 3). None of these threatened species potentially occur as regular or resident species within the proposed development area due to a lack of suitable habitat present, regional scarcity or human disturbance. The remaining potentially occurring SCC are listed as NT, meaning they may become threatened in the near future. None were confirmed to occur, and only one has a moderate likelihood of occurring within the study area and is discussed below:

African Clawless Otter *Aonyx capensis*

This small, widespread carnivore in the Mustelidae family is assessed as NT due to wide scale habitat destruction and pollution of rivers¹⁴. This species has a moderate likelihood of occurring along the irrigation canal and small dams within the study area, although no evidence of its occurrence was found.

Serval *Leptailurus serval*

This medium-sized cat species is fairly common in suitable habitat in Mpumalanga (*pers. obs.*) and is probably resident within the general area although in low numbers due to persecution and disturbance. It is listed as NT due to habitat loss and fragmentation and demand for their coats¹⁵. It has a moderate likelihood of occurring within the grassier parts of the study area, and has possibly benefitted from the recent bush clearing which has resulted in more open habitat.

Twenty-six potentially occurring species are protected under either the NEMBA ToPS or MNCA (Appendix 3). Two confirmed species are protected under NEMBA ToPS, namely Plains (Burchell's) Zebra *Equus quagga burchellii* and Blue Wildebeest *Connochaetes taurinus*, and three are protected under the MNCA, namely South African Giraffe *Giraffa*

¹² African Elephant *Loxodonta africana* (VU) was recorded from the adjacent KNP during fieldwork

¹³ The same approach as Raimondo *et al.* (2009) has been followed here regarding species of conservation concern (i.e. those with a status of Declining, Near Threatened and Data Deficient) and threatened species (Vulnerable, Endangered and Critically Endangered)

¹⁴ Child *et al.*, 2016

¹⁵ Child *et al.*, 2016

camelopardalis giraffa, Common Waterbuck *Kobus ellipsiprymnus* and Southern Savanna Buffalo *Syncerus caffer*.

5.2.2 Birds

5.2.2.1 Regional Overview

The savanna biome, within which the study area is situated, supports the highest diversity of bird species within the Southern African sub-region¹⁶. The Komatipoort area is well sampled, with a total of 393 species having been recorded from 1930 lists submitted for the nine pentads (mapping units covering an area of approximately 77 km²) in the QDGS 2531 BD as per both Full Protocol and Ad Hoc protocols¹⁷ in the second Southern African Bird Atlas Project (SABAP2)¹⁸. This is the highest for any QDGS in Mpumalanga, and contains the pentad with the highest individual Full Protocol species list for anywhere in South Africa (248 species recorded over five days in 2019¹⁹). This highlights the very high avian diversity of the Komatipoort area. A map and summary of these nine pentads is provided in Figure 6 below.

The study area falls within the Kruger National Park and Adjacent Areas Important Bird & Biodiversity Area (IBA) and qualifies as a Global IBA under criteria A1, A2, A3 and A4i. Eleven globally threatened species are resident within the GKNP, in addition to fourteen resident regionally threatened birds. A number of migratory and vagrant threatened species also occur²⁰.

5.2.2.2 Local Avifaunal Assemblages

A high total of 162 bird species were confirmed to occur within or adjacent to the study area during August 2020 fieldwork (Appendix 2), which equates to 41% of the 2531 BD QDGS species list. Sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species, the primary objective of the ornithological component of this study, and to describe broad bird assemblages. Additional fieldwork in summer is likely to increase the species richness of the assemblage but is unlikely to identify additional assemblages. Three assemblages were present and are dealt with below.

¹⁶ Hocket *et al.*, 2006

¹⁷ Full Protocol lists reflect an observer effort of between two hours and five days of data collection while Ad Hoc lists reflect an effort of less than two hours

¹⁸ <http://sabap2.birdmap.africa/coverage/qdgc/2531bd> downloaded on 14/09/2020

¹⁹ http://sabap2.birdmap.africa/coverage/pentad/2520_3150

²⁰ Marnewick *et al.*, 2015

1. Woodland Assemblage

Woodland represents the dominant habitat within the study area and is characterised by deciduous *Acacia* and *Combretum* species which supports a wide diversity of bird species. Common and widespread species found include Black-headed Oriole *Oriolus larvatus*, Kurrichane Thrush *Turdus libonyanus*, Arrow-marked Babbler *Turdoides jardineii*, Chinspot Batis *Batis molitor*, Brown-crowned Tchagra *Tchagra australis*, Yellow-breasted Apalis *Apalis flavida*, Long-billed Crombec *Sylvietta rufescens*, Rattling Cisticola *Cisticola chiniana* and White-browed Scrub Robin *Cercotrichas leucophrys*. Seedeaters are fairly diverse and include Blue Waxbill *Uraeginthus angolensis*, all three local firefinch species, Golden-breasted Bunting *Emberiza flaviventris*, White-winged Widowbird *Euplectes albonotatus* and Yellow-fronted Canary *Crithagra mozambica*. Less common species include Retz's Helmetshrike *Prionops retzii*, Bearded Scrub Robin *Tychaedon quadrivirgata*, Purple Roller *Coracias naevius*, Double-banded Sandgrouse *Pterocles bicinctus* and Senegal Lapwing *Vanellus lugubris*. Woodland supports 89 species, or 55% of the entire list (Appendix 2), the highest of the three assemblages.

2. Forest Assemblage

Tall Riparian Forest occurs along the small streams and the old canal running through the study area. This habitat provides refuge for a number of bird species that favour taller and denser vegetation than the surrounding shorter, dry woodlands, such as Purple-crested Turaco *Tauraco porphyreolophus*, Yellow-rumped Tinkerbird *Pogoniulus bilineatus*, Trumpeter Hornbill *Bycanistes bucinator*, Tambourine Dove *Turtur tympanistria*, White-browed Robin-Chat *Cossypha heuglini*, Yellow-bellied Greenbul *Chlorocichla flaviventris*, Spectacled Weaver *Ploceus ocularis* and African Green Pigeon *Treron calvus*. Rarer species located include African Goshawk *Accipiter tachiro*, Eastern Nicator *Nicator gularis*, Purple-banded Sunbird *Cinnyris bifasciatus* and Pink-throated Twinspot *Hypargos margaritatus*. Thirty-nine species (24% of the total list) were recorded from this assemblage, the lowest of the three assemblages (Appendix 3).

3. Wetland Assemblage

Wetland habitat, including open water and vegetated edges, are present along the adjacent Crocodile River within the KNP, as well as in smaller pockets such as around the small dams that are scattered throughout the study area. Birds recorded that are associated with wetland vegetation include Thick-billed Weaver *Amblyospiza albifrons*, Red-faced Cisticola *Cisticola erythrops*, Black Crake *Amauornis flavirostra* and Common Waxbill *Estrilda astrild*. Birds associated with open water habitats include many storks and herons such as Yellow-billed

Stork *Mycteria ibis*, African Openbill *Anastomus lamelligerus*, Goliath Heron *Ardea goliath* and Little Egret *Egretta garzetta*, ducks such as Egyptian Goose *Alopochen aegyptiaca* and Knob-billed Duck *Sarkidiornis melanotos*, kingfishers such as Malachite Kingfisher *Corythornis cristata* and the predatory African Fish Eagle *Haliaeetus vocifer*. Rarer species located include Red-chested Flufftail *Sarothrura rufa*, White-crowned Lapwing *Vanellus albiceps* and African Yellow Warbler *Iduna natalensis*. Forty-eight species (30% of the total list) were recorded from this assemblage, the second highest of the three assemblages (Appendix 3).

5.2.2.3 Conservation-Important Species

An estimated 35 SCC potentially occur in the Komatipoort area (Appendix 3). Twenty-five of these are considered threatened, three of which were confirmed to occur within the boundaries of the study area during fieldwork. These three are described below.

Bateleur *Terathopius ecaudatus*

This mid-sized eagle is listed as EN in South Africa primarily due to habitat loss and is now mostly restricted to larger conservation areas, at least as a breeding species²¹. An estimated 550 – 650 breeding pairs are found within the GKNP²². Two young birds were observed flying over the study area and suitable nesting locations (tall trees such as *Acacia nigrescens*) are present, although no active nests were located during fieldwork.

White-backed Vulture *Gyps africanus*

This vulture is assessed as Critically Endangered (CR) due to a variety of anthropogenic impacts such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal trade²³. A large number of birds were observed flying over the study area from the adjacent KNP and suitable nesting locations (tall trees such as *Acacia nigrescens*) are present, although no active nests were located during fieldwork.

Hooded Vulture *Necrosyrtes monachus*

This vulture is assessed as CR due to similar anthropogenic impacts as the White-backed Vulture described above such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal trade²⁴. A

²¹ Taylor *et al.*, 2015

²² Barnes, 2000

²³ Taylor *et al.*, 2015

²⁴ Taylor *et al.*, 2015

pair was observed flying over the study area during fieldwork. It is resident within the adjacent KNP and potentially forages within the study area on a regular basis. Suitable breeding trees are present, although no active nests were located.

Yellow-billed Stork *Mycteria ibis* (EN) and Black Stork *Ciconia nigra* (VU) were observed foraging in the adjacent Crocodile River within the KNP. These are discussed in greater detail below.

Of the remaining 33 potentially occurring SCC, ten have a moderate or higher likelihood of occurring within the study area on a regular basis. These species are discussed below.

Tawny Eagle *Aquila rapax*

This large eagle is listed as EN due to continuing decline in the local population through habitat transformation, direct persecution, indirect poisoning and drowning in concrete reservoirs²⁵. It is largely restricted to conservation areas in South Africa and the GKNP area supports an estimated 500 – 700 pairs (Barnes, 1998). Birds could regularly forage within the study area and suitable tall breeding trees are present but no active nests were observed.

Southern Ground-Hornbill *Bucorvus leadbeateri*

This large, mostly terrestrial bird is listed as EN due to habitat loss, direct persecution, bush encroachment and collisions with windows²⁶. They are mostly restricted to large conservation areas in South Africa and their slow reproduction rate of one chick / 9.3 years per family group means they have a very slow recovery rate if bird mortalities occur²⁷. This species is resident in the adjacent KNP in low numbers and may occasionally forage within the study area, although no suitable breeding habitat (cavities in large trees) is present.

White-headed Vulture *Trigonoceps occipitalis* (CR), Lappet-faced Vulture *Torgos tracheliotos* (EN) and Cape Vulture *Gyps coprotheres* (EN)

These three vultures are all threatened due to similar anthropogenic impacts as the White-backed Vultures described above such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal

²⁵ Taylor *et al.*, 2015

²⁶ Taylor *et al.*, 2015

²⁷ Hockey *et al.*, 2005

trade²⁸. All are either resident or regular visitors to the adjacent KNP, and potentially forage within the study area when carcasses are present. Suitable breeding trees are present for all except the cliff-nesting Cape Vulture, although no active nests were located.

Martial Eagle *Polemaetus bellicosus*

Africa's largest eagle is listed as EN due to many factors including habitat loss, direct persecution from small-stock farmers and indirect persecution from electrocution and reservoir drownings²⁹. This species occupies very large territories (up to 150 km² in the Lowveld³⁰) and probably regularly forages over the study area. An estimated 250 birds occur within the GKNP (Hockey *et al.*, 2005), and suitable large trees are present in the study area. However, no active nests were located during fieldwork.

Saddle-billed Stork *Ephippiorhynchus senegalensis* (EN), Yellow-billed Stork *Mycteria ibis* (EN) and Black Stork *Ciconia nigra* (VU)

These three storks all show moderately high reporting rates within the QDGS 2531 BD, and two of them (Yellow-billed and Black Storks) were confirmed from the Crocodile River within the KNP during fieldwork. It is possible that they may forage at the small dams within the study area, but on an irregular basis. Breeding habitat is not present for Black Stork (cliffs) or Yellow-billed Stork (large trees along floodplain pans), but tall riparian breeding habitat is present for Saddle-billed Stork. However, no nests were located during fieldwork and they probably breed in trees within the KNP.

European Roller *Coracias garrulous*

This Palearctic migrant prefers open, grassy areas within savanna. It is listed as NT due to habitat loss over some of its breeding grounds, particularly in Europe³¹. Suitable foraging habitat is present over the northern portions of the study area, and may be present on an annual basis.

Marabou Stork *Leptoptilos crumeniferus*

The largest of all Africa's storks, the Marabou favours a wide diversity of habitats and will readily scavenge around humans. It is listed as NT due to the small regional population, increased threat of poisoning and collision with powerlines³². This species is likely to only

²⁸ Taylor *et al.*, 2015

²⁹ Taylor *et al.*, 2015

³⁰ Hockey *et al.*, 2005

³¹ Taylor *et al.*, 2015

³² Taylor *et al.*, 2015

regularly forage within the study area, particularly on larger ungulate carcasses or during locust outbreaks. This species does not regularly breed in the KNP but a few pairs breed in central Swaziland and far northern KwaZulu-Natal³³.

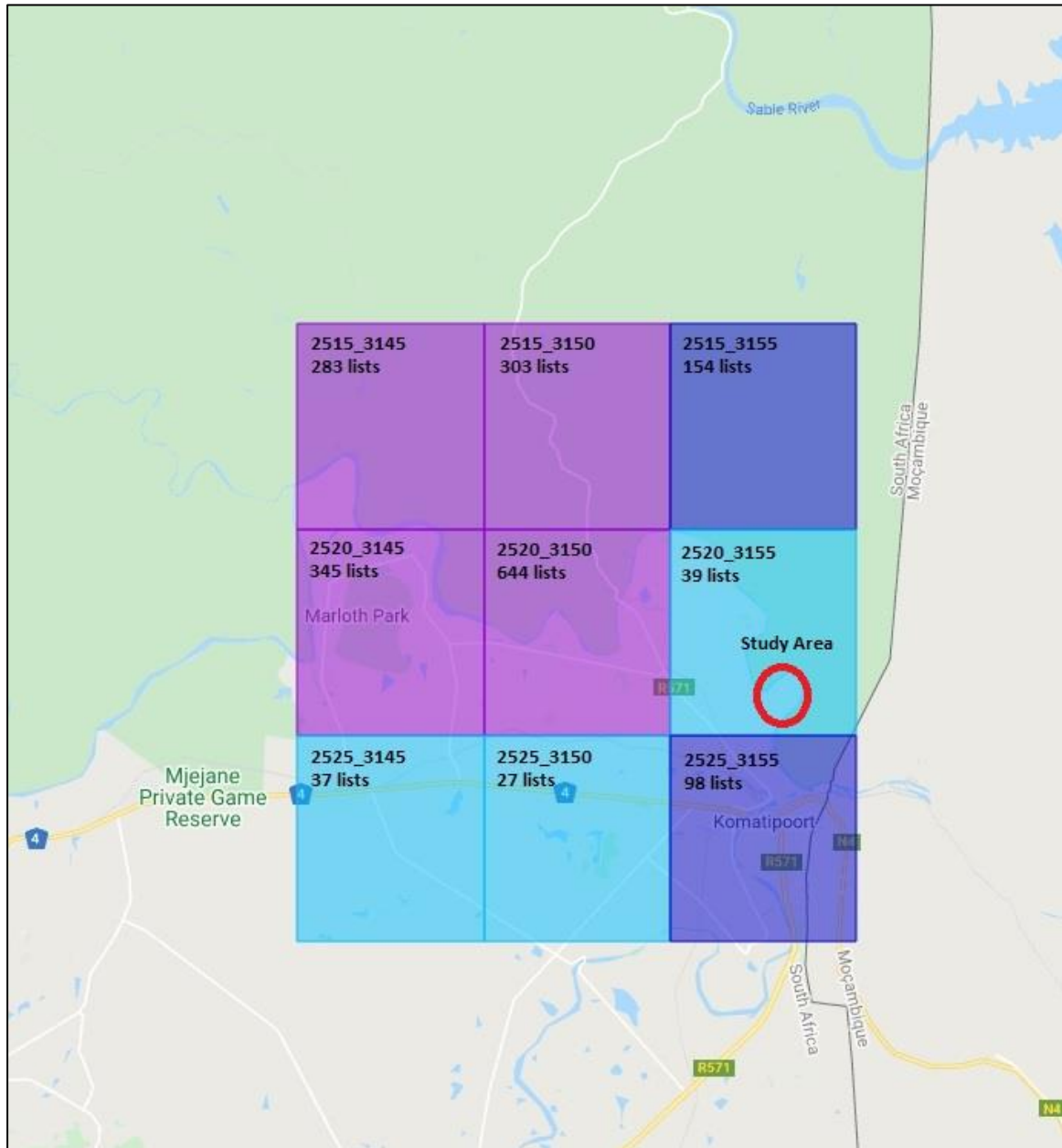


Figure 6. Pentads and lists summary for 2531 BD

³³ Taylor *et al.*, 2015

5.2.3 Reptiles

5.2.3.1 Regional Overview

The Lowveld of far eastern Mpumalanga supports a very high diversity of reptile species, with levels ranking in the top 10% of all areas in South Africa³⁴. The two reptile groups showing the highest diversity include the lizards (20-41 species recorded) and snakes (20-44 species recorded) (Bates *et al.*, 2014). However, reptile endemism is very low, which is to be expected in an area that lies in close proximity to Mozambique and is situated within the widespread savannah biome (Bates *et al.*, 2014). One hundred and twenty species have been recorded from the degree grid 2531³⁵ and, on a finer scale, 69 reptiles have been recorded from the QDGS 2531 BD³⁶.

5.2.3.2 Confirmed Species

Only four reptiles were recorded during fieldwork, namely Striped Skink *Trachylepis striata*, Rainbow Skink *T. margaritifer*, Common Dwarf Gecko *Lygodactylus capensis* and Nile Crocodile *Crocodylus niloticus* (Appendix 3). Dedicated reptile surveys in the wet season, including trapping, would no doubt have produced a number of additional species but are unlikely to have produced data that would change the recommendations in this report.

5.2.3.3 Conservation-Important Species

Of the potentially occurring species, one has been nationally assessed as VU, namely Nile Crocodile *Crocodylus niloticus*, which is also protected under NEMBA ToPS (Appendix 5). A single small animal was observed walking towards one of the small dams in the southern portion of the study area, and they probably regularly move between them and the adjacent Crocodile River. One species has been assessed as provincially threatened in the MTPA threatened species database³⁷, namely Wilhelm's Flat Lizard *Platysaurus intermedius wilhelmi* (VU). This species has a moderate likelihood of occurring within the scattered outcrops within the study area (Appendix 3). The Southern African Python *Python natalensis* is protected under the National Environmental Management: Biodiversity Act (No.10 of 2004) and is likely to be resident within the study area as suitable habitat is present.

³⁴ Bates *et al.*, 2014

³⁵ http://vmus.adu.org.za/vm_sp_list.php accessed 14/09/2020

³⁶ http://vmus.adu.org.za/vm_sp_list.php accessed 14/09/2020

³⁷ MTPA Biobase, 2002

5.2.4 Frogs

5.2.4.1 Regional Overview

The Lowveld of far eastern Mpumalanga supports a relatively high diversity of frog species, with levels exceeding 20 species per QDGS³⁸. Frog endemism, however, is very low with no potentially occurring endemic species present in the Komatipoort area (Minter *et al.*, 2004) due to the proximity to Mozambique. Forty-seven species have been recorded from the degree grid 2531³⁹ and, on a finer scale, 33 reptiles have been recorded from the QDGS 2531 BD⁴⁰, within which the study area is situated.

5.2.4.2 Confirmed Species

Only one frog was recorded during fieldwork, namely Snoring Puddle Frog *Phrynobatrachus natalensis*, primarily due to the timing of the survey. This is a common and widespread species⁴¹. Dedicated frog searches, including nocturnal surveys at the onset of the rains, would have produced additional species but are unlikely to have produced data that would change the recommendations in this report.

5.2.4.3 Conservation-Important Species

One species of frog has a Red Data or protected status, namely Whistling Rain Frog *Breviceps sopranus*, which is classified as Data Deficient (DD) due to a lack of information regarding this little-known forest species. This frog has a low likelihood of occurrence due to the small size and disturbed nature of the Riparian Forest vegetation type present within the study area.

³⁸ Minter *et al.*, 2004

³⁹ http://vmus.adu.org.za/vm_sp_list.php accessed 15/09/2020

⁴⁰ http://vmus.adu.org.za/vm_sp_list.php accessed 15/09/2020

⁴¹ Minter *et al.*, 2004

5.3 Ecological Sensitivity

5.3.1 Environmental Screening Tool

The EST of the DEA indicates that the study area has a **Very High** Terrestrial Biodiversity theme (Figure 7) due to following:

- Mammalia – *Loxodonta africana* – this species has a low likelihood of occurring within the study area due to the presence of an electrified fence between it and the KNP.
- Mammalia – *Lycaon pictus* – this species has a low likelihood of occurring within the study area due to the presence of an electrified fence between it and the KNP.
- Mammalia – *Acinonyx jubatus* – this species has a low likelihood of occurring within the study area due to the presence of an electrified fence between it and the KNP.
- Mammalia – Sensitive Species No. 17 – this species has a low likelihood of occurrence due to regional rarity and preference for sandier soils.
- Flora – *Pavetta zeyheri* subsp. *microlancea* – this species has a low likelihood of occurring within the study area due to adequate fieldwork coverage.
- Flora – Listed Sensitive Species No. 3 – this species has a moderate likelihood of occurring within the study area due to the presence of suitable habitat. A small, deciduous species that flowers in summer and may therefore have been overlooked.
- Critical Biodiversity Area (CBA) 1 (Irreplaceable) – two small areas within the study area are classified as CBA due to potential occurrence of Listed Sensitive Species No. 3 and Core and Supporting Corridors.
- Ecological Support Area (ESA) – the entire study area is situated within an ESA.
- Focus Areas for land-based protected areas expansion.

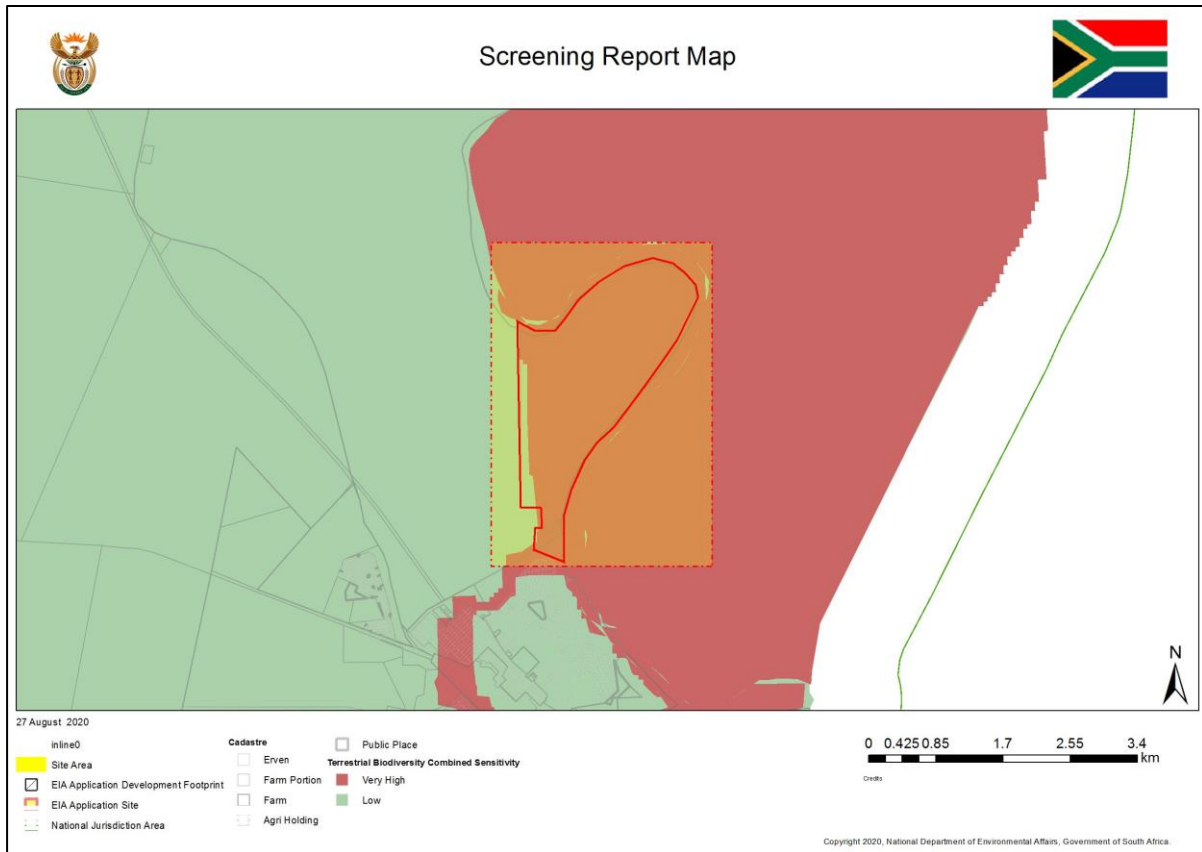


Figure 7. Environmental Screening Tool assessment of Terrestrial Biodiversity Features in the Study Area

5.3.2 Mpumalanga Biodiversity Sector Plan

The Mpumalanga Biodiversity Sector Plan (MBSP) classifies a number of map categories within the study area (Figure 8):

Two small areas, one in the far north and one in the far south, are classified as **Critical Biodiversity Area (CBA): Irreplaceable** (see preceding Section). These are areas that are the most important in Mpumalanga for meeting biodiversity targets outside of formally protected areas and for conserving critical biodiversity ecosystems. CBA areas should be maintained in a natural state with no further loss of natural habitat. The desired management objective in these areas is conservation management which includes, for example, low-intensity livestock or game farming⁴². Any development should be carried out under the provisions of the National Environmental Management Act (NEMA, Act 107 of 1998). The drivers for the CBA assessments within the study area are as follows:

- Potential occurrence of Listed Sensitive Species No. 3;
- Core Corridor;
- Linking Corridor.

Two small areas in the southern portion of the study area are classified as being situated within **Other Natural Areas** by the MBSP. These are areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character, while performing a range of biodiversity and ecological functions. While not considered priority areas for biodiversity conservation at present, they are still an important part of the natural ecosystem. Other Natural Areas offer much more flexibility in terms of permissible land uses, but the desired management objective should be to minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning⁴³.

The entire study area is also situated within the **Ecological Support Areas (ESA): Protected Area Buffers** unit. ESA's are "areas that are not essential for meeting (conservation) targets, but play an important role in supporting the functioning of CBA's and that deliver important ecosystem services" (Lötter *et al.*, 2014). Protected Area Buffers are areas that surround proclaimed protected areas that moderate the negative impacts of land-uses that may affect the ecological functioning of those protected areas⁴⁴. The

⁴² Lötter *et al.*, 2014

⁴³ Lötter *et al.*, 2014

⁴⁴ Lötter *et al.*, 2014

recommended land-use guidelines for these areas are to maintain in a functional, near-natural state but allowing for some habitat loss. The KNP is situated adjacent to the northern and eastern boundaries of the study area.

Most of the study area is also situated within an **ESA: Local Corridor**. These are areas that connect natural areas and protected areas to facilitate the functioning of CBA's. The recommended land-use guidelines for these areas are to maintain in a functional, near-natural state but allowing for some habitat loss⁴⁵.

Smaller areas within the proposed development are classified as **Heavily** or **Moderately Modified**. These areas show the greatest flexibility in terms of management objectives and permissible land-uses⁴⁶.

⁴⁵ Lötter *et al.*, 2014

⁴⁶ Lötter *et al.*, 2014

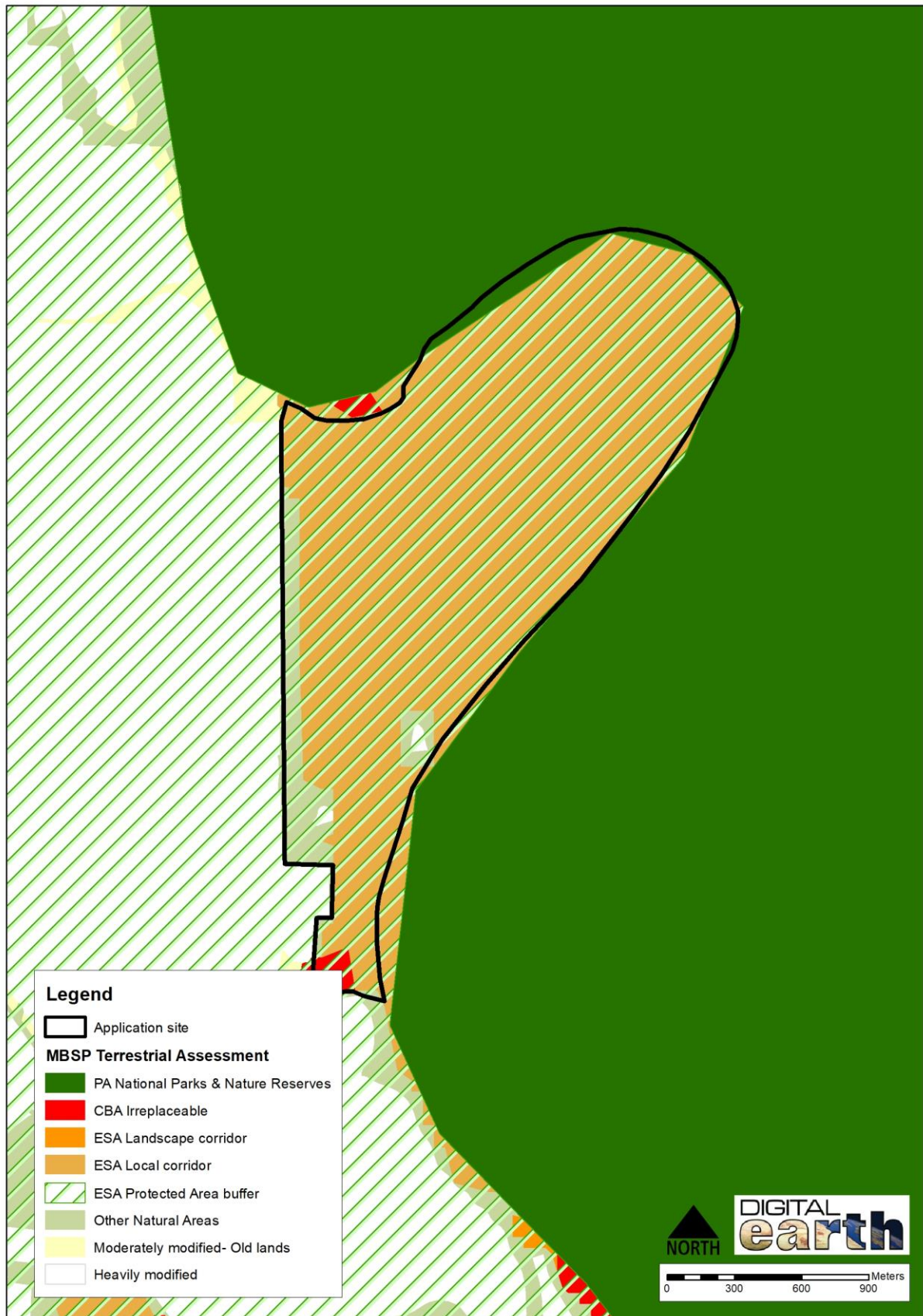


Figure 8. MBSP CBA Map of the Study Area

5.3.3 Site-specific Ecological Importance Analysis

A SEI analysis of the four vegetation communities represented in the study area was undertaken using the methodology described in Section 4.3. Table 10 presents the calculation of the SEI for each community, which is displayed in Figure 9 below.

The Outcrop Woodland vegetation community supports confirmed populations of NT and protected plant species, and potentially supports EN and VU plants and a provincially VU reptile. The Conservation Importance (CI) is therefore assessed as High which, when combined with a High Functional Integrity (FI) results in a Biodiversity Importance (BI) of **High**. Receptor Resilience (RR) is assessed as **Low** as outcrops are sensitive to change and slow to recover. When integrated with the High BI the SEI of the vegetation community is assessed as **High**.

The Plains Woodland community contains confirmed populations of VU and NT and protected plants, and potentially supports additional threatened plants, birds and mammals. However, the density of the confirmed threatened plants is very low. The CI is therefore assessed as High. FI is Medium due to dense bush encroachment in places. The integration of CI and FI results in a BI of **Medium**. RR is also assessed as **Medium** which, when combined with the Medium BI results in a SEI of **Medium**.

The Degraded Woodland community has Low CI as only a few protected plants were confirmed and disturbance levels are high. This leads to a FI assessment of Low and a BI of **Low**. RR is **Medium** due to the higher resilience of woodland habitats. The integration of Low BI and Medium RR results in a SEI of **Low**.

The Riparian Forest / Wetland Mosaic has a Very High CI due to national protection status, confirmed populations of VU reptile and protected plants and potential occurrence of a number of threatened and NT birds and mammals. FI is only Medium due to the presence of a number of alien invasive plants. This leads to a BI of **High**. RR is Low as wetlands are sensitive to disturbances. When the High BI is combined with a Low RR the resulting SEI is **High**.

Table 10. Ecological Sensitivity of Vegetation Communities in the Study Area

Assessment Criteria	Outcrop Woodland	Plains Woodland	Degraded Woodland	Riparian Forest / Wetland mosaic
Conservation Importance	High	High	Low	Very High
Functional Integrity	High	Medium	Low	Medium
Biodiversity Importance	High	Medium	Low	High
Receptor Resilience	Low	Medium	Medium	Low
SITE ECOLOGICAL IMPORTANCE	High	Medium	Low	High

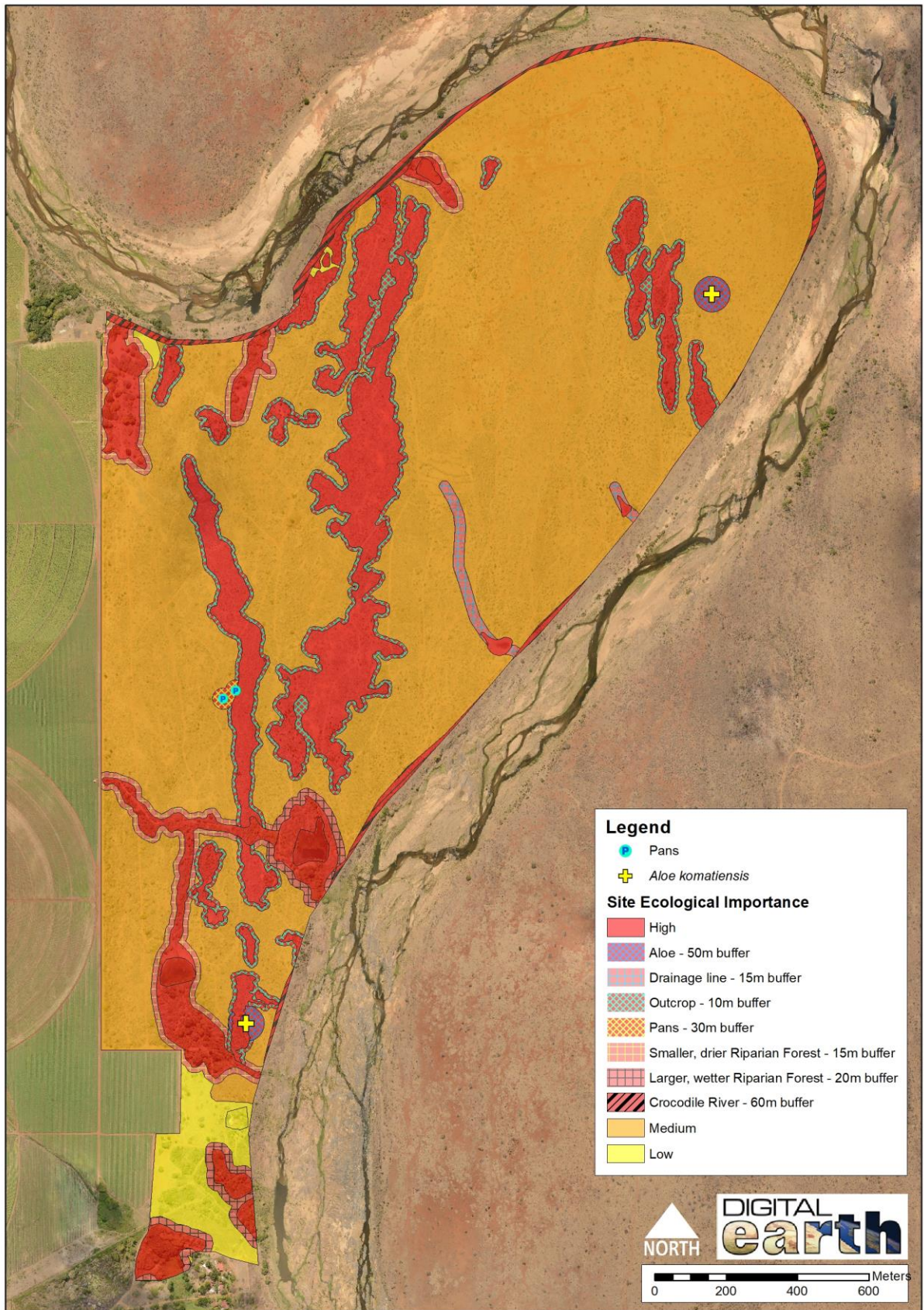


Figure 9. Site Ecological Importance of the vegetation communities within the study area

6. KEY CURRENT AND POTENTIAL IMPACTS

The following are key impacts on the ecology of the area associated with the proposed developments on Tenbosch 661 JU:

- **Losses of portions of CBA, ESA: Protected Areas Buffer, ESA: Local Corridor, vegetation communities with High Site Ecological Importance and Very High Terrestrial Biodiversity Theme** – The proposed development contains areas that have been classified as being important to biodiversity in Mpumalanga, including CBA and ESA's. The area also has a Very High Terrestrial Biodiversity Theme in the DEA's EST. The Outcrop Woodland and Riparian Forest / Wetland Mosaic vegetation communities are also assessed as having a High SEI;
- **Loss of plant species of conservation importance** – three confirmed plant SCC could be impacted by the proposed development, namely the succulent *Aloe komatiensis* which is assessed by SANBI as VU and the trees *Elaeodendron transvaalense* and *Dalbergia melanoxylon* which are assessed as NT. Additionally, six species found are protected under the NFA, namely the trees *Sclerocarya birrea*, *Boscia albitrunca*, *Combretum imberbe*, *Azelia quanzensis*, *Philenoptera violacea* and *Elaeodendron transvaalense*, and nine confirmed species are protected under the MNCA, namely the succulents *Aloe chabaudii*, *A. marlothii*, *A. spicata*, *A. komatiensis*, *Eulophia petersii*, *Stapelia gigantea* and *Pachypodium saundersii* and the trees *Spirostachys africana* and *Berchemia zeyheri*. Three additional plant SCC potentially occur, namely *Barleria oxyphylla* (EN), Listed Sensitive Species No. 3 (VU) and *Drimia sanguinea* (NT);
- **Invasion of natural habitat by alien plants** – 28 alien plants, 18 of which are declared invaders under NEMBA, were recorded during fieldwork and potential invasion into natural areas is possible through the introduction of additional seeds which may establish in adjacent natural areas;
- **Impoverishment of populations of important fauna taxa** – one VU species of reptile was confirmed during fieldwork, namely Nile Crocodile and two CR birds (Hooded and White-backed Vultures) and one EN bird (Bateleur) were also confirmed overhead. Two mammals listed as NT potentially occur within the study area (Serval and African Clawless Otter), while the provincially VU Wilhelm's Flat

Lizard also potentially occurs. One bird listed as CR potentially occurs (White-headed Vulture), seven birds listed as EN potentially occur (Lappet-faced and Cape Vultures, Tawny and Martial Eagles, Saddle-billed and Yellow-billed Storks and Southern Ground Hornbill), one bird listed as VU potentially occurs (Black Stork) and two birds listed as NT potentially occur (Marabou Stork and European Roller);

- **Increased harvesting of plant and animal resources** – Clearing for development will allow increased access to all areas of the proposed footprint, including clearing and land preparation teams prior to construction, as well as builders and associated services. This influx of people into the study area could result in an increase in illegal harvesting of plant and animal resources, such as poaching for bushmeat and removing plants for the traditional muthi trade.
- **Degradation of riparian habitat** – construction activities could result in degradation of sensitive riparian habitat if not carefully managed, e.g. dumping of soil, building rubble, etc.; long-term changes in surface and subsurface runoff could negatively affect riparian structure and function, particularly with respect to channel erosion caused by increased stormwater runoff;
- **Disturbance of fauna along the Crocodile River within the KNP** – the water in the adjacent Crocodile River within the KNP attracts large numbers of birds and mammals to it. Excessive noise or movement along this border area may cause disturbance to sensitive species such as storks, raptors and predators.

7. CONCLUSION AND RECOMMENDATIONS

Approximately 330 ha of the farm Tenbosch 661 JU was surveyed as part of a proposed tourism and residential development. The property is situated within the lower Crocodile River Valley, immediately upstream from the town of Komatipoort. Most of the area to the west of the study area has been cultivated, while the northern and eastern portions lie adjacent to the KNP. The study area is situated within an area classified as having a Very High Biodiversity theme by the DEA's EST, is assessed as containing two small areas of CBA: Irreplaceable, while all or most of the study area is assessed as being within ESA: Local Corridor and ESA: Protected Areas Buffer and Other Natural Areas by the MBSP. The ESA's and Other Natural Areas show much more flexibility in terms of permissible land uses, but the desired management objective should be to minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning.

Four vegetation communities were identified within the study area, namely Outcrop Woodland (High SEI), Plains Woodland (Medium SEI), Degraded Woodland (Low SEI) and Riparian Forest / Wetland Mosaic (High SEI). Disturbance levels within the study area are low to moderate, with two small tourist camps, at least five small dams and irrigation canal, a farm homestead and also includes moderate to high level of alien plant infestation, especially in the riparian area in the far southern portion of the study area. The indigenous shrub *Dichrostachys cinerea* has invaded large areas. Three *Aloe komatiensis* plants were located during fieldwork. This species is listed as VU by SANBI. The trees *Elaeodendron transvaalense* and *Dalbergia melanoxylon*, both assessed as NT, were also found in low numbers. Three threatened birds were seen flying overhead (White-backed and Hooded Vultures – CR, and Bateleur – EN), and two threatened storks were observed along the adjacent Crocodile River (Yellow-billed – EN, and Black, VU). African Elephant (VU) was observed along the adjacent KNP. A number of additional threatened plant and animal species potentially occur, especially within the Outcrop Woodland vegetation community, and on the small dams. Fifteen confirmed plants are protected under either the NFA or MNCA, and 13 fauna species are protected under the NEMBA Tops or MNCA.

The following preliminary recommendations and mitigation measures for the proposed development are applicable:

- No development to take place over the larger exposed rocks within the Outcrop Woodland vegetation community, which has High SEI. A 10 m wide ecological buffer should be established around the outcrops, and this must be incorporated into conservation “open space” land, or can form part of an erf as long as no development takes place on the outcrop. The one exception is the current footprint containing the two tourist huts where development can take place on that exact footprint. This area has been slightly degraded historically.
- In compliance with the recommendations of the wetland specialist, no development is to take place within 60m of the Crocodile River to buffer against edge effects of the adjacent habitat that is going to be developed.
- Similarly, no development to take place within the Riparian Forest / Wetland Mosaic vegetation community, where a 30 m conservation no development zone should be implemented in the three larger, wetter portions to buffer against edge effects of the adjacent habitat that is going to be developed.
- Similarly, no development to take place within ephemeral drainage lines and drier portions of the Riparian Forest / Wetland, where a 15 m conservation no development zone should be implemented to buffer against edge effects of the adjacent habitat that is going to be developed.
- A 50 m conservation buffer should be implemented around the two small colonies of *Aloe komatiensis*, and this area should be incorporated into conservation “open space” land.
- A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.
- A follow-up survey in late summer (February to April) should be performed to search for the VU-listed Sensitive Plant Species No. 3 and the EN-listed *Barleria oxyphylla*, both of which potentially occur within the study area and flower in that period. If a population is confirmed, then a monitoring program needs to be implemented to check the health of these populations each year.
- Each stand, lodge, road or other proposed development areas should be checked by an experienced botanist prior to clearing and all SCC or protected plants should be marked with hazard tape to indicate where development may not take place. These plants must remain *in situ*.

- No alien plants should be allowed to be planted within any of the stands, lodge site or any other development sites. A nursery could be constructed on site where naturally occurring plants can be propagated from seed and sold to prospective residents. Special attention could be placed on propagating some of the many aloes or other succulents on site, especially for conservation purposes, such as for *Aloe komatiensis* (VU).
- A management plan should be compiled to effectively manage and control populations of game so as to avoid overgrazing, as is evident in a number of similar developments in the Lowveld.
- All arterial roads and buildings / houses / lodges should not be placed adjacent to the KNP fence to minimise noise and visual disturbance. A visual / noise buffer of 10 to 20m should be implemented on the fenceline.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- The measures currently in progress to curb bush-encroachment from the indigenous shrub *Dichrostachys cinerea* should continue to operate.
- Weeds will inevitably establish around the developments and it is important that weed control, if involving herbicides, be managed correctly so as to reduce the impact on the adjacent natural vegetation. Regular inspections should be made to determine if any additional alien plants have established.
- Poaching is a potential threat. External labour teams used during clearing and building should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

Provided the above recommendations suggested in this report are followed, and the developer complies with all relevant legislation pertaining to the development activities (such as the NEMBA), there is no objection to the proposed developments in terms of the terrestrial ecosystems of the study area. However, if the development was to proceed without the implementation of the recommendations given above then we would object to the development application.

8. REFERENCES

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9. APPENDICES

Appendix 1. Checklist of Flora recorded during fieldwork

Taxa	Growth Form	Red Data	Protected	MPU Endemic	NEMBA Alien Invasive Species Category	Vegetation Communities			
						Outcrop Woodland	Disturbed Woodland	Degraded Woodland	Riparian Forest / Wetland Mosaic
Family Acanthaceae Acanthaceae sp. <i>Barleria elegans</i> S.Moore ex C.B.Clarke <i>Dyschoriste rogersii</i> S.Moore <i>Hypoestes forskalii</i> (Vahl) R.Br. <i>Justicia flava</i> (Vahl) Vahl <i>Justicia protracta</i> (Nees) T.Anderson subsp. <i>protracta</i> <i>Ruellia patula</i> Jacq.	herb herb dwarf shrub herb herb herb herb					r	r	r	r
Family Agavaceae * <i>Agave sisalana</i> Perrine	succulent				2		r		
Family Amaranthaceae * <i>Achyranthes aspera</i> L. var. <i>aspera</i> * <i>Alternanthera pungens</i> Kunth * <i>Gomphrena celosioides</i> Mart. <i>Kyphocarpa angustifolia</i> (Moq.) Lopr.	herb herb herb herb					r	r	r	r
Family Anacardiaceae <i>Lannea schweinfurthii</i> (Engl.) Engl. var. <i>stuhlmannii</i> (Engl.) Kokwaro <i>Ozoroa engleri</i> R.Fern. & A.Fern.	tree tree					u	r		

<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA			u	r	u	r
<i>Searsia gueinzii</i> (Sond.) F.A.Barkley	tree					r	r	r	r
<i>Searsia pentheri</i> (Zahlbr.) Moffett	tree						r		
Family Apocynaceae									
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	shrub				1b	r			r
* <i>Catharanthus roseus</i> (L.) G.Don	herb					r			
<i>Cynanchum viminale</i> (L.) L.	succulent					r			
<i>Pachypodium saundersii</i> N.E.Br.	succulent		MNCA			r			
<i>Rauvolfia caffra</i> Sond.	tree								u
<i>Stapelia gigantea</i> N.E.Br.	succulent		MNCA			r	r		
<i>Tabernaemontana elegans</i> Stapf	tree								r
Family Araceae									
* <i>Colocasia esculenta</i> (L.) Schott	herb								r
<i>Stylochaeton natalensis</i> Schott	herb					r	r		
Family Araliaceae									
* <i>Schefflera actinophylla</i> (Endl.) Harms	tree				1b				u
Family Arecaceae									
<i>Phoenix reclinata</i> Jacq.	shrub								r
Family Asparagaceae									
<i>Asparagus densiflorus</i> (Kunth) Jessop	shrub						r		
<i>Asparagus falcatus</i> L.	climber					r	u		
Family Asphodelaceae									
<i>Aloe chabaudii</i> Schönland	succulent		MNCA			r			
<i>Aloe komatiensis</i> Reynolds	succulent	VU	MNCA				r		
<i>Aloe marlothii</i> A.Berger subsp. <i>marlothii</i>	succulent		MNCA			r	u		
<i>Aloe spicata</i> L.f.	succulent		MNCA			u			
Family Asteraceae									
* <i>Ageratum conyzoides</i> L.	herb				1b				f
<i>Baccharoides adoensis</i> (Sch.Bip. ex Walp.) H.Rob. var. <i>kotschyana</i> (Sch.Bip. ex Walp.) Isawumi, El-Ghazaly & B.Nord.	shrub							u	
* <i>Bidens pilosa</i> L.	herb						r	r	
* <i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	shrub				1b				f
<i>Dicoma tomentosa</i> Cass.	herb						u		
<i>Emilia transvaalensis</i> (Bolus) C.Jeffrey	herb					u			
<i>Gymnanthemum coloratum</i> (Willd.) H.Rob. & B.Kahn	dwarf shrub							f	r
<i>Laggera crispata</i> (Vahl) Hepper & J.R.I.Wood	herb							r	

<i>Litogyne gariepina</i> (DC.) Anderb.	herb								r
<i>Polydora steetziana</i> (Oliv. & Hiern) H.Rob.	herb						r	u	
* <i>Parthenium hysterophorus</i> L.	herb				1b			u	
* <i>Tridax procumbens</i> (L.) L.	herb					r	r	u	
Family Bignoniaceae									
* <i>Spathodea campanulata</i> P.Beauv.	tree				3				r
Family Boraginaceae									
<i>Ehretia amoena</i> Klotzsch	tree					r			
<i>Heliotropium ciliatum</i> Kaplan	herb						r	r	
Family Burseraceae									
<i>Commiphora africana</i> (A.Rich.) Endl.	tree							f	
<i>Commiphora neglecta</i> l.Verd.	tree					r			
<i>Commiphora pyracanthoides</i> Engl.	tree					r			
Family Cactaceae									
* <i>Cylindropuntia imbricata</i> (Haw.) F.M.Knuth	succulent				1b			r	
* <i>Opuntia stricta</i> (Haw.) Haw.	succulent				1b	r	r	r	
Family Capparaceae									
<i>Boscia albitrunca</i> (Burch.) Gilg & Benedict	tree			NFA		r	r		
<i>Capparis tomentosa</i> Lam.	climber								r
<i>Maerua parvifolia</i> Pax	shrub						u		
Family Celastraceae									
<i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	tree	NT	NFA			r			
<i>Gymnosporia glaucophylla</i> Jordaan	tree						u	r	
<i>Gymnosporia maranguensis</i> (Loes.) Loes.	shrub						f		
<i>Gymnosporia senegalensis</i> (Lam.) Loes.	shrub					r	r	r	u
<i>Gymnosporia</i> species C	shrub					r			
Family Clusiaceae									
<i>Garcinia livingstonei</i> T.Anderson	tree								r
Family Combretaceae									
<i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i>	tree					u	u	r	
<i>Combretum hereroense</i> Schinz	tree					u	f		
<i>Combretum imberbe</i> Wawra	tree			NFA			u	r	f
<i>Combretum microphyllum</i> Klotzsch	climber								u
<i>Combretum mossambicense</i> (Klotzsch) Engl.	climber						r		r
<i>Terminalia phanerophlebia</i> Engl. & Diels	tree					r			
Family Commelinaceae									

<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B.Clarke	herb							r	
Family Convolvulaceae									
Convolvulaceae sp.	climber							r	
<i>Cuscuta</i> sp.	climber							u	u
<i>Evolvulus alsinoides</i> (L.) L.	herb						r		
* <i>Ipomoea alba</i> L.	climber				1b				f
<i>Ipomoea cairica</i> (L.) Sweet	climber							u	
<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	climber						r		
Family Crassulaceae									
<i>Kalanchoe paniculata</i> Harv.	succulent						r		
Family Cucurbitaceae									
<i>Cucumis zeyheri</i> Sond.	climber							r	
<i>Cucumis metuliferus</i> E.Mey. ex Naudin	climber						r	r	
Family Cyperaceae									
<i>Bulbostylis hispidula</i> (Vahl) R.W.Haines subsp. <i>pyriformis</i> (Lye) R.W.Haines	sedge						r		
<i>Cyperus dives</i> Delile	sedge								r
<i>Cyperus sexangularis</i> Nees	sedge								u
<i>Schoenoplectus</i> sp.	sedge								u
Family Dracaenaceae									
<i>Sansevieria hyacinthoides</i> (L.) Druce	succulent						u	r	
Family Ebenaceae									
<i>Diospyros mespiliformis</i> Hochst. ex A.DC.	tree						r	u	r
<i>Euclea divinorum</i> Hiern	tree							u	
<i>Euclea natalensis</i> A.DC. subsp. <i>angustifolia</i> F.White	tree						r	r	r
<i>Euclea daphnoides</i> Hiern	shrub						r	r	
Family Euphorbiaceae									
<i>Acalypha indica</i> L. var. <i>indica</i>	herb								r
<i>Euphorbia confinalis</i> R.A.Dyer	tree						d		
<i>Euphorbia cooperi</i> N.E.Br. ex A.Berger	tree						f		
* <i>Euphorbia heterophylla</i> L.	herb								r
<i>Euphorbia ingens</i> E.Mey. ex Boiss.	tree						r	r	
<i>Euphorbia neopolycnemoides</i> Pax & K.Hoffm.	herb						r		
<i>Euphorbia tirucalli</i> L.	tree						r		
* <i>Ricinus communis</i> L. var. <i>communis</i>	dwarf shrub				2				r
<i>Spirostachys africana</i> Sond.	tree			MNCA				r	r
Family Fabaceae									

<i>Abrus laevigatus</i> E.Mey.	climber								r
<i>Acacia exuvialis</i> I.Verd.	shrub							u	
<i>Acacia gerrardii</i> Benth. subsp. <i>gerrardii</i> var. <i>gerrardii</i>	tree							r	
<i>Acacia nigrescens</i> Oliv.	tree					f		d	u
<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>kraussiana</i> (Benth.) Brenan	tree							u	
<i>Acacia robusta</i> Burch. subsp. <i>clavigera</i> (E.Mey.) Brenan	tree							r	u
<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>heteracantha</i> (Burch.) Brenan	tree							r	
<i>Acacia xanthophloea</i> Benth.	tree								d
<i>Azelia quanzensis</i> Welw.	tree		NFA						r
<i>Albizia forbesii</i> Benth.	tree					r			r
<i>Albizia harveyi</i> E.Fourn.	tree							r	
<i>Cassia abbreviata</i> Oliv.	tree							r	
<i>Cordyla africana</i> Lour.	tree								r
<i>Dalbergia melanoxylon</i> Guill. & Perr.	tree	NT‡						r	
<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt	tree					f		d	d
<i>Indigofera tristoides</i> N.E.Br.	dwarf shrub					r			
<i>Indigofera vicioides</i> Jaub. & Spach	herb					r			
<i>Peltophorum africanum</i> Sond.	tree					f		r	
<i>Philenoptera violacea</i> (Klotzsch) Schrire	tree		NFA					r	u
<i>Pterocarpus rotundifolius</i> (Sond.) Druce subsp. <i>rotundifolius</i>	tree					r			
<i>Rhynchosia minima</i> (L.) DC. var. <i>prostrata</i> (Harv.) Meikle	climber					r			
<i>Schotia brachypetala</i> Sond.	tree					r		r	u
* <i>Senna bicapsularis</i> (L.) Roxb.	shrub				1b				r
<i>Tephrosia rhodesica</i> Baker f. var. <i>rhodesica</i>	dwarf shrub					r			
Family Hyacinthaceae									
<i>Drimia delagoensis</i> (Baker) Jessop	bulb					r			
<i>Drimia intricata</i> (Baker) J.C.Manning & Goldblatt	bulb					r			
Family Lamiaceae									
<i>Hoslundia opposita</i> Vahl	herb					r			
<i>Leonotis nepetifolia</i> (L.) R.Br.	herb							r	
<i>Leucas sexdentata</i> Skan	herb							r	
<i>Plectranthus cylindraceus</i> Hochst. ex Benth.	succulent					r			
<i>Syncolostemon canescens</i> (Gürke) D.F.Otieno	herb					u			
Family Loranthaceae									
<i>Erianthemum ngamicum</i> (Sprague) Danser	epiphyte							r	
Family Malvaceae									

<i>Abutilon austro-africanum</i> Hochr.	dwarf shrub						r		
<i>Abutilon indicum</i> (L.) Sweet	dwarf shrub						r		
<i>Corchorus confusus</i> Wild	herb						r		
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	tree					r			
<i>Gossypium herbaceum</i> L.	dwarf shrub					r	r		
<i>Grewia bicolor</i> Juss. var. <i>bicolor</i>	shrub					u	f		
<i>Grewia flava</i> DC.	shrub						r		
<i>Grewia flavescens</i> Juss.	shrub					f	f	u	
<i>Grewia hexamita</i> Burret	tree					u			
<i>Grewia villosa</i> Willd. var. <i>villosa</i>	shrub					r	r		
<i>Hermannia glanduligera</i> K.Schum. ex Schinz	herb							r	
<i>Hibiscus micranthus</i> L.f. var. <i>micranthus</i>	dwarf shrub							r	
<i>Hibiscus engleri</i> K.Schum.	herb					r			
<i>Melhania acuminata</i> Mast.	herb						r		
<i>Melhania forbesii</i> Planch. ex Mast.	dwarf shrub						r		
<i>Pavonia burchellii</i> (DC.) R.A.Dyer	dwarf shrub					r	r		
<i>Sida dregei</i> Burt Davy	dwarf shrub							u	
<i>Sterculia rogersii</i> N.E. Br.	tree					d			
<i>Waltheria indica</i> L.	herb					r	u	f	
Family Meliaceae									
* <i>Melia azedarach</i> L.	tree				1b				r
<i>Trichilia emetica</i> Vahl subsp. <i>emetica</i>	tree								u
Family Menispermaceae									
<i>Cissampelos mucronata</i> A.Rich.	climber							u	r
<i>Cocculus hirsutus</i> (L.) Diels	climber					r		f	u
Family Moraceae									
<i>Ficus abutilifolia</i> (Miq.) Miq.	tree					u			
<i>Ficus petersii</i> Warb.	tree					r			
<i>Ficus sycomorus</i> L. subsp. <i>sycomorus</i>	tree								f
<i>Maclura africana</i> (Bureau) Corner	tree					r			d
* <i>Morus alba</i> L. var. <i>alba</i>	tree				3				r
Family Musaceae									
* <i>Musa</i> sp.	herb								r
Family Myrtaceae									
* <i>Psidium guajava</i> L.	shrub				2/3				r
<i>Syzygium guineense</i> (Willd.) DC.	tree								u

Family Nymphaeaceae <i>Nymphaea nouchali</i> Burm.f. var. <i>caerulea</i> (Savigny) Verdc.	herb								r
Family Ochnaceae <i>Ochna inermis</i> (Forssk.) Schweinf. ex Penz.	shrub					r			
Family Olacaceae <i>Ximenia americana</i> var. <i>microphylla</i> Welw. <i>Ximenia caffra</i> Sond. var. <i>caffra</i>	shrub tree					r	r		
Family Oleaceae <i>Jasminum fluminense</i> Vell. subsp. <i>fluminense</i> <i>Jasminum multipartitum</i> Hochst.	climber dwarf shrub					u			u
Family Onagraceae <i>Ludwigia adscendens</i> subsp. <i>diffusa</i> (Forssk.) P.H.Raven <i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	herb shrub								r r
Family Orchidaceae <i>Eulophia petersii</i> (Rchb.f.) Rchb.f.	succulent		MNCA			r			
Family Papaveraceae * <i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	herb				1b			r	
Family Passifloraceae * <i>Passiflora subpeltata</i> Ortega	climber				1b				u
Family Pedaliaceae <i>Ceratotheca triloba</i> (Bernh.) Hook.f.	herb					r			
Family Phyllanthaceae <i>Bridelia cathartica</i> Bertol. <i>Bridelia micrantha</i> (Hochst.) Baill. <i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i> <i>Phyllanthus maderaspatensis</i> L. <i>Phyllanthus reticulatus</i> Poir. var. <i>reticulatus</i>	tree tree shrub dwarf shrub shrub					r r r r	r		u f u u
Family Phytolaccaceae * <i>Rivina humilis</i> L.	herb								r
Family Plumbaginaceae <i>Plumbago zeylanica</i> L.	herb					r			
Family Poaceae <i>Aristida adscensionis</i> L. <i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter <i>Brachiaria serrata</i> (Thunb.) Stapf <i>Cynodon dactylon</i> (L.) Pers.	grass grass grass grass					r	f	f	r d

<i>Digitaria eriantha</i> Steud.	grass								
<i>Enneapogon cenchroides</i> (Licht. ex Roem. & Schult.) C.E. Hubb	grass					r	u		
<i>Eragrostis rigidior</i> Pilg.	grass					r	f		
<i>Eragrostis superba</i> Peyr.	grass						u	d	
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	grass					u	d	f	
<i>Hyparrhenia tamba</i> (Steud.) Stapf	grass							r	
<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton	grass							r	
<i>Ischaemum polystachyum</i> J.Presl	grass								r
<i>Leersia hexandra</i> Sw.	grass								u
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	grass					u	r	u	
<i>Microchloa caffra</i> Nees	grass					u			
<i>Panicum maximum</i> Jacq.	grass					r	d	f	u
<i>Phragmites mauritianus</i> Kunth	reed								u
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	grass					r	r		
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sphacelata</i>	grass							r	
<i>Sporobolus pyramidalis</i> P.Beauv.	grass							u	
<i>Tragus berteronianus</i> Schult.	grass							u	
<i>Urochloa mosambicensis</i> (Hack.) Dandy	grass						r		
Family Rhamnaceae									
<i>Berchemia zeyheri</i> (Sond.) Grubov	tree			MNCA					r
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	tree					u	u	u	
<i>Ziziphus rivularis</i> Codd	tree					r			r
Family Rubiaceae									
<i>Coddia rudis</i> (E.Mey. ex Harv.) Verdc.	shrub					r			
<i>Gardenia volkensii</i> K.Schum. subsp. <i>volkensii</i> var. <i>volkensii</i>	tree					r			
<i>Kraussia floribunda</i> Harv.	shrub								u
* <i>Richardia brasiliensis</i> Gomes	herb							u	
Family Rutaceae									
<i>Clausena anisata</i> (Willd.) Hook.f. ex Benth. var. <i>anisata</i>	shrub								r
<i>Ptaeroxylon obliquum</i> (Thunb.) Radlk.	tree					r			
Family Sapindaceae									
<i>Cardiospermum halicacabum</i> L.	climber								r
<i>Pappea capensis</i> Eckl. & Zeyh.	tree					u			
Family Sapotaceae									
<i>Manilkara mochisia</i> (Baker) Dubard	tree					r			
Family Selaginellaceae									

<i>Selaginella dregei</i> (C. Presl) Hieron.	fern						f			
Family Sinopteridaceae										
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	fern						u	r		
Family Solanaceae										
<i>Solanum campylacanthum</i> A. Rich. subsp. <i>panduriforme</i>	dwarf shrub							r	f	
Family Strychnaceae										
<i>Strychnos madagascariensis</i> Poir.	tree						f	f	u	
<i>Strychnos spinosa</i> Lam. subsp. <i>spinosa</i>	tree						r			
Family Thelypteridaceae										
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	fern									f
Family Typhaceae										
<i>Typha capensis</i> (Rohrb.) N.E.Br.	rush									u
Family Velloziaceae										
<i>Xerophyta retinervis</i> Baker	dwarf shrub						f			
Family Verbenaceae										
* <i>Lantana camara</i> L.	dwarf shrub				1b					r
<i>Lippia javanica</i> (Burm.f.) Spreng.	dwarf shrub								u	
Family Viscaceae										
<i>Viscum</i> sp.	herb							r		
Family Vitaceae										
<i>Cissus cactiformis</i> Gilg	succulent						f	r		
<i>Cissus cornifolia</i> (Baker) Planch.	climber							r		
<i>Cissus rotundifolia</i> Vahl	succulent						f	u		
<i>Rhoicissus revouillii</i> Planch.	climber						r			
<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	climber						r			
Family Zygophyllaceae										
<i>Tribulus terrestris</i> L.	herb								u	
TOTAL		230	3	15	0	18	105	94	57	74

NFA - National Forests Act
 MNCA - Mpumalanga Nature Conservation Act
 NEMBA - National Environmental Management Biodiversity Act
 VU - Vulnerable
 NT - Near Threatened
 ‡ - IUCN assessment

d - dominant
 f - frequent
 u - uncommon
 r - rare

* - exotic species

Appendix 2. Checklist of Fauna recorded during fieldwork

Common Name	Scientific Name	Red Data	Protected	Woodland	Forest	Wetland
Mammals						
ORDER: PRIMATES						
Family Cercopithecidae (Old World monkeys)						
Chacma Baboon	<i>Papio ursinus</i>			x		
Vervet Monkey	<i>Chlorocebus pygerythrus</i>			x	x	
ORDER: LAGOMORPHA						
Family Leporidae (rabbits and hares)						
African Savanna Hare	<i>Lepus victoriae</i>			x		
ORDER: RODENTIA						
Family Hystricidae (Old World porcupines)						
Cape Porcupine	<i>Hystrix africaeaustralis</i>			x		
Family Muridae (rats & mice)						
Single-striped Mouse	<i>Lemniscomys rosalia</i>			x		
ORDER: CARNIVORA						
Family Canidae (dogs, jackals & allies)						
Black-backed Jackal	<i>Canis mesomelas</i>			x		
Family Herpestidae (mongooses)						
Slender Mongoose	<i>Herpestes sanguineus</i>			x		
White-tailed Mongoose	<i>Ichneumia albicauda</i>			x		
Family Viverridae (genets & civets)						
Genet sp.	<i>Genetta sp.</i>			x		
ORDER: PROBOSCIDEA						
Family Elephantidae (elephants)						
African Elephant *	<i>Loxodonta africana</i>	VU‡	NEMBA (PR)	x		
ORDER: PERRISODACTYLA						
Family Equidae (horses)						
Plains (Burchell's) Zebra	<i>Equus quagga burchellii</i>		NEMBA (PR)	x		
ORDER: CETARTIODACTYLA						
Family Suidae (pigs)						

Common Warthog	<i>Phacochoerus africanus</i>			x		
Family Giraffidae (giraffes)						
South African Giraffe	<i>Giraffa camelopardalis giraffa</i>		MNCA	x		
Family Bovidae (antelope, cattle)						
Impala	<i>Aepyceros melampus melampus</i>			x		
Common Waterbuck	<i>Kobus ellipsiprymnus</i>		MNCA	x		x
Southern Savanna Buffalo	<i>Syncerus caffer caffer</i>		MNCA	x		
Blue Wildebeest	<i>Connochaetes taurinus</i>		NEMBA (PR)	x		
Greater Kudu	<i>Tragelaphus strepsiceros</i>			x		
Southern Bushbuck	<i>Tragelaphus sylvaticus</i>			x		
Subtotal	18	8	10	18	1	1
Birds						
ORDER: ANSERIFORMES						
Family Anatidae (ducks, geese and swans)						
White-faced Whistling Duck	<i>Dendrocygna viduata</i>					x
Knob-billed Duck	<i>Sarkidiornis melanotos</i>					x
Egyptian Goose	<i>Alopochen aegyptiaca</i>					x
ORDER: GALLIFORMES						
Family Numididae (guineafowl)						
Helmeted Guineafowl	<i>Numida meleagris</i>			x		
Family Phasianidae (pheasants, fowl and allies)						
Crested Francolin	<i>Dendroperdix sephaena</i>			x		
Natal Spurfowl	<i>Pternistis natalensis</i>			x		
ORDER: CICONIIFORMES						
Family Ciconiidae (storks)						
Yellow-billed Stork *	<i>Mycteria ibis</i>	EN				x
African Openbill	<i>Anastomus lamelligerus</i>					x
Black Stork *	<i>Ciconia nigra</i>	VU				x
Woolly-necked Stork	<i>Ciconia episcopus</i>					x
ORDER: PELECANIFORMES						
Family Threskiornithidae (ibises and spoonbills)						
African Sacred Ibis	<i>Threskiornis aethiopicus</i>					x
Hadedda Ibis	<i>Bostrychia hagedash</i>					x
African Spoonbill	<i>Platalea alba</i>					x
Family Ardeidae (herons and bitterns)						
Striated Heron	<i>Butorides striata</i>					x

Western Cattle Egret	<i>Bubulcus ibis</i>						x
Grey Heron	<i>Ardea cinerea</i>						x
Goliath Heron	<i>Ardea goliath</i>						x
Purple Heron	<i>Ardea purpurea</i>						x
Great Egret	<i>Ardea alba</i>						x
Little Egret	<i>Egretta garzetta</i>						x
Family Scopidae (Hamerkop)							
Hamerkop	<i>Scopus umbretta</i>						x
ORDER: SULIFORMES							
Family Phalacrocoracidae (cormorants and shags)							
Reed Cormorant	<i>Microcarbo africanus</i>						x
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>						x
Family Anhingidae (anhingas and darters)							
African Darter	<i>Anhinga rufa</i>						x
ORDER: ACCIPITRIFORMES							
Family Accipitridae (kites, hawks and eagles)							
African Harrier-Hawk	<i>Polyboroides typus</i>					x	
White-backed Vulture	<i>Gyps africanus</i>	CR	NEMBA (EN)		x		
Hooded Vulture	<i>Necrosyrtes monachus</i>	CR	NEMBA (EN)		x		
Bateleur	<i>Terathopius ecaudatus</i>	EN	NEMBA (EN)		x		
African Goshawk	<i>Accipiter tachiro</i>					x	
African Fish Eagle	<i>Haliaeetus vocifer</i>						x
ORDER: GRUIFORMES							
Family Sarothruridae (flufftails)							
Red-chested Flufftail	<i>Sarothrura rufa</i>						x
Family Rallidae (rails, crakes and coots)							
Black Crake	<i>Amaurornis flavirostra</i>						x
ORDER: CHARADRIIFORMES							
Family Burhinidae (thick-knees)							
Water Thick-knee	<i>Burhinus vermiculatus</i>						x
Family Recurvirostridae (stilts and avocets)							
Black-winged Stilt	<i>Himantopus himantopus</i>						x
Family Charadriidae (plovers)							
Blacksmith Lapwing	<i>Vanellus armatus</i>						x
White-crowned Lapwing	<i>Vanellus albiceps</i>						x
Senegal Lapwing	<i>Vanellus lugubris</i>				x		

Crowned Lapwing	<i>Vanellus coronatus</i>			x		
African Wattled Lapwing	<i>Vanellus senegallus</i>					x
Three-banded Plover	<i>Charadrius tricollaris</i>					x
Family Jacanidae (jacanas)						
African Jacana	<i>Actophilornis africanus</i>					x
Family Scolopacidae (sandpipers and snipes)						
Common Greenshank	<i>Tringa nebularia</i>					x
Wood Sandpiper	<i>Tringa glareola</i>					x
Common Sandpiper	<i>Actitis hypoleucos</i>					x
ORDER: PTEROCLIFORMES						
Family Pteroclididae (sandgrouse)						
Double-banded Sandgrouse	<i>Pterocles bicinctus</i>			x		
ORDER: COLUMBIFORMES						
Family Columbidae (pigeons and doves)						
Red-eyed Dove	<i>Streptopelia semitorquata</i>				x	
Cape Turtle Dove	<i>Streptopelia capicola</i>			x		
Laughing Dove	<i>Spilopelia senegalensis</i>			x		
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>			x		
Tambourine Dove	<i>Turtur tympanistris</i>				x	
African Green Pigeon	<i>Treron calvus</i>			x	x	
ORDER: MUSOPHAGIFORMES						
Family Musophagidae (turacos)						
Purple-crested Turaco	<i>Tauraco porphyreolophus</i>				x	
Grey Go-away-bird	<i>Corythaixoides concolor</i>			x		
ORDER: CUCULIFORMES						
Family Cuculidae (cuckoos)						
Burchell's Coucal	<i>Centropus burchelli</i>					x
ORDER: STRIGIFORMES						
Family Strigidae (owls)						
Pearl-spotted Owllet	<i>Glaucidium perlatum</i>			x		
ORDER: CAPRIMULGIFORMES						
Family Caprimulgidae (nightjars)						
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>			x		
Freckled Nightjar	<i>Caprimulgus tristigma</i>			x		
Square-tailed Nightjar	<i>Caprimulgus fossii</i>			x		
ORDER: APODIFORMES						

Family Apodidae (swifts) African Palm Swift Little Swift	<i>Cypsiurus parvus</i> <i>Apus affinis</i>			over over	over over	over over
ORDER: COLIIFORMES Family Coliidae (mousebirds) Speckled Mousebird Red-faced Mousebird	<i>Colius striatus</i> <i>Urocolius indicus</i>			x	x	
ORDER: CORACIIFORMES Family Coraciidae (rollers) Purple Roller Lilac-breasted Roller	<i>Coracias naevius</i> <i>Coracias caudatus</i>			x x		
Family Alcedinidae (kingfishers) Brown-hooded Kingfisher Malachite Kingfisher Giant Kingfisher Pied Kingfisher	<i>Halcyon albiventris</i> <i>Corythornis cristata</i> <i>Megaceryle maxima</i> <i>Ceryle rudis</i>			x		x x x
Family Meropidae (bee-eaters) Little Bee-eater White-fronted Bee-eater	<i>Merops pusillus</i> <i>Merops bullockoides</i>			x x		
ORDER: BUCEROTIFORMES Family Upupidae (hoopoes) African Hoopoe Family Phoeniculidae (wood-hoopoes) Green Wood-hoopoe Common Scimitarbill Family Bucerotidae (hornbills) Crowned Hornbill Southern Red-billed Hornbill Southern Yellow-billed Hornbill Trumpeter Hornbill	<i>Upupa africana</i> <i>Phoeniculus purpureus</i> <i>Rhinopomastus cyanomelas</i> <i>Tockus alboterminatus</i> <i>Tockus rufirostris</i> <i>Tockus leucomelas</i> <i>Bycanistes bucinator</i>			x x x		x x
ORDER: PICIFORMES Family Lybiidae (African barbets) Yellow-rumped Tinkerbird Black-collared Barbet Crested Barbet Family Indicatoridae (honeyguides)	<i>Pogoniulus bilineatus</i> <i>Lybius torquatus</i> <i>Trachyphonus vaillantii</i>			x x x		x x

Lesser Honeyguide	<i>Indicator minor</i>					x	
Greater Honeyguide	<i>Indicator indicator</i>					x	
Family Picidae (woodpeckers)							
Golden-tailed Woodpecker	<i>Campethera abingoni</i>					x	
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>					x	
Bearded Woodpecker	<i>Dendropicos namaquus</i>					x	
ORDER: PSITTACIFORMES							
Family Psittacidae (parrots)							
Brown-headed Parrot	<i>Poicephalus cryptoxanthus</i>					x	
ORDER: PASSERIFORMES							
Family Platysteiridae (wattle-eyes and batises)							
Chinspot Batis	<i>Batis molitor</i>					x	
Family Prionopidae (helmetshrikes)							
White-crested Helmetshrike	<i>Prionops plumatus</i>					x	
Retz's Helmetshrike	<i>Prionops retzii</i>					x	
Family Malaconotidae (bushshrikes)							
Grey-headed Bushshrike	<i>Malaconotus blanchoti</i>					x	
Orange-breasted Bushshrike	<i>Chlorophoneus sulfureopectus</i>					x	
Brown-crowned Tchagra	<i>Tchagra australis</i>					x	
Black-crowned Tchagra	<i>Tchagra senegalus</i>					x	
Black-backed Puffback	<i>Dryoscopus cubla</i>					x	x
Southern Boubou	<i>Laniarius ferrugineus</i>						x
Brubru	<i>Nilaus afer</i>					x	
Family Laniidae (shrikes)							
Magpie Shrike	<i>Urolestes melanoleucus</i>					x	
Family Oriolidae (figbirds and orioles)							
Black-headed Oriole	<i>Oriolus larvatus</i>					x	
Family Dicruridae (drongos)							
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>					x	
Family Monarchidae (monarchs)							
African Paradise Flycatcher	<i>Terpsiphone viridis</i>						x
Family Corvidae (crows and jays)							
Pied Crow	<i>Corvus albus</i>					x	
Family Paridae (tits and chickadees)							
Southern Black Tit	<i>Melaniparus niger</i>					x	
Family Nicatoridae (nicators)							

Eastern Nicator	<i>Nicator gularis</i>					x		
Family Pycnonotidae (bulbuls)								
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>		x			x		
Sombre Greenbul	<i>Andropadus importunus</i>					x		
Yellow-bellied Greenbul	<i>Chlorocichla flaviventris</i>					x		
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>					x		
Family Hirundinidae (swallows and martins)								
Wire-tailed Swallow	<i>Hirundo smithii</i>		over			over		over
Lesser Striped Swallow	<i>Cecropis abyssinica</i>		over			over		over
Family Macrosphenidae (crombecs and African warblers)								
Long-billed Crombec	<i>Sylvietta rufescens</i>		x					
Family Acrocephalidae (reed warblers and allies)								
African Yellow Warbler	<i>Iduna natalensis</i>							x
Family Cisticolidae (cisticolas and allies)								
Red-faced Cisticola	<i>Cisticola erythrops</i>							x
Rattling Cisticola	<i>Cisticola chiniana</i>		x					
Tawny-flanked Prinia	<i>Prinia subflava</i>		x					x
Yellow-breasted Apalis	<i>Apalis flava</i>		x					
Green-backed Camaroptera	<i>Camaroptera brachyura</i>						x	
Family Leiothrichidae (laughingthrushes)								
Arrow-marked Babbler	<i>Turdoides jardineii</i>		x					
Family Zosteropidae (white-eyes)								
Cape White-eye	<i>Zosterops virens</i>						x	
Family Sturnidae (starlings)								
Cape Starling	<i>Lamprotornis nitens</i>		x					
Burchell's Starling	<i>Lamprotornis australis</i>		x					
Family Buphagidae (oxpeckers)								
Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>		x					
Family Turdidae (thrushes)								
Kurrichane Thrush	<i>Turdus libonyanus</i>		x					
Family Muscicapidae (chats and Old World flycatchers)								
Bearded Scrub Robin	<i>Tychaedon quadrivirgata</i>						x	
White-browed Scrub Robin	<i>Cercotrichas leucophrys</i>		x					
Grey Tit-Flycatcher	<i>Myioparus plumbeus</i>						x	
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>		x					
Ashy Flycatcher	<i>Muscicapa caerulescens</i>						x	

African Dusky Flycatcher	<i>Muscicapa adusta</i>				X	
White-throated Robin-Chat	<i>Cossypha humeralis</i>				X	
White-browed Robin-Chat	<i>Cossypha heuglini</i>				X	
Red-capped Robin-Chat	<i>Cossypha natalensis</i>				X	
Family Nectariniidae (sunbirds)						
Collared Sunbird	<i>Hedydipna collaris</i>				X	
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>		X			
Purple-banded Sunbird	<i>Cinnyris bifasciatus</i>				X	
White-bellied Sunbird	<i>Cinnyris talatala</i>		X			
Family Passeridae (Old World sparrows)						
Southern Grey-headed Sparrow	<i>Passer diffusus</i>		X			
Family Ploceidae (weavers and widowbirds)						
Thick-billed Weaver	<i>Amblyospiza albifrons</i>					X
Spectacled Weaver	<i>Ploceus ocularis</i>				X	
Lesser Masked Weaver	<i>Ploceus intermedius</i>		X			
Southern Masked Weaver	<i>Ploceus velatus</i>		X			
Village Weaver	<i>Ploceus cucullatus</i>		X			
Red-headed Weaver	<i>Anaplectes rubriceps</i>		X			
Red-billed Quelea	<i>Quelea quelea</i>		X			
Southern Red Bishop	<i>Euplectes orix</i>		X			
White-winged Widowbird	<i>Euplectes albonotatus</i>		X			
Family Estrildidae (waxbills, munias and allies)						
Green-winged Pytilia	<i>Pytilia melba</i>		X			
Cut-throat Finch	<i>Amadina fasciata</i>		X			
Pink-throated Twinspot	<i>Hypargos margaritatus</i>			X		
Red-billed Firefinch	<i>Lagonosticta senegala</i>		X			
African Firefinch	<i>Lagonosticta rubricata</i>			X		
Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>		X			
Blue Waxbill	<i>Uraeginthus angolensis</i>		X			
Common Waxbill	<i>Estrilda astrild</i>		X			X
Bronze Mannikin	<i>Lonchura cucullata</i>		X			
Family Viduidae (indigobirds and whydahs)						
Village Indigobird	<i>Vidua chalybeata</i>		X			
Pin-tailed Whydah	<i>Vidua macroura</i>		X			
Family Motacillidae (wagtails and pipits)						
African Pied Wagtail	<i>Motacilla aguimp</i>					X

Yellow-throated Longclaw	<i>Macronyx croceus</i>			x		
African Pipit	<i>Anthus cinnamomeus</i>			x		
Family Fringillidae (finches and canaries)						
Yellow-fronted Canary	<i>Crithagra mozambica</i>			x		
Brimstone Canary	<i>Crithagra sulphurata</i>			x		
Family Emberizidae (buntings and New World sparrows)						
Golden-breasted Bunting	<i>Emberiza flaviventris</i>			x		
Subtotal	162	5	3	89	39	48
Reptiles						
ORDER: CROCODYLIA						
Family Crocodylidae (true crocodiles)						
Nile Crocodile	<i>Crocodylus niloticus</i>	VU	NEMBA (PR)			x
ORDER: SQUAMATA						
Family Gekkonidae (geckos)						
Common Dwarf Gecko	<i>Lygodactylus capensis</i>			x		
Family Scincidae (skinks)						
Rainbow Skink	<i>Trachylepis margaritifer</i>			x		
Striped Skink	<i>Trachylepis striata</i>			x		
Subtotal	1	7	4	93	40	47
Frogs						
ORDER: ANURA						
Family Phrynobatrachidae (puddle frogs)						
Snoring Puddle Frog	<i>Phrynobatrachus natalensis</i>					x
Subtotal	1	8	5	92	41	49
TOTAL	182	13	13	107	40	49

PR - Protected
 VU - Vulnerable
 EN - Endangered
 CR - Critically Endangered
 NEMBA - National Environmental Management: Biodiversity Act
 MNCA - Mpumalanga Nature Conservation Act
 * - recorded from the adjacent KNP
 ‡ - IUCN assessment

Appendix 3. Potentially occurring fauna of conservation concern

Common Name	Scientific Name	Red Data	Protected	Habitat	SABAP2 Reporting Rate for 2531 BD	Likelihood	Reason
Mammals							
Cheetah	<i>Acinonyx jubatus</i>	VU	NEMBA (VU)	Savanna, semi desert		Low	Suitable habitat present but area is fenced off from KNP. May very occasionally wander through the study area
African Clawless Otter	<i>Aonyx capensis</i>	NT	MNCA	Rivers and streams		Moderate	Some suitable habitat present
White Rhinoceros	<i>Ceratotherium simum</i>	NT	NEMBA (PR)	Savanna, semi desert		Very Low	Suitable habitat present but area is fenced off from KNP
Blue Wildebeest	<i>Connochaetes taurinus</i>		NEMBA (PR)	Savanna, grassland		Confirmed	Suitable habitat present, potentially occurs as an introduced species
Swamp Musk Shrew	<i>Crocidura mariquensis</i>	NT		Wetlands in savanna		Low	Very limited suitable habitat present
Spotted Hyaena	<i>Crocuta crocuta</i>	NT	NEMBA (PR)	Wide variety of habitats		Low	Suitable habitat present but area is fenced off from KNP. May very occasionally wander through the study area
Tsessebe	<i>Damaliscus lunatus lunatus</i>	VU	NEMBA (PR)	Open savanna and grassland		Low	Very limited suitable habitat present, area is fenced off from KNP
African Marsh Rat	<i>Dasymys incomtus</i>	NT		Wetlands		Low	Very limited suitable habitat present
Black Rhinoceros	<i>Diceros bicornis minor</i>	EN	NEMBA (VU)	Thickets, dense woodland		Very Low	Suitable habitat present but area is fenced off from KNP
Burchell's Zebra	<i>Equus quagga burchelli</i>		NEMBA (PR)	Savanna, grassland		Confirmed	

Southern Lesser Galago	<i>Galago moholi</i>		MNCA	Savanna		High	Suitable habitat present
Giraffe	<i>Giraffa camelopardalis</i>		MNCA	Savanna		Confirmed	
Hippopotamus	<i>Hippopotamus amphibius</i>	VU‡	MNCA	Wetlands		Low	Suitable habitat present but area is fenced off from KNP
Sable	<i>Hippotragus niger</i>	VU	NEMBA (VU)			Very Low	No recent records from adjacent KNP, prefers broad-leaved woodlands further north and west of the study area
Serval	<i>Leptailurus serval</i>	NT	NEMBA (PR)	Grassland, wetlands		Moderate	Some suitable habitat present
African Elephant	<i>Loxodonta africana</i>	VU‡	NEMBA (PR)	Wide variety of habitats		Low	Suitable habitat present but area is fenced off from KNP
African Wild Dog	<i>Lycaon pictus</i>	EN	NEMBA (EN)	Wide variety of habitats		Low	Suitable habitat present but area is fenced off from KNP
Honey Badger	<i>Mellivora capensis</i>		MNCA	Wide variety of habitats		High	Suitable habitat present
Aardvark	<i>Orycteropus afer</i>		NEMBA (PR)	Wide variety of habitats		Low	Rare in the Lowveld, may occasionally pass through the study area
Thick-tailed Greater Galago	<i>Otolemur crassicaudatus</i>		MNCA	Moist woodland and forest		High	Suitable habitat present
Lion	<i>Panthera leo</i>	VU‡	NEMBA (VU)	Wide variety of habitats		Low	Could occasionally enter the study area through the fence but would not remain for long
Leopard	<i>Panthera pardus</i>	VU	NEMBA (VU)	Wide variety of habitats		Low	Could occasionally enter the study area through the fence but would not remain for long
African Weasel	<i>Poecilogale albinucha</i>	DD		Wide variety of habitats		Very Low	Very rare in E Mpumalanga
Aardwolf	<i>Proteles cristatus</i>		MNCA	Wide variety of habitats		Low	Rare in the Lowveld, may occasionally pass through
Steenbok	<i>Raphicerus campestris</i>		MNCA	Wide variety of habitats		High	Suitable habitat present
Southern Reedbuck	<i>Redunca arundinum</i>		MNCA	Grasslands, wetlands		Low	Very limited suitable habitat present

Giant Yellow House Bat	<i>Scotophilus nigrita</i>	NT		Savanna		Low	Poorly known, only recorded from three localities in South Africa, all three from bat boxes
Sensitive Species No. 17		VU	NEMBA (VU)	Wide variety of habitats		Low	Suitable habitat present but rare in the area. May very infrequently pass through
African Buffalo	<i>Syncerus caffer</i>		MNCA	Wide variety of habitats		Confirmed	
<i>Subtotal</i>	28	18	25				
Birds							
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	NT		Streams with overhanging vegetation	0,3%	Very Low	Some suitable habitat present but very rare in the Lowveld
Steppe Eagle	<i>Aquila nipalensis</i>	EN‡		Savanna	0,8%	Very Low	Suitable habitat present but very rare in the area
Tawny Eagle	<i>Aquila rapax</i>	EN	NEMBA (EN)	Savanna	27,3%	Moderate	Suitable foraging and breeding habitat present but no nests located
Kori Bustard	<i>Ardeotis kori</i>	NT	NEMBA (PR)	Open savanna	6,4%	Low	No suitable habitat present
Southern Ground-Hornbill	<i>Bucorvus leadbeateri</i>	EN	NEMBA (EN)	Savanna	13,0%	Moderate	Suitable foraging and breeding habitat present but no nests located
Curlew Sandpiper	<i>Calidris ferruginea</i>	NT‡		Mudflats, tidal wetlands	0,1%	Very Low	Rare in the Lowveld, limited suitable habitat present
Abdim's Stork	<i>Ciconia abdimii</i>	NT		Wide variety of habitats	0,1%	Very Low	Occasional influxes possible but very rare in the area
Black Stork	<i>Ciconia nigra</i>	VU		Forages in wetlands and breeds on cliffs	6,7%	Low	Confirmed from the adjacent Crocodile River. May very occasionally forage in the small dams within the study area. No nesting habitat (cliffs) present
Pallid Harrier	<i>Circus macrourus</i>	NT		Open grassland and semi-desert	0,2%	Very Low	No suitable habitat present

African Marsh Harrier	<i>Circus ranivorus</i>	EN		Moist grassland and wetland	0,2%	Very Low	No suitable habitat present, may rarely forage over reedbeds within the adjacent Crocodile River
European Roller	<i>Coracias garrulus</i>	NT		Savanna	15,3%	Moderate	Some suitable habitat present
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	EN		Large rivers, dams and pans	31,1%	Moderate	Foraging habitat present in the adjacent Crocodile River. May occasionally forage in the small dams within the study area
Lanner Falcon	<i>Falco biarmicus</i>	VU		Wide variety of habitats but nests on cliffs	0,3%	Very Low	Very rare in the area, no suitable nesting sites (cliffs) present
White-backed Night-Heron	<i>Gorsachius leuconotus</i>	VU		Streams with overhanging vegetation	0,9%	Very Low	Foraging habitat present in the adjacent Crocodile River. May very occasionally forage in the small dams within the study area but very rare in the district
White-backed Vulture	<i>Gyps africanus</i>	CR	NEMBA (EN)	Savanna	58,5%	Confirmed	
Cape Vulture	<i>Gyps coprotheres</i>	EN	NEMBA (EN)	Wide variety of habitats	2,9%	Moderate	May very occasionally forage within study area but rare in the area
Marabou Stork	<i>Leptoptilos crumeniferus</i>	NT		Wide variety of habitats	10,7%	Moderate	Suitable foraging habitat present
Bat Hawk	<i>Macheiramphus alcinus</i>	EN		Tall woodland along rivers	0,1%	Very Low	Limited suitable habitat present, only one record in the area
Lesser Jacana	<i>Microparra capensis</i>	VU		Floating vegetation on tropical wetlands	0,2%	Very Low	Limited suitable habitat present, very rare in the area

Yellow-billed Stork	<i>Mycteria ibis</i>	EN		Wide variety of wetlands	25,4%	Moderate	Confirmed from the adjacent Crocodile River. May very occasionally forage in the small dams within the study area.
Hooded Vulture	<i>Necrosyrtes monachus</i>	CR	NEMBA (EN)	Wide variety of wetlands	19,2%	Confirmed	
African Pygmy Goose	<i>Nettapus auritus</i>	VU		Tropical wetlands with floating vegetation	0,6%	Very Low	Limited suitable habitat present, very rare in the area
Great White Pelican	<i>Pelecanus onocrotalus</i>	VU		Large pools, rivers and lakes	-	Very Low	Unrecorded from the area, very limited suitable habitat present
Pink-backed Pelican	<i>Pelecanus rufescens</i>	VU		Large pools, rivers and lakes	0,1%	Very Low	Unrecorded from the area, very limited suitable habitat present
Lesser Flamingo	<i>Phoeniconaias minor</i>	NT		Saline wetlands	-	Very Low	No suitable habitat present
Greater Flamingo	<i>Phoenicopterus roseus</i>	NT		Saline wetlands	-	Very Low	No suitable habitat present
African Finfoot	<i>Podica senegalensis</i>	VU		Rivers and streams with overhanging vegetation	0,9%	Very Low	Foraging habitat present in the adjacent Crocodile River. May very occasionally forage in the small dams within the study area
Martial Eagle	<i>Polemaetus bellicosus</i>	EN	NEMBA (EN)	Wide variety of habitats	22,7%	Moderate	Suitable foraging and breeding habitat present but no nests located
Greater Painted-snipe	<i>Rostratula benghalensis</i>	NT		Wetlands	2,8%	Moderate	Some suitable habitat present
Secretarybird	<i>Sagittarius serpentarius</i>	VU		Open savanna and grassland	1,3%	Very Low	No suitable habitat present
Pel's Fishing Owl	<i>Scotopelia peli</i>	EN		Rivers and streams with overhanging vegetation	-	Very Low	Some suitable habitat present but unrecorded from the area
Crowned Eagle	<i>Stephanoaetus coronatus</i>	VU		Forest	-	Very Low	Limited suitable habitat present, vagrant to the Lowveld

Bateleur	<i>Terathopius ecaudatus</i>	EN	NEMBA (EN)	Savanna	53,9%	Confirmed	
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN	NEMBA (EN)	Savanna	19,2%	Moderate	Suitable foraging and breeding habitat present but no nests located
White-headed Vulture	<i>Trigonoceps occipitalis</i>	CR	NEMBA (EN)	Savanna	10,0%	Moderate	Suitable foraging and breeding habitat present but no nests located
<i>Subtotal</i>	35	35	10				
Reptiles							
Nile Crocodile	<i>Crocodylus niloticus</i>	VU	NEMBA (VU)	Wetlands		Confirmed	
KwaZulu-Natal Hinged-back Tortoise	<i>Kinixys natalensis</i>	VU		Savanna		Low	No recent records from the area, regional scarcity
Wilhelm's Flat Lizard	<i>Platysaurus intermedius wilhelmi</i>	VU#		Large outcrops with sheetrock		High	Suitable habitat present
Southern African Python	<i>Python natalensis</i>		NEMBA (PR)	Wide variety of habitats, but usually near water or rocky outcrops		High	Suitable habitat present
<i>Subtotal</i>	4	3	2				
Frogs							
Whistling Rain Frog	<i>Breviceps sopranus</i>	DD		Forest with dense understory		Low	Small size and poor state of habitat, rare species
<i>Subtotal</i>	1	1	0				
TOTAL	68	57	37				

CR - Critically Endangered EN - Endangered
 VU - Vulnerable NT - Near Threatened
 DD - Data Deficient PR - Protected
 NEMBA - National Environmental Management: Biodiversity Act
 MNCA - Mpumalanga Nature Conservation Act
 ‡ - IUCN assessment

Appendix 4. Curriculum Vitae of Duncan McKenzie

Name: Duncan Robert McKenzie
Profession: Terrestrial Ecologist
Date of Birth: 9 Nov 1977
Name of Firm: ECOREX Consulting Ecologists cc
Position in Firm: Ecologist
Years with firm: 12
Nationality: South African
Qualifications :



- N.Dip. [Nature Conservation] UNISA, RSA 2007
- N.Cert. [Nature Guiding] Drumbeat Academy, RSA 2004

Membership in Professional Societies:

- BirdLife South Africa
- Animal Demography Unit, University of Cape Town

Languages :

	<u>Speaking</u>	<u>Reading</u>	<u>Writing</u>
English (home):	Excellent	Excellent	Excellent
Afrikaans:	Good	Good	Good
isiZulu:	Good	Fair	Fair

Countries of Work Experience: Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe (Guiding). South Africa, Mozambique, DRC, Mali, Lesotho, Tanzania, Morocco, Guinea, Swaziland, Sierra Leone (Consulting Ecologist)

OVERVIEW OF EXPERIENCE

- 12 years' experience in specialist species identification, conducting baseline surveys, data analysis and report writing in various biomes in southern Africa, particularly savannah, forest and grassland biomes
- 2 years' experience game reserve management (KwaZulu-Natal)
- 5 years' experience (part time) of wetland delineation and management
- 2 years' experience of plant propagation and use for rehabilitation
- Specialist knowledge of identification of vascular plants
- Specialist knowledge of identification of mammals, birds, reptiles and amphibians
- SABAP2 Regional Co-ordinator: Mpumalanga
- Former member of the Kwa-Zulu-Natal Bird Rarities Committee
- Trustee on the John Voelcker Bird Book Fund

Employment Record:

2007 - present	ECOREX	Ecologist
2005 - 2006	Iglu (London, UK)	Specialist Travel Agent
1997 - 2005	Duncan McKenzie Bird Tours	Owner, Specialist Guide
2001	KZN Wildlife	District Conservation Officer, Reserve Manager
1999 - 2001	Institute of Natural Resources	Part-time Horticulturalist and Rehabilitation Officer
1997-2001	Mondi Wetlands Project	Part-time Field Assistant and Regional Co-ordinator
1996-1997	Natal Parks Board	Ranger

Appendix 5. Specialists Declaration

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

I ...Duncan McKenzie..., as the appointed specialist hereby declare/affirm the correctness of the information provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

X	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
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	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
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- have expertise in conducting specialist work as required, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014 (as amended in 2017);
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application;
- will take into account, to the extent possible, the matters listed in regulation 18 of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).



Signature of the specialist

ECOREX Consulting Ecologists CC

Name of company

26/10/2020

Date