

KAPAMA GAME RESERVE

TERRESTRIAL ECOLOGICAL ASSESSMENT



APRIL 2019

REVISED MAY 2021

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TABLE OF CONTENTS

LIST OF TABLES.....	3
LIST OF FIGURES.....	3
ABBREVIATIONS.....	4
TERMINOLOGY.....	4
DECLARATION OF INDEPENDENCE.....	5
1. INTRODUCTION.....	6
2. OBJECTIVES.....	7
3. STUDY AREA.....	8
4. METHODS.....	11
4.1 FLORA.....	11
4.2 FAUNA.....	11
4.3 METHOD FOR THE DETERMINATION OF SITE ECOLOGICAL IMPORTANCE (SEI).....	12
4.4 ASSUMPTIONS, LIMITATIONS AND KNOWLEDGE GAPS.....	18
4.4.1 Seasonality.....	18
4.4.2 Overlooked Species.....	18
4.4.3 Sampling Effort.....	18
4.4.4 Additional Development Sites.....	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 Vegetation Assemblages.....	20
5.1.3 Plant Species of Conservation Concern.....	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.....	40
5.2.3 Reptiles.....	46
5.2.4 Frogs.....	48
5.3 ECOLOGICAL SENSITIVITY.....	49
5.3.1 Environmental Screening Tool.....	49
5.3.2 Limpopo Province Biodiversity Conservation Assessment.....	53
5.3.3 Site-specific Ecological Sensitivity Analysis.....	55
6. KEY CURRENT AND POTENTIAL IMPACTS.....	59
6.1 GENERAL IMPACTS ON THE ECOLOGY OF KGR.....	59
6.2 SPECIFIC IMPACTS OF APPLICATION SITES ON THE ECOLOGY OF KGR.....	61
6.3 BIRDLIFE SOUTH AFRICA SOLAR GUIDELINES.....	67
7. CONCLUSION AND RECOMMENDATIONS.....	69
8. REFERENCES.....	72
9. APPENDICES.....	75
APPENDIX 1. CHECKLIST OF FLORA RECORDED DURING FIELDWORK.....	75
APPENDIX 2. POTENTIALLY OCCURRING PLANT SPECIES OF CONSERVATION CONCERN.....	84
APPENDIX 3. CO-ORDINATES OF FLORA AND FAUNA TAXA OF CONSERVATION-IMPORTANCE RECORDED DURING FIELDWORK.....	86

APPENDIX 4. CHECKLIST OF FAUNA RECORDED DURING FIELDWORK.....	90
APPENDIX 5. POTENTIALLY OCCURRING FAUNA OF CONSERVATION CONCERN.....	100
APPENDIX 6. CURRICULUM VITAE OF DUNCAN MCKENZIE	106
APPENDIX 7. SPECIALISTS DECLARATION	107

List of Tables

Table 1. Application Site Details.....	9
Table 2. Criteria for Determining Conservation Importance of a Receptor	14
Table 3. Criteria for Determining Functional Integrity of a Receptor	15
Table 4. Biodiversity Importance Two-way Matrix	15
Table 5. Criteria for Determining Receptor Resilience.....	16
Table 6. Site Ecological Importance Two-way Matrix.....	17
Table 7. Guidelines for interpreting Site Ecological Importance of Receptors in terms of project impacts	17
Table 8. Conservation-important plant species confirmed during fieldwork.....	31
Table 9. Ecological Sensitivity of Vegetation Communities in the Study Area	56
Table 10. Summary of Areas and Impact Assessment of the Application Sites within the Study Area	68

List of Figures

Figure 1. Location of Study Area	10
Figure 2. Photographs of Application Sites situated within Riparian Forest	22
Figure 3. Photographs of Application Sites situated within Riparian Thicket.....	23
Figure 4. Photographs of Application Sites situated within Closed Woodland	25
Figure 5. Photographs of Application Sites situated within Degraded Woodland	27
Figure 6. Photographs of Species of Conservation Concern recorded during fieldwork	29
Figure 7. Pre-development Vegetation Communities within the Application Sites	33
Figure 8. Vegetation Communities surrounding the proposed new (2021).....	34
Figure 9. Codes and List Quantities for the Pentads surrounding the Study Area	45
Figure 10. Environmental Screening Tool Themes relevant to Terrestrial Ecology.....	52
Figure 11. LPBCP Classification of Land Units within and adjacent to the Study Area	54
Figure 12. Site Ecological Importance of Vegetation Communities in the Study Area Prior to Construction of the Application Sites	57
Figure 13. Site Ecological Importance of Vegetation Communities in the Study Area Relevant to the Proposed 2021 Developments.....	58

Abbreviations

BODATSA	Botanical Database of Southern Africa
DEA	Department of Environmental Affairs
EST	Environmental Screening Tool
GKNP	Greater Kruger National Park
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
LEMA	Limpopo Environmental Management Act (No. 7 of 2003)
LPBCA	Limpopo Province Biodiversity Conservation Assessment
mamsl	Metres Above Mean Sea Level
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

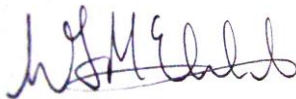
Alien	Introduced from elsewhere: neither endemic nor indigenous.
Biodiversity	The structural, functional and compositional attributes of an area, ranging from genes to landscapes.
Disturbed	An ecosystem that is in a sub-climax ecological state, usually through impacts such as low levels of invasion by 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 in a poor ecological state, usually through impacts such as invasion by alien plants, severe overgrazing, poor burning regimes, etc. These systems contain a low proportion of indigenous flora.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaptation to survive frost, drought and / or fire.
Palearctic	Ecozone consisting of North Africa, Europe and Asia north of the Himalayan foothills.

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 Environmental Impact Assessment Regulations, 2010. 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

03 May 2021



D.R. McKenzie

03 May 2021

1. INTRODUCTION

Kapama Game Reserve (Pty) LTD (KGR), situated in south-eastern Limpopo Province, carried out multi-faceted construction activities during the period of 1989-2018 without the necessary environmental authorisation. This necessitated an application for approval under Section 24(G) of the National Environmental Management Act 107 of 1998 (NEMA). Ecorex Consulting Ecologists CC was appointed by Peter Velcich of NuLeaf Planning & Environmental to perform the terrestrial ecology survey (flora, mammals, avifauna and herpetofauna) of the development areas in April 2019. KGR have subsequently added several new developments to their application in 2021, which has necessitated the update of the 2019 baseline terrestrial ecology report. This study will provide a basis for the retrospective and new assessments of the potential impacts of the developments on the terrestrial ecology of the study area as well as providing a baseline of surrounding untransformed vegetation. The key deliverables for this study were a report on terrestrial ecosystems survey and an integrated Ecological Sensitivity Assessment.

The study team was as follows:

Duncan McKenzie (Terrestrial Ecologist). Duncan has been involved in biodiversity assessments for Ecorex for 13 years and countries of work experience include Lesotho, Swaziland, Mali, Mozambique, Sierra Leone, Morocco, 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 the Roberts Birds of the Kruger National Park projects. A more detailed CV is presented in Appendix 6.

Linda McKenzie (GIS Specialist). Linda is a GIS Specialist/GIS Analyst with over 15 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 were to:

- Provide an assessment of the ecological sensitivity of affected and potentially affected ecosystems;
- Provide an overview of key potential impacts that the project has had and potentially will have on terrestrial ecosystems;
- Make recommendations regarding infrastructure layout, where applicable.

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

- Biodiversity Baseline Description;
- Ecological Sensitivity Assessment;
- Broad-scale Vegetation Map;
- Ecological Sensitivity Map;
- Recommendations regarding infrastructure layout, where relevant.

3. STUDY AREA

The KGR, a commercial tourism venture, is situated approximately 10 km south of the town of Hoedspruit, Mopani District, Limpopo Province (Figure 1). KGR is approximately 16 000 ha in size¹ and is situated between the tarred R40 in the west and the perennial Klaserie River in the east. Although it is not part of the Greater Kruger National Park (GKNP), it is situated adjacent to it with the closest portion being Thornybush Game Reserve to the east. Fourteen Application Sites within KGR were sampled in the survey; the details and coordinates of each are presented in Table 1.

In addition to these sites that were surveyed in 2019, the following developments form part of the 2021 amendment:

1. 500 – 750 kW Solar plant – 6000 m²
2. New staff accommodation – 2000 m²
3. Staff village – 350 m²
4. Laundry – 220 m²
5. Walkway – 115 m in length (115 m²)

These Application Sites are situated on the following farm portions:

- Remainder of Portion 1 of the farm Hoedspruit 82 KU
- Remainder of Portion 4 of the farm Moria 83 KU
- Portions 35, 67, 204, 211, 213, 229 & the Remainder of Portion 3 of the farm Guernsey 81 KU

The study area is situated within the quarter-degree grid 2431 AC with an altitudinal gradient of 470 metres above mean sea level (mamsl) in the far north-eastern portion along the Klaserie River up to 590 mamsl in the central western section. The topography of the general area is flat to undulating with shallowly incised drainage lines. Most of the study area contains untransformed vegetation, but existing infrastructure is present within the Application Sites listed in Table 1. Furthermore, the southern portions adjacent to the Airstrip, Karula Lodge and Hongonyi Gate were formerly cultivated but are in various stages of re-vegetation.

¹ <https://www.kapama.com/about/>

Table 1. Application Site Details

APPLICATION SITE	DESCRIPTION	AREA (ha)	BEDS GUEST	BEDS STAFF	LONG	LAT
River Lodge	Expansion of old day visitor facility (pre-1989) including tourist accommodation, main complex, reception, spa, waste water treatment works, staff accommodation etc.	8.4	164	40	-24.42715	31.02747
Karula Lodge	New camp. Guest villas, main complex, staff accommodation, waste water treatment works	5.2	24	40	-24.45911	31.10622
Buffalo Camp	Expansion on old farmstead site. Guest tents, main complex, staff accommodation.	1.8	10	8	-24.46648	31.05126
Southern Camp	Guest villas / suites, main complex, staff accommodation, waste water treatment works	5.9	20	40	-24.45518	31.08312
Drakensig Staff Village & Workshop	Separate staff village for River lodge	2.8	n/a	60	-24.43418	31.01733
Waste Incineration Site	Adjacent to an old farmhouse	1	n/a	n/a	-24.43394	31.02062
Main Gate	Main entrance gate to Kapama from the R40	0.5	n/a	n/a	-24.42930	31.01380
Hongonyi Gate	Upgrade to existing gate & add generator room and staff accommodation	0.6	n/a	n/a	-24.47435	31.09860
Reservoirs	2 x 800 000l water reservoirs	0.2	n/a	n/a	-24.44422	31.05131
Airstrip	Extension to existing airstrip (500m)	18.1	n/a	n/a	-24.46474	31.08968
Water Purification Plant	New facility adjacent to the Klaserie River	0.1	n/a	n/a	-24.43657	31.11230
Klaserie River Crossing 2	Kubu Dam Weir / River Crossing	7.2	n/a	n/a	-24.43590	31.11295
Klaserie River Crossing 1	River Crossing	0.2	n/a	n/a	-24.44554	31.11947
Bosplaas	Owner's House adjacent to Klaserie River	0.5	0	8	-24.39842	31.10149

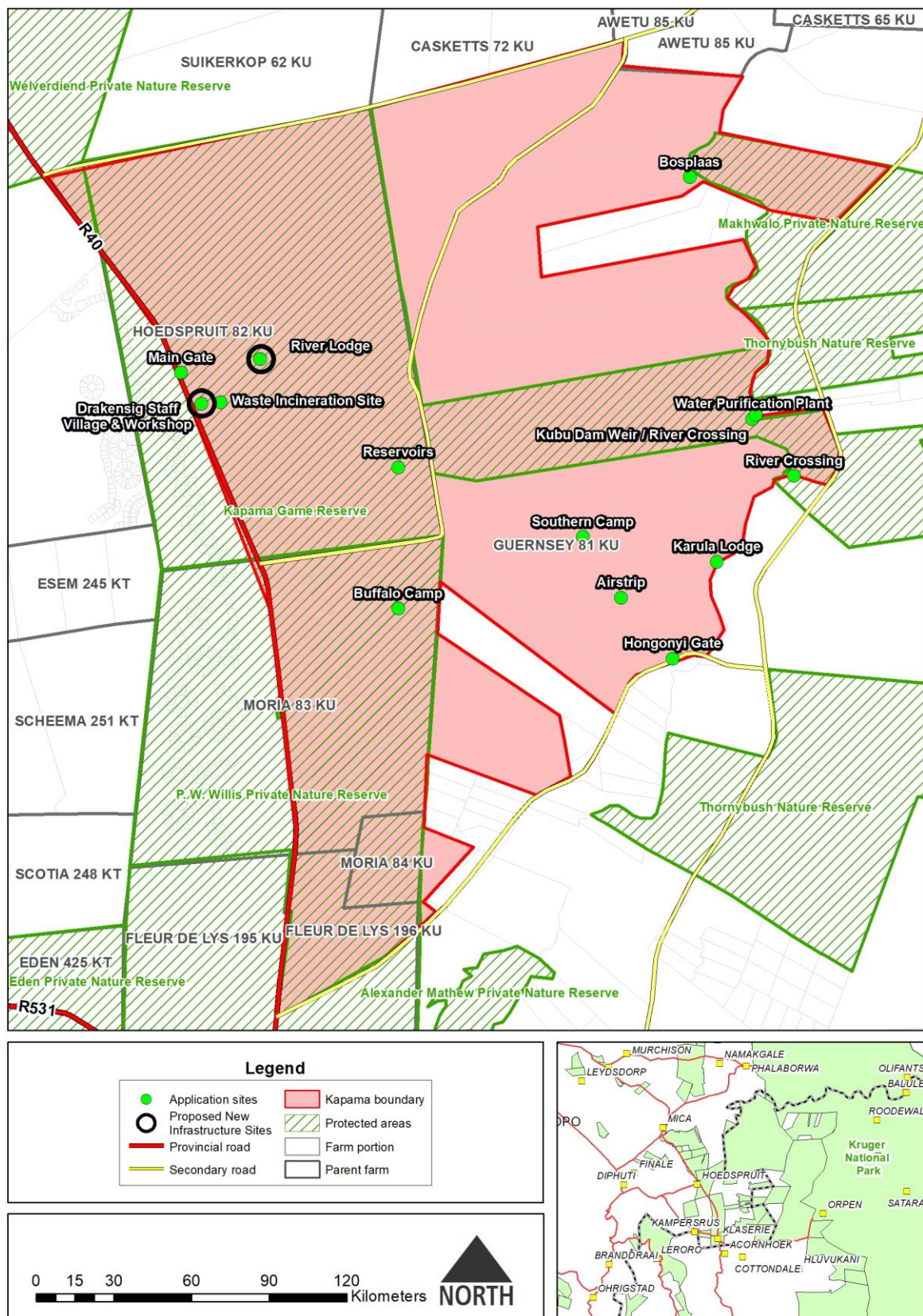


Figure 1. Location of Study Area

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 **High** Animal Theme, **Medium** Plant Theme and **Very High** Terrestrial Biodiversity Theme. More detail in this regard is provided in section 5.3.1 of this report. Some of the modelled or confirmed species have been identified as sensitive species by the South African National Biodiversity Institute (SANBI) and have been assigned a unique number in the screening report produced by the EST. These names have been withheld as the species may be prone to illegal harvesting and must be protected.

4.1 Flora

Desktop

The Botanical Database of Southern Africa (BODATSA)¹, which is curated by the South African National Biodiversity Institute (SANBI), was queried for a list of plant species that have been recorded from a 20 km radius of the study area. BODATSA contains records from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH). This list was used to produce a list of the most likely threatened species, which were searched for during fieldwork.

Fieldwork

Each Application Site was sampled during site visits on the 3rd and 4th of April 2019. Vegetation within each Application Site as well as the surrounding, untransformed vegetation, was surveyed on foot and the location of species of conservation-importance captured onto a Samsung S7 phone using LocusMap Pro™ software. Species lists were compiled for each vegetation community located.

4.2 Fauna

Desktop

Lists of conservation-important mammals, birds, reptiles and frogs potentially occurring within KGR were prepared using data from the KGR website², Child *et al.* (2016), the Virtual

¹ <http://newposa.sanbi.org/>

² <https://www.kapama.com/>

Museum (<http://vmus.adu.org.za/>) and Southern African Bird Atlas Project 2 (<http://sabap2.birdmap.africa/>) projects of the Fitzpatrick Institute of African Ornithology, 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 Bushnell 10x42 binoculars. Observations were made incidentally during the time that the vegetation survey was conducted and limited to birds seen and heard within the study area 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), providing guidelines for biodiversity specialists in ESIA's, has been followed in this report (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 footprint / 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 2.

Table 2. 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 3.

Table 3. 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 4.

Table 4. 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 5.

Table 5. 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 using the above two matrices, SEI can be determined using the matrix in Table 6.

Table 6. 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 7.

Table 7. 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 12.

4.4 Assumptions, Limitations and Knowledge Gaps

4.4.1 Seasonality

The assessment was based on a single field visit over two days in the growing season. It is possible that plants which flower at other times of the year were underrepresented although this is not seen as a limitation that could affect the Record of Decision as the specialist has extensive experience of local flora in the area and has assessed habitat suitability for potentially occurring threatened plant species.

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.

4.4.3 Sampling Effort

The survey took place over two days, within which all 14 Application Sites scattered across KGR were visited. This resulted in a fairly limited amount of time sampling each site, but sufficient sampling of adjacent natural vegetation was performed in each vegetation community to assess the impacts of the sites on untransformed habitat.

4.4.4 Additional Development Sites

Fieldwork for this project took place in 2019. None of the localities of the 2021 additions were sampled intensively as they were not part of the original application. Therefore, it is possible that some SCC or protected species may be present in these areas.

5. BIODIVERSITY BASELINE DESCRIPTION

5.1 Flora

5.1.1 Regional Context

5.1.1.1 National Vegetation Types

According to the current National Vegetation Map (SANBI, 2018), the vegetation type present within the study area is Granite Lowveld. This occurs in a narrow strip from Phongola in northern KwaZulu-Natal in the south, through central Swaziland, and to Giyani in Limpopo Province in the north. Granite Lowveld originally covered about 19 838 km², of which 21% has been transformed, mostly through agriculture and urbanisation. Mucina & Rutherford (2006) assessed this community to be Vulnerable, but it is not situated within any Threatened Ecosystems as listed in Government Gazette No. 34809 of 9 December 2011 (DEAT, 2011).

Typical Granite Lowveld is dominated by tall trees such as *Senegalia nigrescens* and *Sclerocarya birrea*, as well as a variety of smaller trees and shrubs such as *Combretum zeyheri* and *C. apiculatum*, *Terminalia sericea*, *Euclea divinorum* and *Peltophorum africanum*. Common herbaceous plants include *Waltheria indica*, *Aspilia mossambicensis*, *Commelina* species and *Kohautia virgata*. Dominant grasses are *Digitaria eriantha*, *Panicum maximum* and *Pogonarthria squarrosa* (Mucina & Rutherford, 2006).

5.1.1.2 Centres of Plant Endemism

The study area is not situated in any of southern Africa's floristic centres of endemism, which are areas that have an unusually high number of plants unique to that area (Van Wyk & Smith, 2001).

5.1.1.3 Threatened Ecosystems

The study area is not situated within any Threatened Ecosystems as listed in Government Gazette No. 34809 of 9 December 2011 (DEAT, 2011).

5.1.2 Local Context – Plant Species Richness and Vegetation Assemblages

SANBI's Botanical Database of Southern Africa (BODATSA) lists 240 plant species from 75 families for a 20 km radius of the project area, below the Escarpment. This area is somewhat under sampled as 197 plants species from 56 families were recorded from the project area during April 2019 fieldwork alone, representing 82% of the BODATSA total. The true plant species diversity of the district is likely to be significantly higher. The full list of 197 plant species confirmed to occur in the project area during fieldwork is provided in Appendix 1. The dominant plant families in the flora are Poaceae (29 spp), Fabaceae (28 spp), Asteraceae (14 spp), Malvaceae (12 spp) and Combretaceae (8 spp).

Four untransformed 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.). Figure 7 provides an overview of the vegetation communities across the study area for the existing developments while Figure 8 reflects the vegetation communities around the proposed 2021 developments. The untransformed vegetation communities are described in detail below, with alien plant species indicated by an asterisk:

5.1.2.1 *Combretum erythrophyllum* – *Diospyros mespiliformis* Riparian Forest

This vegetation community occurs along the Klaserie River in the eastern border of Kapama (Figure 7 & Figure 8). The following Application Sites are situated within Riparian Forest:

1. Karula Lodge
2. Water Purification Plant
3. Klaserie River Crossing 1
4. Klaserie River Crossing 2 (Kubu Dam)
5. Bosplaas (owner's house)

Approximately 11 ha of this vegetation community has been impacted by the above-listed developments. Vegetation structure is mostly Tall Forest (sensu Edwards, 1983) (Figure 2). Tall riparian trees such as *Combretum erythrophyllum* and *Diospyros mespiliformis* dominate in the canopy, while other common trees are *Ficus sycomorus*, *Schotia brachypetala*, *Vachellia xanthophloea* and *V. robusta*. Smaller trees and woody shrubs that are commonly encountered in the understory include *Searsia gueinzii*, *Mystroxydon aethiopicum*, *Azima tetracantha* and *Gymnosporia senegalensis*. The ground layer is sparse in places due to the

dense canopy and mid-stratum, but the herbs *Barleria elegans* and *Commelina benghalensis*, as well as the shade-loving grasses *Panicum deustum* and *P. maximum* occur throughout. In places, the sandier riverbed is dominated by the reed *Phragmites australis*, while various alien invasive species such as * *Xanthium spinosum*, * *Sesbania punicea*, * *Ricinus communis* and * *Lantana camara* are well established. The sedges *Cyperus dives* and *C. sexangularis* are evident where muddier sediments have deposited, as well as the grass *Leersia hexandra*.

A total of 60 species (30% of the entire list) was recorded from *Combretum erythrophyllum* – *Diospyros mespilliformis* Riparian Forest (Appendix 1), the lowest species list of the four communities present. Species fidelity, which is closely linked to community uniqueness, is high with 18 species (30% of the community list) occurring nowhere else in the study area.

Six conservation-important species were recorded from this community (Table 8), although all are rarely encountered within the community and none are considered to be national Species of Conservation Concern (SCC) as defined by Raimondo *et al.* (2009)¹. The International Union for Conservation of Nature (IUCN) considers the epiphyte *Ansellia africana* to be Vulnerable (VU) and the small tree *Dalbergia melanoxylon* to be Near Threatened (NT). The trees *Sclerocarya birrea*, *Philenoptera violacea* and *Breonadia salicina* are protected under the National Forests Act (No. 30 of 1998, NFA), while the tree *Spirostachys africana* is protected under the Limpopo Environmental Management Act (No. 7 of 2003).

¹ Species of Conservation Concern include those with a status of Rare, Critically Rare, Near Threatened, Data Deficient, Vulnerable, Endangered and Critically Endangered



Figure 2. Photographs of Application Sites situated within Riparian Forest

5.1.2.2 *Schotia brachypetala* – *Euclea divinorum* Riparian Thicket

Riparian Thicket occurs along the banks of seasonal drainage lines throughout Kapama (Figure 7 & Figure 8). It is characterised by moderately tall riparian trees with a clumped, dense understory layer. Vegetation structure is mostly Short Thicket (*sensu* Edwards, 1983) (Figure 3). The following Application Sites contain Riparian Thicket:

1. River Lodge
2. Buffalo Camp
3. Proposed Walkway

Approximately 7 ha of this vegetation community has been impacted by the above-listed developments.

The tree *Schotia brachypetala* dominates the canopy of this community with a lower abundance of additional trees such as *Mystroxydon aethiopicum*, *Spirostachys africana*, *Vachellia robusta*, *Combretum hereroense*, *Elaeodendron transvaalense* and *Commiphora neglecta*. Smaller trees and shrubs found include *Euclea natalensis* and *E. divinorum*, *Gymnosporia senegalensis*, *Vachellia exuvialis*, *Croton menyharthii*, *Pappea capensis*, *Searsia gueinzii*, *Grewia flavescens*, *Dalbergia melanoxylon* and *Phyllanthus reticulatus*. Dwarf shrubs and herbs found include *Hypoestes forskalii*, *Barleria elegans*, *B. obtusa* and * *Ageratum conyzoides*. Grasses are sparse but include *Panicum maximum* and *Eragrostis trichophora*.

A total of 95 species (48% of the entire list) was recorded from Riparian Thicket (Appendix 1), the second highest species list of the four vegetation communities present. Species fidelity, which is closely linked to community uniqueness, is high, with 27 species (28% of the community list) occurring nowhere else in the study area.

Five conservation-important species were recorded (Table 8) with one considered to be a national SCC. *Elaeodendron transvaalense* is assessed as NT by Raimondo *et.al.* (2009) while the IUCN has assessed the epiphyte *Ansellia africana* to be VU and the small tree *Dalbergia melanoxylon* to be NT. *Sclerocarya birrea* and *Elaeodendron transvaalense* are protected under the National Forests Act (No. 30 of 1998) and *Spirostachys africana* is protected under the Limpopo Environmental Management Act (No. 7 of 2003).

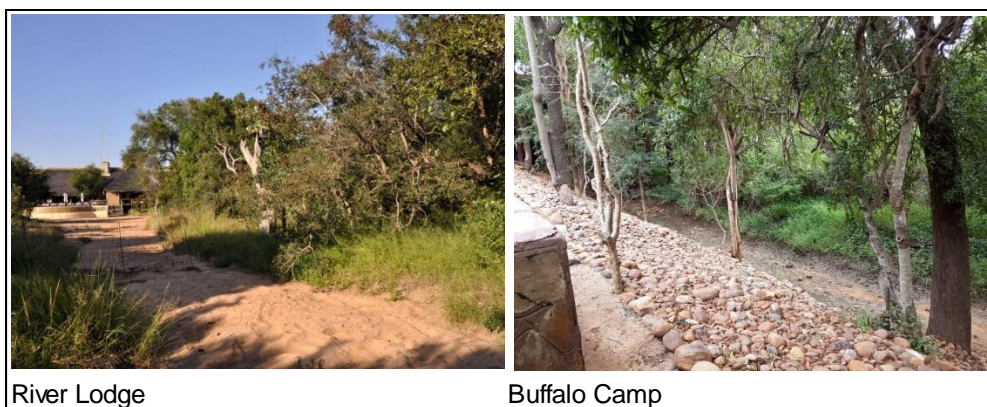


Figure 3. Photographs of Application Sites situated within Riparian Thicket

5.1.2.3 *Combretum apiculatum* – *Sclerocarya birrea* Closed Woodland

This is the dominant vegetation community on KGR, occurring in twelve of the Application Sites (Figure 7 & Figure 8). Vegetation structure is Short to Tall Closed Woodland (Figure 4) (Edwards, 1983). The following Application Sites contain Closed Woodland:

1. River Lodge (incl. staff accommodation and waste water treatment works)
2. Karula Lodge (incl. staff accommodation)
3. Southern Camp (incl. staff accommodation and waste water treatment works)
4. Drakensig Staff Quarters and Workshop
5. Main Gate
6. Reservoirs & Cell Tower
7. Bosplaas (owner's house)
8. Buffalo Camp
9. Proposed Solar Plant
10. Proposed Staff Accommodation
11. Proposed Staff Village
12. Proposed Laundry

Approximately 16 ha of this vegetation community has already been impacted by the above-listed developments.

A high diversity of trees dominate the canopy with the most dominant including *Sclerocarya birrea*, *Combretum apiculatum*, *C. zeyheri*, *C. hereroense*, *Peltophorum africanum*, *Senegalia nigrescens*, *Strychnos madagascariensis* and *Terminalia sericea*. Common shrubs found include *Euclea divinorum*, *Vachellia gerrardii*, *Dichrostachys cinerea* and *Mundulea sericea*. Dominant forbs, bulbs and herbs found include *Ocimum americanum*, *Waltheria indica*, *Kyphocarpa angustifolia* and *Agathisanthemum bojeri*. The dominant grasses found include *Eragrostis rigidior*, *Urochloa mosambicensis*, *Sporobolus pyramidalis*, *Eragrostis superba* and *Heteropogon contortus*.

A total of 106 species (54% of the entire list) was recorded in *Combretum apiculatum* – *Sclerocarya birrea* Closed Woodland (Appendix 1), the highest of the four communities present. Species fidelity is high, with 36 species (34% of the community list) occurring nowhere else in the study area.

Six conservation-important species were recorded (Table 8). One of these is listed by the IUCN as VU, namely *Ansellia africana*, and one as NT, namely *Dalbergia melanoxylon*. Four species are protected under the NFA, namely *Sclerocarya birrea*, *Philenoptera violacea*, *Combretum imberbe* and *Balanites maughamii*.



Figure 4. Photographs of Application Sites situated within Closed Woodland

5.1.2.4 *Vachellia nilotica* – *Dichrostachys cinerea* Degraded Woodland

Vachellia nilotica – *Dichrostachys cinerea* Degraded Woodland occurs in the southern parts of Kapama, in areas that were possibly historically old lands or other degraded areas (Figure 7 & Figure 8). Vegetation structure is Short Closed Woodland (Figure 5) (Edwards, 1983). The following Application Sites are situated within Degraded Woodland:

1. Waste Incineration Site
2. Hongonyi Gate (incl. staff accommodation)
3. Air Strip
4. Karula Wastewater Pond

Approximately 20 ha of this vegetation community has been impacted by the above-listed developments.

The dominant canopy species in this community are the pioneer trees *Vachellia nilotica* and *V. tortilis*, while other prevalent trees and shrubs include *Dichrostachys cinerea*, *Ziziphus mucronata*, *Combretum hereroense* and *C. imberbe*. Several alien herbs dominate the ground layer, including * *Richardia brasiliensis*, * *Acanthospermum australe*, * *Alternanthera pungens*, * *Bidens pilosa* and * *Zinnia peruviana*. Grasses are sparse due to overgrazing but include *Heteropogon contortus*, *Cynodon dactylon* and *Eragrostis superba*.

A total of 65 species (33% of the entire list) was recorded from Degraded Woodland - the third most species-rich of the vegetation communities in the study area (Appendix 1). Species fidelity is moderate, with 13 species (20% of the community list) occurring nowhere else in the study area. A total of 16 alien plant species were recorded from this community, reflecting the high levels of degradation.

Only two conservation-important species were recorded from this community, namely the trees *Sclerocarya birrea* and *Combretum imberbe* which are protected under the NFA (Table 8).



Figure 5. Photographs of Application Sites situated within Degraded Woodland

5.1.3 Plant Species of Conservation Concern

A total of 197 plant species in 56 families was recorded during fieldwork (Appendix 1). One of these is considered VU by the IUCN, namely the epiphytic orchid *Ansellia africana*. This species is discussed below.

***Ansellia africana* Lindl.** Leopard Orchid

This familiar epiphytic orchid occurs from South Africa to Senegal and assessed as VU by the IUCN due to over-collection for a wide variety of traditional uses such as the medicinal medicine trade, for use as a love charm, to ward off lightning and as an antidote against bad dreams. It is also highly desirable in the horticultural trade¹. Despite these threats, this species is still relatively common in protected areas in South Africa, specifically the GKNP (*pers. obs.*) and is not listed as a SCC by Raimondo *etal.* (2009). Several plants were observed in most of the lodges in Kapama (Figure 6) where it appears they have been harvested from the surrounding vegetation and planted within the camps. Mortality appears to be fairly high, as a number of transplanted specimens were either dead or dying.

¹ Crook, 2013

Two additional species confirmed during fieldwork, namely *Elaeodendron transvaalense* and *Dalbergia melanoxylon*, are assessed as NT and are dealt with below:

***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.*, 2008a). A moderate number of plants were located within the Riparian Thicket community, particularly in River Lodge.

***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 nationally listed, it is assessed by the IUCN as NT due to over-collection for the wood carving industry and in the manufacturing of musical instruments¹. However, this species is still common in the Lowveld of South Africa, including KGR (*pers.obs.*). Moderate numbers were located mostly within the Closed Woodland community.

Eight additional SCC potentially occur in the wider KGR area, one of which has a moderate likelihood of occurring within the study area and is discussed below.

***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 during fieldwork due to the timing of the survey. This plant is listed as NT due to over-collection for the medicinal plant trade².

The remaining two SCC have a Low likelihood of occurring within the study area due to unsuitable habitat present or regional rarity (Appendix 2).

¹ World Conservation Monitoring Centre. 1998. *Dalbergia melanoxylon*. The IUCN Red List of Threatened Species 1998: e.T32504A9710439.
<http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T32504A9710439.en>. Downloaded on 24 April 2019.

² Williams *et al.*, 2008b

Six plant species recorded during fieldwork are protected under the NFA, namely *Sclerocarya birrea*, *Elaeodendron transvaalense*, *Philenoptera violacea*, *Combretum imberbe*, *Balanites maughamii* and *Breonadia salicina*, and two are protected under the LEMA, namely the tree *Spirostachys africana* and the epiphyte *Ansellia africana* (Table 8).

5.1.4 Endemic Species

None of the plants recorded are endemic to Limpopo or any centre of plant endemism.

5.1.5 Invasive Alien Species

Twenty-three alien plant species were recorded from the study area during fieldwork, eleven of which are listed as being invasive under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004, NEMBA) Alien and Invasive Species Lists, (2016) (Appendix 1). The highest levels of infestation are within and adjacent to existing infrastructure, such as staff accommodation. The bare or disturbed soil resulting from clearing activities and frequent human access may encourage the establishment of additional invasive alien species.

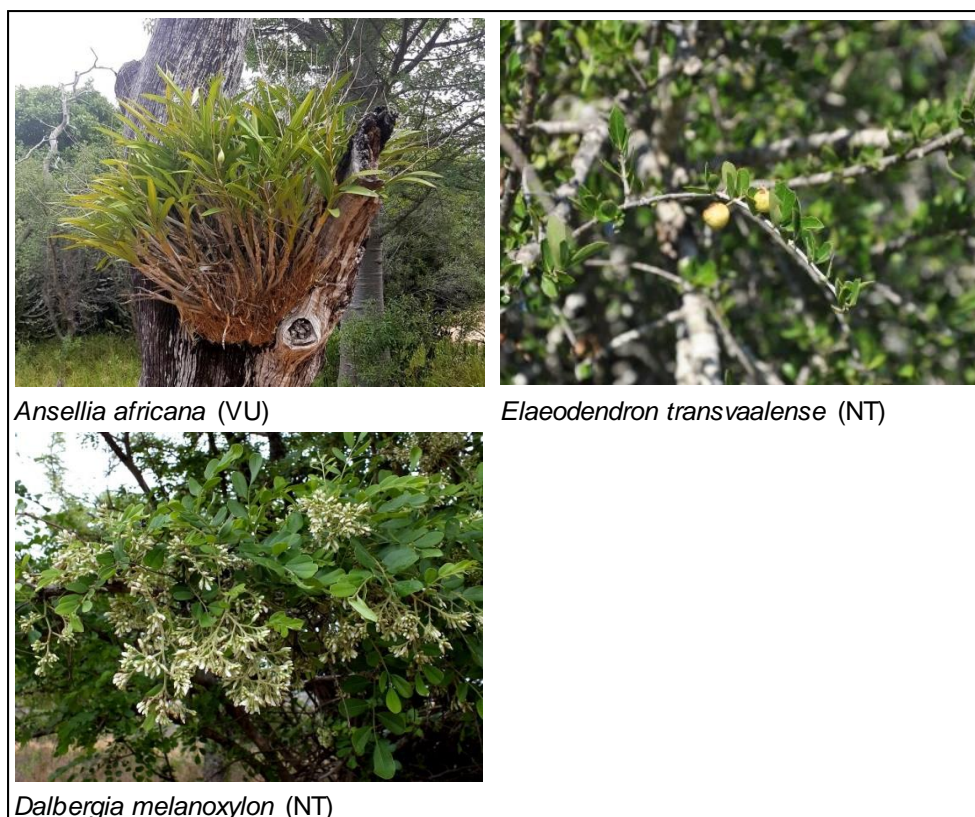


Figure 6. Photographs of Species of Conservation Concern recorded during fieldwork

The co-ordinates of the plant SCC and protected species located within and around each Application Site during fieldwork are presenting in Appendix 3. These points are spatially presented in Figure 7 and Figure 8.

Table 8. Conservation-important plant species confirmed during fieldwork

Taxa	Growth Form	Red Data	Protected	Vegetation Communities			
				Riparian Forest	Riparian Thicket	Closed Woodland	Degraded Woodland
				Karula Lodge Klaserie Weirs / Crossings Bosplaas	River Lodge Karula Lodge Water Purification Plant Buffalo Camp Proposed Wooden Walkway	River Lodge Drakensig Main Gate Reservoirs & Cell Tower Southern Camp Karula Lodge Bosplaas Proposed Solar Plant, Staff Accommodation, Staff Village & Laundry	Airstrip Hongonyi Gate Waste Incineration
Family Anacardiaceae <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA	r	r	d	r
Family Balanitaceae <i>Balanites maughamii</i> Sprague subsp. <i>maughamii</i>	tree		NFA			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
Family Euphorbiaceae <i>Spirostachys africana</i> Sond.	tree		LEMA	r	u		
Family Fabaceae <i>Dalbergia melanoxylon</i> Guill. & Perr. <i>Philenoptera violacea</i> (Klotzsch) Schrire	tree tree	NT‡	NFA	r r	u	r r	
Family Orchidaceae <i>Ansellia africana</i> Lindl.	epiphyte	VU‡	LEMA	r	r	r	
Family Rubiaceae <i>Breonadia salicina</i> (Vahl) Hepper & J.R.I.Wood	tree		NFA	r			
TOTAL	9	3	8	6	5	6	2

NFA = National Forests Act
LEMA = Limpopo Environmental Management Act

d = dominant
f = frequent

NT = Near Threatened
‡ = IUCN assessment
* = exotic species

u = uncommon
r = rare

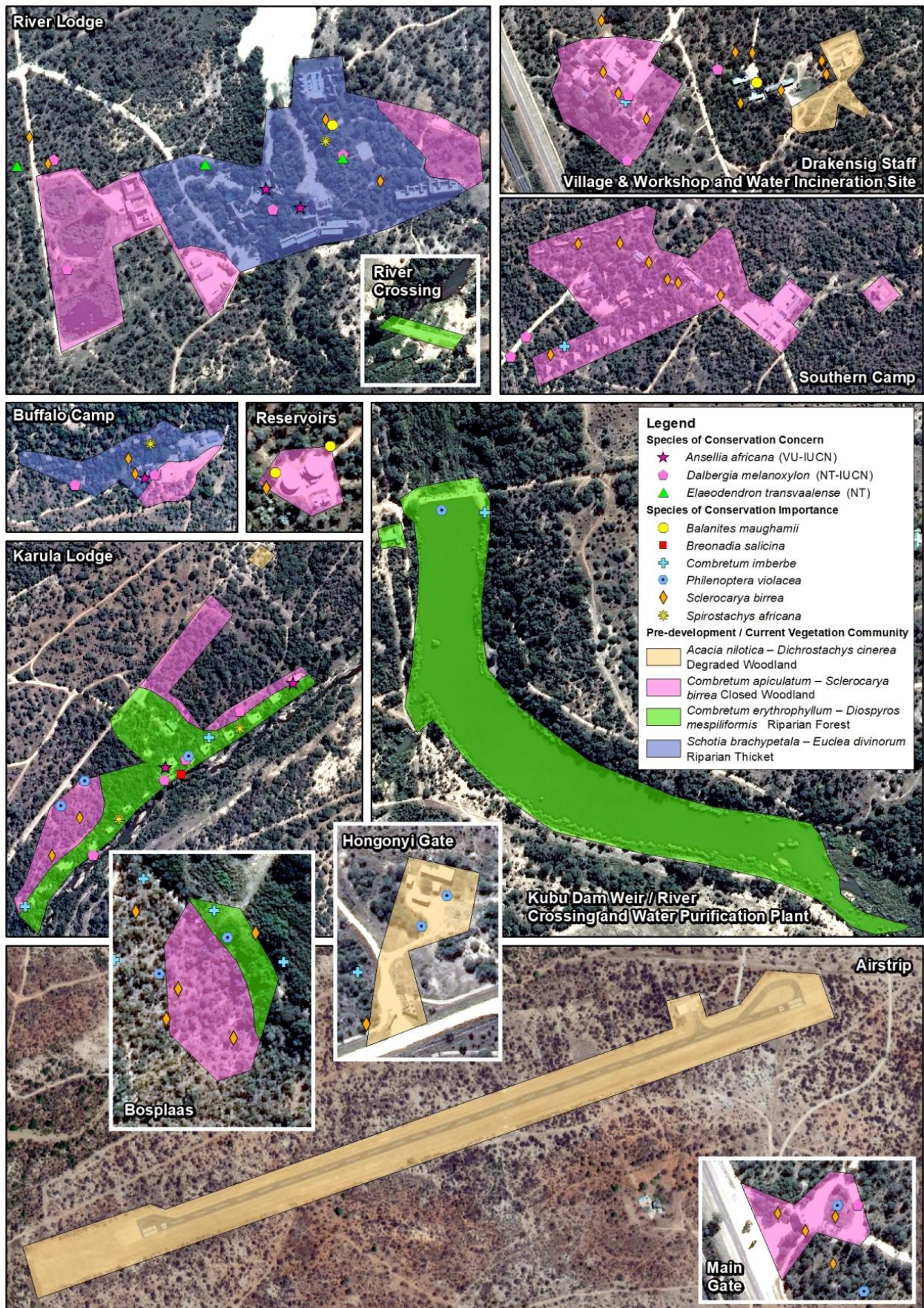


Figure 7. Pre-development Vegetation Communities within the Application Sites

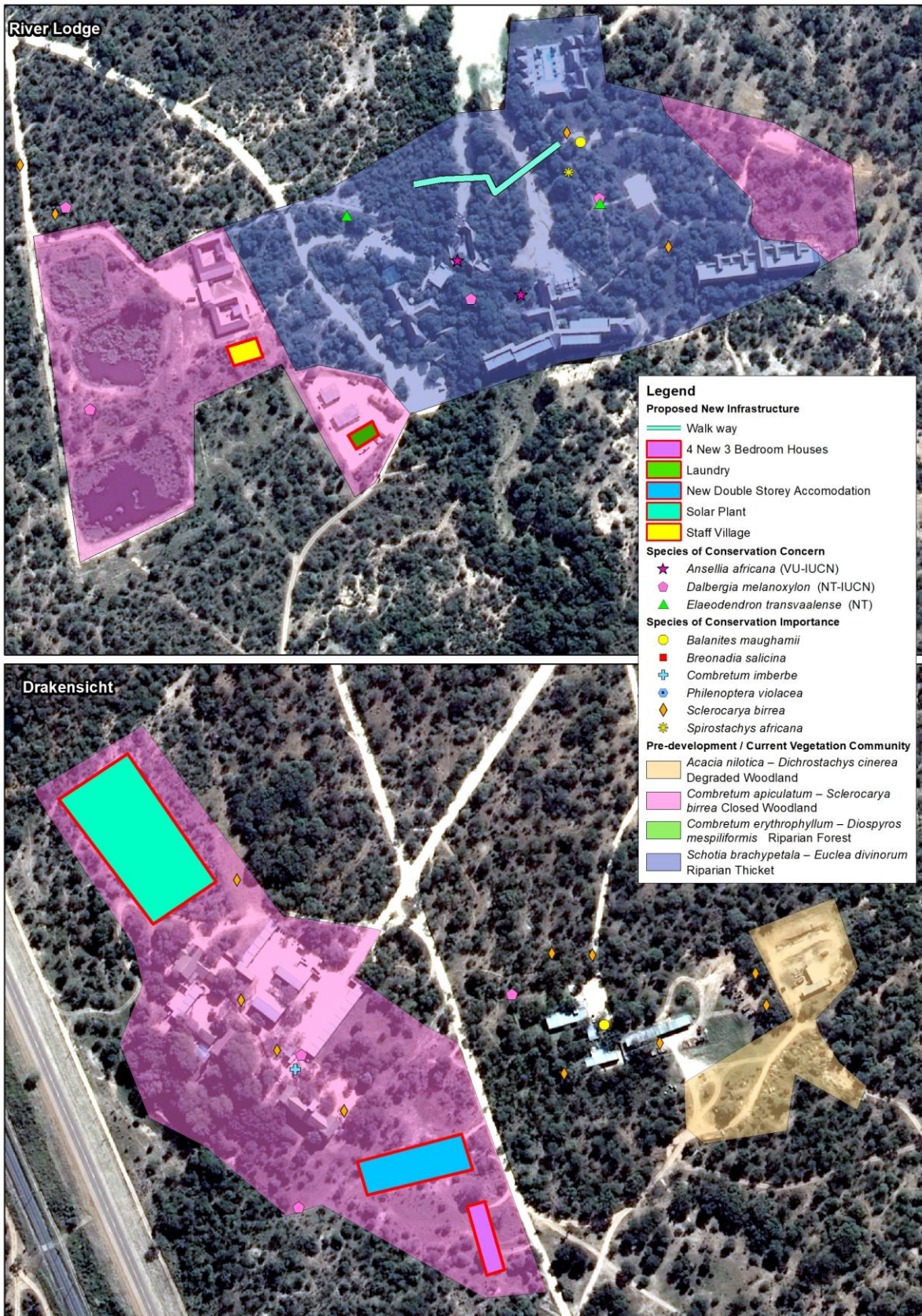


Figure 8. Vegetation Communities surrounding the proposed new (2021) Developments

5.2 Terrestrial Fauna

5.2.1 Mammals

5.2.1.1 Regional Overview

KGR is situated in the savanna biome adjacent to the GKNP and therefore has very high mammal diversity, relatively low numbers of endemics and a relatively high number of Red Data species⁸. Most of the surrounding area is formally conserved with roads and lodges the primary types of development. Mammal populations, therefore, are well protected and reasonably secure. A total of 61 mammals have been recorded in the QDGS 2431 AC in the Animal Demography Unit's Virtual Museum's database⁹. As all virtual museum submissions require the inclusion of at least one photograph of the mammal, the actual number of species present is likely to be significantly higher as many mammals are small, cryptic or nocturnal in habit and therefore difficult to photograph. Six of the confirmed Virtual Museum mammals are SCC.

5.2.2.2 Confirmed Species

Twenty-six mammal species were recorded during fieldwork (Appendix 4), 23 of which were recorded from Closed Woodland. These included many common and widespread species such as Impala *Aepyceros melampus*, Greater Kudu *Tragelaphus strepsiceros*, Plains (Burchell's) Zebra *Equus quagga burchelli* and Chacma Baboon *Papio ursinus*. Seven species were recorded from Forest / Thicket habitats, including Nyala *Tragelaphus angasii* and Vervet Monkey *Chlorocebus pygerythrus*, while two mammals were recorded from aquatic habitat, namely Hippopotamus *Hippopotamus amphibius* and African Savanna Elephant *Loxodonta africana*. Additional sampling, including small mammal trapping, bat sampling and camera traps, would result in additional species but would not change the findings of the report.

5.2.1.3 Conservation-Important Species

An estimated 30 conservation-important mammals potentially occur within the project area (Appendix 5), which is an extremely high total, but this is due to the study area being situated within a large, formally protected conservation area in the savanna biome. Several

⁸ Child *et al.*, 2016

⁹ http://vmus.adu.org.za/vm_sp_list.php accessed 20/04/2021

cave-roosting bat species of conservation concern are likely to 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.

Of the 30 potentially occurring species, 19 are considered to be SCC¹⁰ with 12 considered threatened (Appendix 5). Of these, four were confirmed during fieldwork and are discussed in more detail below:

African Savanna Elephant *Loxodonta africana*

Despite South Africa only having 4% of Africa's Savanna Elephant population, they are the best protected and most intensely managed¹¹. African Savanna Elephants are now mostly restricted to larger conservation areas in South Africa and the adjacent GKNP area supports an estimated 17 000 animals in 2017¹². KGR supports approximately 50 elephants¹³. Although assessed as Least Concern in South Africa, the world's largest land mammal is listed as EN by the IUCN due to poaching for ivory and meat, loss and fragmentation of habitat and conflict with humans in agricultural areas¹⁴. Extensive evidence of these animals was observed at most of the Application Sites and they probably frequently visit adjacent water holes and dams.

Leopard *Panthera pardus*

Upgraded to VU in the latest Red Data assessment¹⁵, leopards are severely threatened outside protected areas mainly due to habitat loss, direct and indirect persecution including hunting and extermination from wildlife ranchers and for traditional attire (Child *et al.*, 2016). The adjacent GKNP supports the largest population of these large cats in South Africa¹⁶. Tracks were observed adjacent to River Lodge although they probably regularly forage around all the Application Sites.

¹⁰ The same approach as Raimondo *et al.* (2009) has been followed here regarding species of conservation concern (i.e., those with a status of Near Threatened and Data Deficient) and threatened species (Vulnerable, Endangered and Critically Endangered)

¹¹ Blanc, 2008

¹² Ferreira *et al.*, 2017

¹³ KGR staff *pers. comm.*

¹⁴ Gobush, 2021

¹⁵ Child *et al.*, 2016

¹⁶ Child *et al.*, 2016

Cheetah *Acinonyx jubatus*

Cheetah have suffered significant habitat loss, persecution for their coats and poorly planned translocations and reintroductions across their narrow remaining range in South Africa. This has led to a regional assessment of VU¹⁷. Low numbers are present on Kapama (KGR staff *pers. comm.*). Individuals may occasionally pass through any of the development sites but would not remain for long as human disturbance levels are high.

Hippopotamus *Hippopotamus amphibius*

This large aquatic mammal is listed as VU by the IUCN due to habitat loss, range contraction, conflict from farmers and a decline in water quality¹⁸. They are resident in the larger dams in KGR, as well as along the Klaserie River in the east, and were recorded at a number of localities.

Lion *Panthera leo*

Although assessed as Least Concern in South Africa, Africa's largest member of the cat family is listed as VU by the IUCN due to indiscriminate killing in defense of human life and livestock, habitat loss, and prey base depletion¹⁹. This species is resident in KGR and probably regularly forages around all the Application Sites. Spoor was observed within Buffalo Camp in the southern portion of KGR but they are expected to wander widely within the reserve.

Giraffe *Giraffa camelopardalis*

Due to its abundance in most public and private reserves, the Giraffe is also considered as LC in South Africa²⁰. However, due to hunting, habitat loss and competition with domestic livestock for food, it is assessed as VU by the IUCN²¹. This species is locally common in the GKNP (*pers. obs.*) and is likely to regularly forage within the study area.

One threatened species is regularly recorded in KGR and is discussed below.

Ground Pangolin *Smutsia temminckii*

Threatened by an insatiable demand in its scales for the traditional medicine market in Asia, electrocutions on fences and harvesting for bush meat, Ground Pangolin is listed as VU in

¹⁷ Child *et al.*, 2016

¹⁸ Lewison & Pluháček, 2017

¹⁹ Bauer *et al.*, 2016

²⁰ Child *et al.*, 2016

²¹ Muller *et al.*, 2018

South Africa²². This species is regularly recorded in KGR²³ as many tourist game drives take place twice a day and the likelihood of finding one is relatively high, although the actual population size may be fairly low.

The remaining potentially occurring threatened species have a Low likelihood of occurrence due to general scarcity or absence in KGR (Appendix 5).

Seven potentially occurring species are assessed as NT, which are species close to or likely to soon qualify for the status of VU. Two species were located during fieldwork, and are described below:

Spotted Hyaena *Crocuta crocuta*

This large carnivore is dependent on conservation areas in South Africa for survival as it is frequently persecuted by stock farmers outside²⁴. An estimated 2000-5340 animals reside within the adjacent GKNP (SANParks, 2011). Tracks were located at a number of Application Sites and they are likely to regularly forage around the camps and staff villages.

White Rhinoceros *Ceratotherium simum*

A continued and increased threat from poaching and increasing illegal demand for rhino horn has resulted in this species being assessed as NT²⁵. This is a resident species in KGR and faeces were observed near Hongonyi Gate. It is expected to forage widely across KGR.

One additional Near Threatened mammal has a moderate likelihood of occurring within the study area and is described below.

African Clawless Otter *Aonyx capensis*

This small carnivore in the Mustelidae family is assessed as NT due to habitat destruction and pollution of rivers²⁶. This species has a high likelihood of residing along the Klaserie River on the eastern boundary of KGR.

The remaining potentially occurring NT species have a Low likelihood of occurrence due to general scarcity or absence in KGR (Appendix 5).

²² Child *et al.*, 2016

²³ KGR staff *pers. comm.*

²⁴ Child *et al.*, 2016

²⁵ Child *et al.*, 2016

²⁶ Child *et al.*, 2016

Twenty-five potentially occurring species are protected under either the LEMA or the National Environmental Management: Biodiversity Act Threatened or Protected Species (No. 10 of 2004) (NEMBA), nine of which were confirmed during fieldwork (Appendix 5).

5.2.2 Birds

5.2.2.1 Regional Overview

The savanna biome supports the highest diversity of bird species within the Southern African sub-region. The GKNP supports the largest birdlist of all conservation areas in South Africa with an estimated 57% of the birds found within the entire southern African sub-region²⁷. The study area, situated within the QDGS 2431 AC, is especially diverse with a total of 358 species recorded during the second Southern African Bird Atlas Project (SABAP2)²⁸, which is currently in progress. At a slightly finer scale, data from SABAP2 indicate that an even higher 369 bird species from 156 full protocol lists²⁹ have already been recorded from the five pentads (mapping units) in which the study area is situated (2420_3100, 2420_3105, 2425_3100, 2430_3100 & 2425_3105)³⁰. A pentad covers an area of approximately 77 km², which is considerably smaller than a QDGS (which contains nine pentads) and thus a better indication of which species occur in the study area. A map of these five pentads is provided in Figure 9 below. This figure compares favourably with other well-sampled pentads in the Lowveld and indicates a high level of avian diversity.

The study area falls within the Kruger National Park and Adjacent Areas Important Bird and 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. Several migratory and vagrant threatened species also occur³¹.

5.2.2.2 Local Avifaunal Assemblages

A total of 157 bird species were confirmed to occur in the study area during fieldwork and are listed in Appendix 4. 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. Further fieldwork around each of the Application Sites is likely to increase the species richness of each assemblage slightly but is unlikely to identify additional assemblages. Three assemblages were present and are dealt with below.

²⁷ Taylor *et al.*, 2015

²⁸ Data accessed from <http://sabap2.adu.org.za/coverage/qdgc/2431ac> on 22/04/2021

²⁹ Full protocol lists require at least two hours of coverage per list

³⁰ Data accessed from http://sabap2.birdmap.africa/coverage/group/459_Kpm on 22/04/2021

³¹ Taylor *et al.*, 2015

I. Woodland Assemblage

This is by far the largest and most diverse bird assemblage in the general KGR area. A number of common and conspicuous savanna species are present in this community, including Grey Go-away-bird *Corythaixoides concolor*, Crested Francolin *Dendroperdix sephaena*, Marico Sunbird *Cinnyris mariquensis*, Burchell's Starling *Lamprotornis australis*, Southern Yellow-billed Hornbill *Tockus leucomelas* White-browed Scrub Robin *Erythropygia leucophrys*, Blue Waxbill *Uraeginthus angolensis* and Arrow-marked Babbler *Turdoides jardineii*. Rarer species encountered include African Hawk-Eagle *Aquila spilogaster*, Great Spotted Cuckoo *Clamator glandarius*, Quail-Finch *Ortygospiza fuscocrissa* and Common House Martin *Delichon urbicum*. One-hundred and eleven species (71% of the total list) were recorded from this assemblage, by far the highest of the three assemblages (Appendix 4).

II. Riparian Forest / Thicket Assemblage

Forest and thicket vegetation occurs along the ephemeral drainage lines within the River Lodge and Buffalo Camp Application Sites as well as along the perennial Klaserie River around Karula Lodge and River Crossings. It provides refuge for several bird species that favour dense vegetation, such as White-throated Robin-Chat *Cossypha humeralis*, Purple-crested Turaco *Tauraco porphyreolophus*, Yellow-bellied Greenbul *Chlorocichla flaviventris*, Green-backed Camaroptera *Camaroptera brachyura* and Spectacled Weaver *Ploceus ocularis*. Rarer species found include Crowned Hornbill *Lophoceros alboterminatus*, Lesser Honeyguide *Indicator minor* and Marsh Warbler *Acrocephalus palustris*. Forty-six species (29% of the total list) were recorded from this assemblage, the second highest of the three assemblages (Appendix 4).

III. Aquatic Assemblage

The aquatic habitats within KGR are fairly diverse, and include various dams, ephemeral streams, the perennial Klaserie River and the various wastewater treatment works associated with the lodges. Common species recorded include Egyptian Goose *Alopochen aegyptiaca*, Striated Heron *Butorides striata*, African Jacana *Actophilornis africanus*, Water Thick-knee *Burhinus vermiculatus*, African Fish Eagle *Haliaeetus vocifer*, Blacksmith Lapwing *Vanellus armatus* and African Pied Wagtail *Motacilla aguimp*. Rarer species found include Black-winged Stilt *Himantopus himantopus* and Little Grebe *Tachybaptus ruficollis*. Twenty-six species were recorded from the Aquatic Assemblage, or 17% of the entire list, the lowest of the three assemblages (Appendix 4).

5.2.2.3 Conservation-Important Species

An estimated 36 conservation-important birds potentially occur within the study area (Appendix 5). Twenty-six of these are considered threatened, three of which were confirmed to occur during fieldwork and are discussed below:

Bateleur *Terathopius ecaudatus*

The Bateleur 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 species³². An estimated 550 – 650 breeding pairs are found within the GKNP³³. A single bird was observed foraging north of River Lodge and suitable nesting sites (tall trees such as *Senegalia nigrescens*) are present, although no nests were located during fieldwork. It is unlikely to nest near any of the Application Sites due to human disturbance.

White-backed Vulture *Gyps africanus*

This vulture is assessed as Critically Endangered (CR) due to anthropogenic impacts such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal trade³⁴. A number of birds were observed throughout KGR and suitable foraging and breeding habitat is present. However, it is unlikely to breed near any of the Application Sites due to human disturbance.

Hooded Vulture *Necrosyrtes monachus*

Hooded Vulture is also listed as CR due to anthropogenic impacts such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal trade³⁵. Two birds were observed in the southern portion of KGR, near Southern Camp, and suitable foraging and breeding habitat is present within the reserve. However, it is unlikely to breed near any of the Application Sites due to human disturbance.

Four additional threatened species have a moderate or high likelihood of occurring within KGR and are discussed below:

³² Taylor *et. al.*, 2015

³³ Barnes, 1998

³⁴ Taylor *et. al.*, 2015

³⁵ Taylor *et. al.*, 2015

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 reservoirs³⁶. It is largely restricted to conservation areas in South Africa and the GKNP area supports an estimated 500 – 700 pairs (Barnes, 1998). Birds will probably regularly utilise the study area to forage in and suitable breeding habitat is present. Like most of the larger threatened bird species, it is unlikely to nest within close proximity to any of the Application Sites due to high disturbance levels.

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 windows³⁷. 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 occur³⁸. Birds are likely to be resident in KGR in low numbers and suitable breeding habitat (cavities in large trees) is present.

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

These three vultures are all threatened due to similar anthropogenic impacts as the above-mentioned vultures such as habitat loss, poisoning, electrocution and collision with powerlines, drowning in concrete farm reservoirs and collection for the medicinal trade³⁹. As a result, White-headed Vulture is assessed as CR and Lappet-faced and Cape Vultures are assessed as EN. All could potentially forage within the study area and suitable breeding trees are present for all but the Cape Vulture which breeds on nearby Manoutsa cliffs west of Hoedspruit.

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 drownings⁴⁰. This species occupies very large territories (up to 150 km² in the

³⁶ Taylor *et. al.*, 2015

³⁷ Taylor *et. al.*, 2015

³⁸ Hockey *et al.*, 2005

³⁹ Taylor *et. al.*, 2015

⁴⁰ Taylor *et. al.*, 2015

Lowveld⁴¹) 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 KGR for breeding.

African Finfoot *Podica senegalensis*

The African Finfoot is an unobtrusive resident of relatively undisturbed rivers and streams across eastern South Africa. It is listed as VU due to a decrease in water quality and destruction of riparian habitats⁴² and is also a species that naturally occurs in low densities in specialised habitats. Although this species has a very low reporting rate within the KGR during SABAP2 so far, it is apparently resident along the Klaserie River⁴³, an area that is likely to be under-sampled.

Eight NT species potentially occur within the study area with only one confirmed during fieldwork and is discussed below.

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. A flock was recorded roosting at the waste water treatment works adjacent to River Lodge and it is likely to regularly forage within the study area. This species does not regularly breed in South Africa but a few pairs breed in central Swaziland⁴⁴.

One additional NT species has a moderate likelihood of occurring within the study area (Appendix 5). This species is discussed below:

European Roller *Coracias garrulous*

This Palearctic migrant prefers open, grassy areas within savanna. It is listed as Near Threatened due to habitat loss over some of its breeding grounds, particularly in Europe⁴⁵. Suitable foraging habitat is present in KGR and it is probably an annual non-breeding visitor.

The remaining SCC all have a low likelihood of occurring within the study area (Appendix 5). This is primarily due to a lack of suitable habitat or regional scarcity. Ten potentially

⁴¹ Hockey *et al.*, 2005

⁴² Taylor *et al.*, 2015

⁴³ KGR staff *pers. comm.*

⁴⁴ Taylor *et al.*, 2015

⁴⁵ Taylor *et al.*, 2015

occurring species are protected under the NEMBA, three of which were confirmed (Appendix 3).

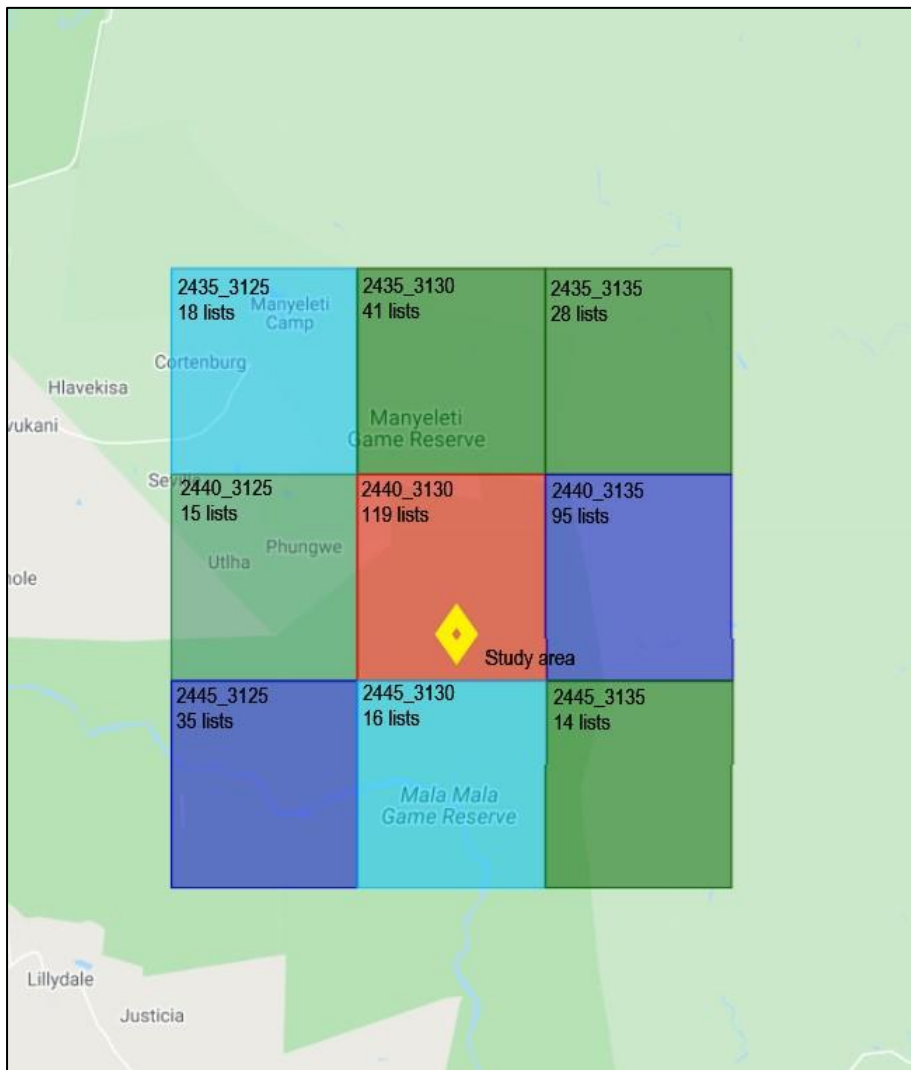


Figure 9. Codes and List Quantities for the Pentads surrounding the Study Area

5.2.3 Reptiles

5.2.3.1 Regional Overview

The Lowveld of eastern Limpopo province supports a high diversity of reptile species with 102 species already recorded from the degree grid 2431⁴⁶. Fifty-five species of reptiles have been recorded from the QDGS 2431 AC, in which Kapama is situated, as listed on the Reptile Atlas of Southern Africa website (<http://vmus.adu.org.za/>), indicating that reptile diversity in the area is high. However, reptile endemism is low which is to be expected as the area lies adjacent to Mozambique within the widespread savanna biome (Bates *et al.*, 2014). 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).

5.2.3.2 Confirmed Species

Nine reptiles were recorded during fieldwork (Appendix 4), all of which are common and widespread in the Lowveld (Bates *et al.*, 2014). Species recorded in the Woodland assemblage include Speke's Hinged Tortoise *Kinixys spekii*, Bushveld Lizard *Heliobolus lugubris* and Eastern Black-lined Plated Lizard *Gerrhosaurus intermedius*. Serrated Hinged Terrapin *Pelusios sinuatus* and Water Monitor *Varanus niloticus* were recorded from aquatic habitats. No reptiles were recorded from Forest / Thicket environments. Dedicated reptile surveys, including trapping, would no doubt have produced many 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, only three conservation-important reptiles potentially occur (Appendix 5). Only two of these are considered a SCC, namely Listed Sensitive Species No. 2, which is also protected under NEMBA ToPS, and Natal Hinged Tortoise *Kinixyx natalensis*. Although Listed Sensitive Species No. 2 was not recorded during fieldwork, this species is confirmed from Kapama⁴⁷. It is listed as VU due to degradation of aquatic environments, persecution and water pollution⁴⁸. The population in the adjacent GKNP is considered the largest in South Africa (Bates *et al.*, 2014). This species could occur in any of the dams, streams and rivers in KGR and breeding habitat is present along the

⁴⁶ http://vmus.adu.org.za/vm_sp_list.php accessed 22/04/2021

⁴⁷ KGR staff *pers. comm.*

⁴⁸ Bates *et al.*, 2014

Klaserie River. Natal Hinged Tortoise has a Low likelihood of occurrence due to regional rarity and lack of suitable hilly habitat. Southern African Python *Python natalensis* is protected under the National Environmental Management: Biodiversity Act (No.10 of 2004) and is probably a breeding resident in KGR.

5.2.4 Frogs

5.2.4.1 Regional Overview

The Lowveld of Limpopo and Mpumalanga provinces supports one of the richest areas in South Africa for frog diversity (Minter *et al.* 2004). Twenty-seven species of frogs have been recorded in the QDGS 2431 AC, and 41 in the degree grid 2431, as listed on the Frogs of Southern Africa website⁴⁹. However, frog endemism is very low with no potentially occurring endemic species present in the Kapama area (Minter *et al.*, 2004).

5.2.4.2 Confirmed Species

Only two species of frogs were recorded during fieldwork (Appendix 5), one from the Forest / Thicket community, namely Southern Foam Nest Frog *Chiromantis xerampelina*, and one from Aquatic Habitat, namely Common Platanna *Xenopus laevis*. Both frogs are common and widespread in the Lowveld (Minter *et al.*, 2004). Dedicated frog searches, including nocturnal surveys in spring 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

None of the potentially occurring frog species have a conservation-important status.

⁴⁹ http://vmus.adu.org.za/vm_sp_list.php accessed 22/04/2021

5.3 Ecological Sensitivity

5.3.1 Environmental Screening Tool

A Screening Report was generated for the study area using the DEA's online EST. The result of the query indicated that the study area has **High** Sensitivity for Animal Species Theme, **Medium** Sensitivity for Plant Species Theme and **Very High** Sensitivity for the Terrestrial Biodiversity Theme (Figure 10). These themes are discussed in more detail below.

Animal Theme

- Mammalia – *Lycaon pictus* – EN

African Wild Dog has a low likelihood of occurring within the study area as it is not a resident species in KGR, and only occasionally wanders through.

- Mammalia – *Loxodonta africana* - EN

African Savanna Elephant was confirmed during fieldwork and is a resident species in KGR.

- Mammalia – *Acinonyx jubatus* - EN

Cheetah has a moderate likelihood of occurring within the study area and is regularly recorded from KGR.

- Mammalia – *Cercopithecus alboqularis schwarzi* - EN

The inland, Escarpment race of Samango Monkey has a very low likelihood of occurrence due to the lack of suitable climax forest habitat on KGR.

- Mammalia – *Chrysospalax villosus* - VU

Even though this has been included by the EST, Rough-haired Golden Mole is unlikely to occur within the study area due to a lack of suitable grassland habitat.

- Mammalia - *Dasymys robertsii* - VU

Robert's Marsh Rat is dependent on aquatic habitats such as marshes, which are absent from within the study area.

- Mammalia – *Hippopotamus amphibius* - VU

Hippopotamus is confirmed from KGR and is a resident species in KGR.

- Mammalia – *Panthera leo* - VU

Lion has a moderate likelihood of occurring within the study area and is resident in KGR.

- Mammalia – *Smutsia temminckii* - VU

Pangolin has a moderate likelihood of occurring within the study area and is likely to be resident in KGR.

- Aves – *Ephippiorhynchus senegalensis* - EN

Saddle-billed Stork has a low likelihood of occurrence due to regional rarity and high disturbance levels adjacent to existing / planned infrastructure.

- Reptilia – *Kinixys natalensis* - VU

Limited habitat is present for this tortoise species, which only has one recent record in the QDGS 2431 AC. Therefore, it has a low likelihood of occurrence.

Plant Theme

- Flora – Sensitive species 1252

This species has low likelihood of occurrence due to lack of suitable habitat and distance from known localities.

- Flora – Sensitive species 738

This species has a low likelihood of occurring within the study area due to a lack of records in the Lowveld and regional rarity.

- Flora – Sensitive species 575

This species has a very low likelihood of occurring within the study area due to regional rarity and lack of recent records.

Terrestrial Biodiversity Theme

- The study area is situated within a Protected Area.

- The study area is situated within a CBA1 and CBA2.
- The study area is situated within an ESA1 and ESA2.
- KGR is situated within a Freshwater ecosystem priority area quinary catchment.
- KGR is situated within a Focus Areas for land-based protected areas expansion.

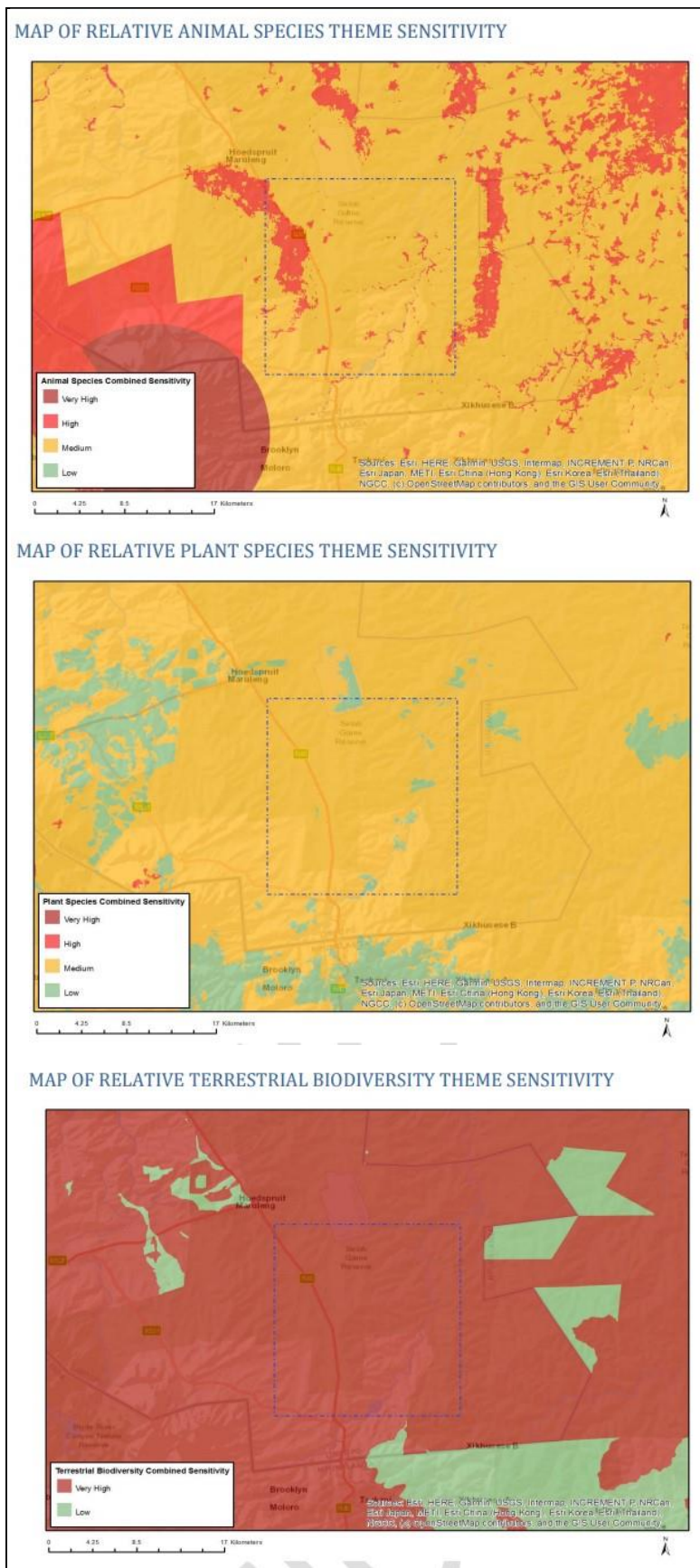


Figure 10. Environmental Screening Tool Themes relevant to Terrestrial Ecology

5.3.2 Limpopo Province Biodiversity Conservation Assessment

The Limpopo Province Biodiversity Conservation Assessment (LPBCA) classifies most of the study area and general surroundings as a **Critical Biodiversity Area 1 & 2** (CBA1, CBA2) (Desmet *et al.*, 2013). CBA's are described as **Irreplaceable** Sites that are required to meet biodiversity pattern and/or ecological processes targets. The primary land management objective for CBA's is to maintain them in a natural state with limited or no biodiversity loss and to rehabilitate degraded areas to a natural or near natural state. Compatible land uses for these areas include conservation activities such as eco-tourism and extensive game farming (Desmet *et al.*, 2013). A few small, formerly degraded / cultivated areas such as around the Airstrip and Hongonyi Gate are classified as **Ecological Support Area 2** (ESA2) which allows for greater flexibility with land use options. Figure 11 spatially presents the LPBCA within the study area.

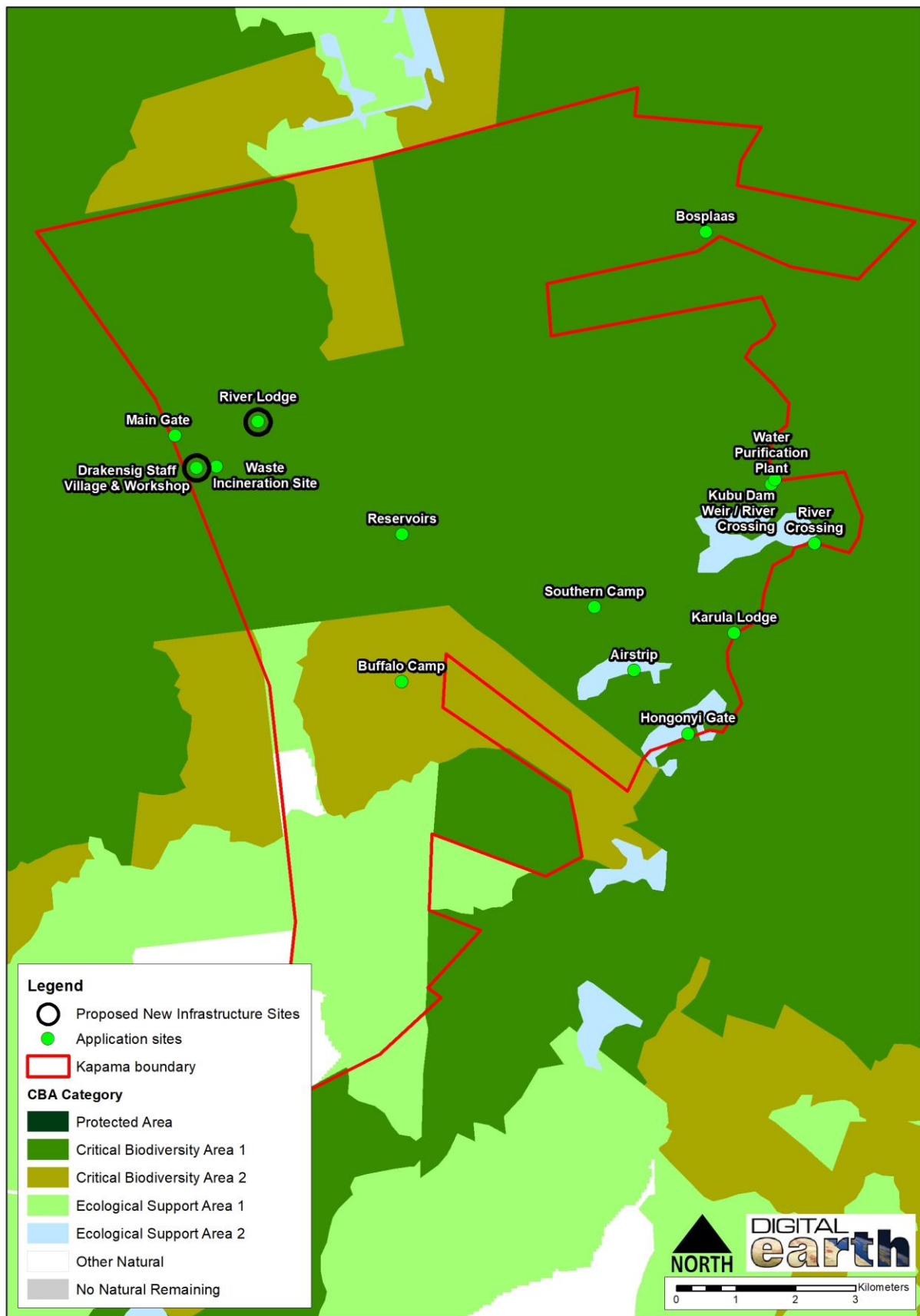


Figure 11. LPBCP Classification of Land Units within and adjacent to the Study Area

5.3.3 Site-specific Ecological Sensitivity Analysis

An Ecological Importance analysis of the two control sites in the four vegetation communities represented in the study area was undertaken using the methodology described in Section 4.3. The Degraded Woodland community is situated within a Protected Area and in an area assessed as ESA2 in the LPBCP. Several threatened fauna species are confirmed or potentially occur. However, it is situated within a large, protected area in the widespread savanna biome. The CI is therefore assessed as High. FI is only Medium as most of the vegetation present, despite being indigenous, is indicative of former degradation with many pioneer plants present. The integration of CI and FI results in a BI of **Medium**. Receptor Resilience (RR) is assessed as **Medium** as many savanna species regenerate moderately quickly due to favourable climatic conditions and rate of growth of taxa. When integrated with the Medium BI the SEI of the community is assessed as **Medium**.

Table 9 shows the calculation of the SEI of the study area, which is displayed in Figure 12 and Figure 13 below.

The Riparian Forest community is situated within a Protected Area and in an area assessed as CBA1 and CBA2 in the LPBCP. Several threatened fauna species have been confirmed within this community, it provides an important migration corridor for fauna and provides habitat for many specialised threatened aquatic species. Conservation Importance (CI) is therefore Very High. The community is also relatively pristine, leading to a Functional Integrity (FI) of High. When CI and FI are combined the resultant Biodiversity Importance (BI) is **Very High**. Receptor Resilience (RR) is assessed as **Low**, meaning that it will take relatively long to be ecologically restored with human intervention. When integrated with the Very High BI the SEI of Riparian Forest is assessed as **High**.

The Riparian Thicket vegetation community has High CI as a result of the number of confirmed and predicted occurrence of faunal SCC, being situated within a Protected Area and in an area assessed as CBA1 and CBA2 in the LPBCP. Riparian Thicket is also an important ecological corridor. However, it is situated within a large, protected area in the widespread savanna biome. The FI is assessed as High. The integration of High CI and High FI results in a BI of **High**. RR is **Medium** as most thicket species will regenerate moderately quickly due to favourable climatic conditions and rate of growth of taxa. When integrated with the Very High BI the SEI of the vegetation community is assessed as **Medium**.

The Closed Woodland community is situated within a Protected Area and in an area assessed as CBA1 and CBA2 in the LPBCP. Several threatened fauna species are confirmed, as well as NT and VU plant species. However, it is situated within a large, protected area in the widespread savanna biome. 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 **Medium** as many savanna species regenerate moderately quickly due to favourable climatic conditions and rate of growth of taxa. When integrated with the Very High BI the SEI of the community is assessed as **High**.

The Degraded Woodland community is situated within a Protected Area and in an area assessed as ESA2 in the LPBCP. Several threatened fauna species are confirmed or potentially occur. However, it is situated within a large, protected area in the widespread savanna biome. The CI is therefore assessed as High. FI is only Medium as most of the vegetation present, despite being indigenous, is indicative of former degradation with many pioneer plants present. The integration of CI and FI results in a BI of **Medium**. Receptor Resilience (RR) is assessed as **Medium** as many savanna species regenerate moderately quickly due to favourable climatic conditions and rate of growth of taxa. When integrated with the Medium BI the SEI of the community is assessed as **Medium**.

Table 9. Ecological Sensitivity of Vegetation Communities in the Study Area

Assessment Criteria	Riparian Forest	Riparian Thicket	Closed Woodland	Degraded Woodland
Conservation Importance	Very High	High	High	High
Functional Integrity	High	High	High	Medium
Biodiversity Importance	Very High	High	High	Medium
Receptor Resilience	Low	Medium	Medium	Medium
SITE ECOLOGICAL IMPORTANCE	High	Medium	Medium	Medium

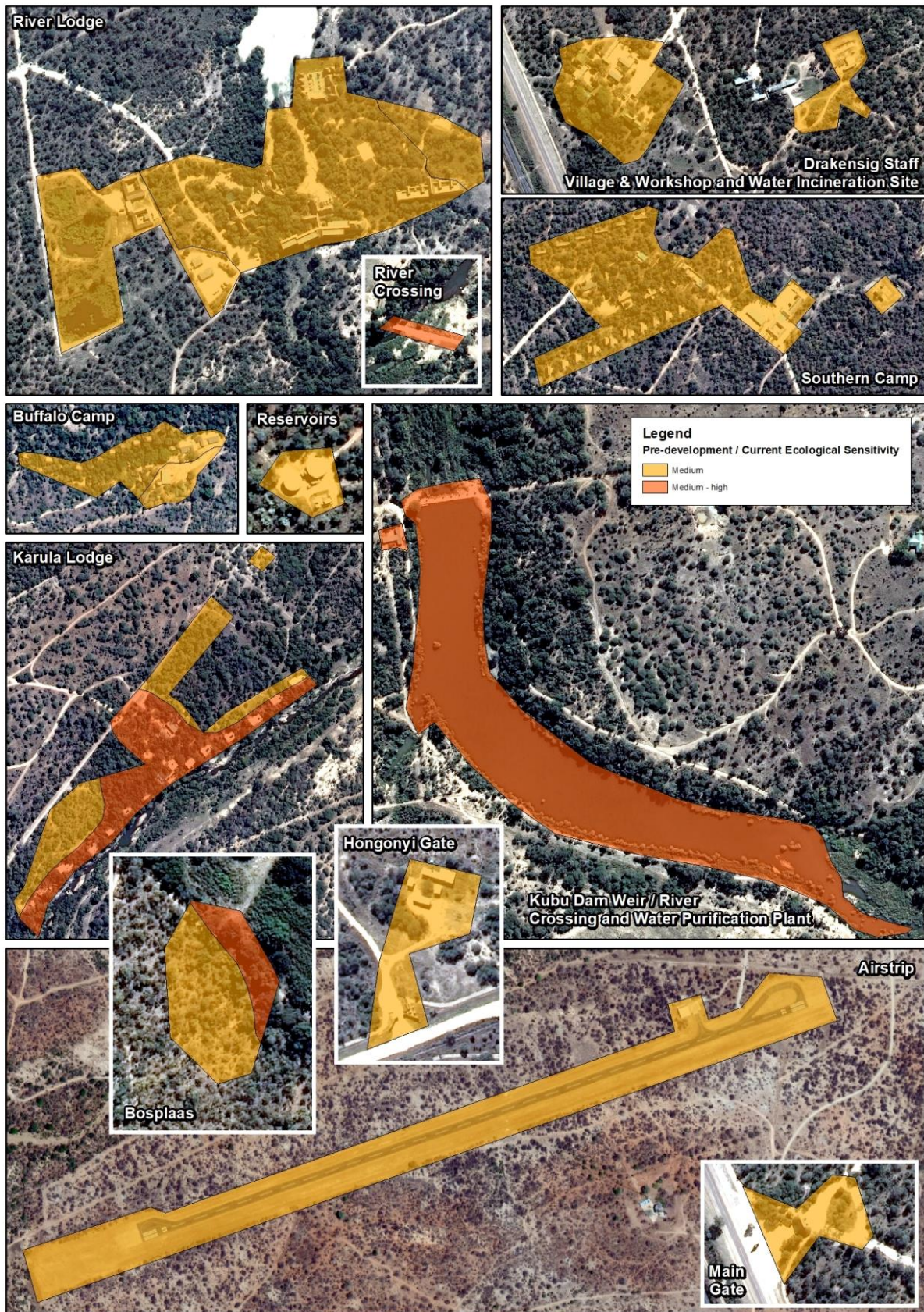


Figure 12. Site Ecological Importance of Vegetation Communities in the Study Area Prior to Construction of the Application Sites

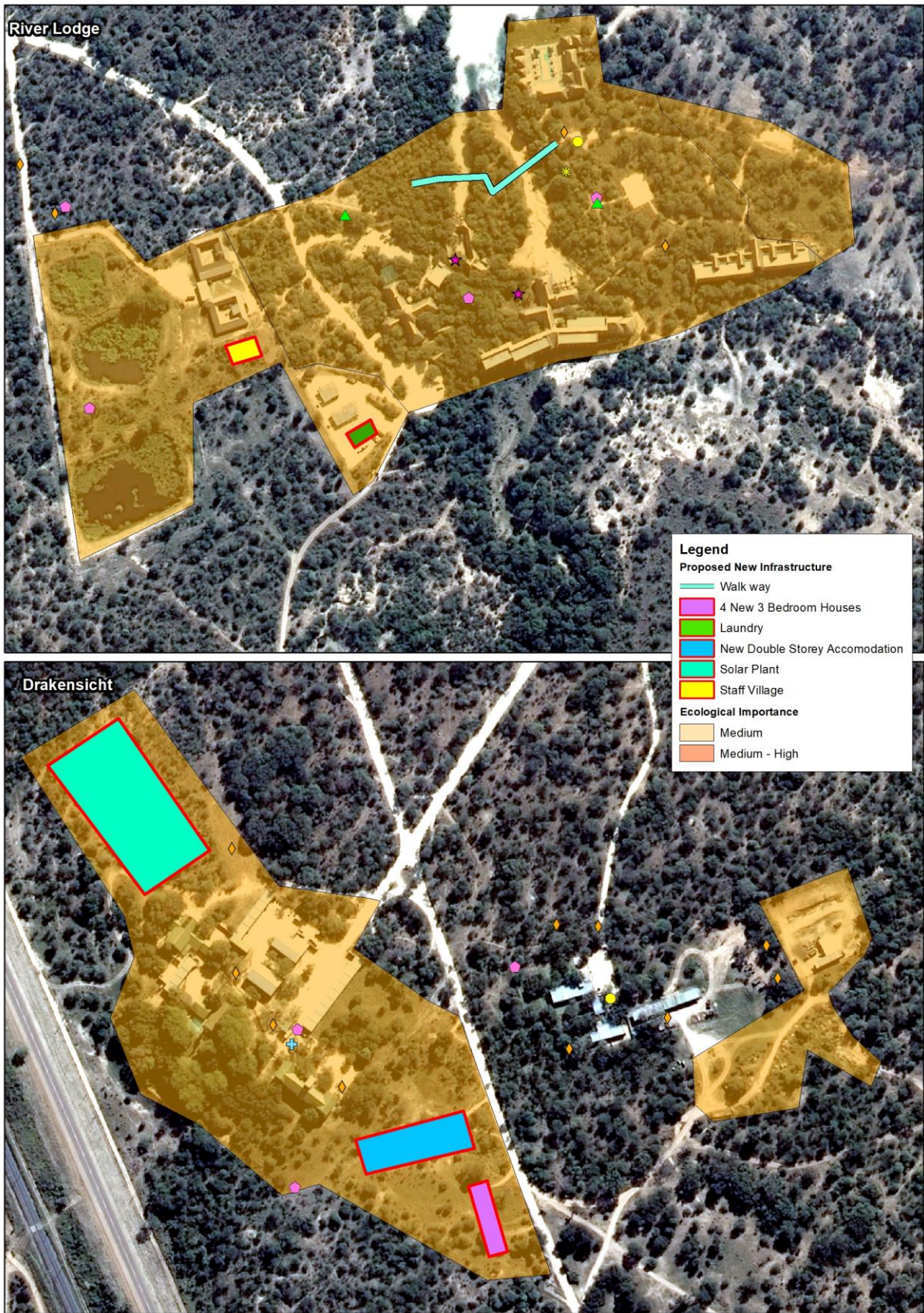


Figure 13. Site Ecological Importance of Vegetation Communities in the Study Area Relevant to the Proposed 2021 Developments

6. KEY CURRENT AND POTENTIAL IMPACTS

While a detailed impact assessment was not part of the terms of reference for this report, key general impacts associated with the existing developments on KGR on the ecology of the reserve are discussed below. The discussion of specific impacts per Application Site follows in Section 6.2 below. The assessments of these impacts are summarised in

Table 10.

6.1 General Impacts on the Ecology of KGR

- **Losses of portions of Critical Biodiversity Area 1** – many of the Application Sites were constructed in areas that have been assessed as a Critical Biodiversity Area 1 or CBA 2 by the LPBCA. The total area impacted is c. 60 ha in size and much of this area still contains natural vegetation (such as in the tourist lodges).
- **Degradation of a vegetation community with High SEI** – The Riparian Forest vegetation community is assessed as having High SEI. Four Application Sites are situated within this sensitive environment and a number of impacts have been identified, including loss of habitat, increased sedimentation and increased invasion by alien invasive plants.
- **Loss of plant species of conservation importance** – Eight species could have been impacted during the construction. The epiphyte *Ansellia africana* is listed as VU by the IUCN and many appear to have been removed from natural vegetation and only partially successfully transplanted within the camps. The trees *Elaeodendron transvaalense* and *Dalbergia melanoxylon* are listed as NT and occur in fair numbers, especially in the Riparian Thicket and Closed Woodland communities. The trees *Elaeodendron transvaalense*, *Sclerocarya birrea*, *Philenoptera violacea*, *Breonadia salicina* and *Balanites maughamii* are protected under the NFA and the epiphyte *Ansellia africana* and tree *Spirostachys africana* are protected under the LEMA.
- **Degradation of watercourses** – Several ephemeral streams (such as at River Lodge and Buffalo Camp) have been impacted through lodge and dam construction. Four developments are found along the Klaserie River. Current threats include habitat destruction, alien plant infestation, sedimentation and dumping of building rubble. Long-term changes in surface and subsurface runoff could negatively affect the riparian structure and function, particularly with respect to channel erosion caused by increased stormwater runoff.
- **Invasion of natural habitat by alien plants** – A total of 22 alien plants were recorded during fieldwork, 11 of which are listed as invasive under the under the NEMBA Alien & Invasive Species list. These are mostly found in Degraded

Woodland and the two Riparian communities. Invasion into other areas is likely as construction activities introduce seeds which may thrive in bare soil resulting from building activities.

- **Loss of habitat for conservation-important fauna** – KGR supports healthy populations of several EN and VU-listed mammals such as Leopard, Lion, Hippopotamus and African Savanna Elephant, as well as CR-listed White-backed and Hooded Vulture, EN Bateleur and more. Although the total area taken up by the Application Sites is fairly small compared to the total size of KGR, they have high disturbance levels and would repel sensitive species such as the larger raptors.

6.2 Specific Impacts of Application Sites on the Ecology of KGR

The specific identified impacts of the developed / proposed developments on KGR are described below. These are summarized in

Table 10.

Riparian Forest

Five Application Sites are situated partially or wholly within the Riparian Forest vegetation community, namely Karula Lodge, Klaserie River Crossing 1 & 2, Water Treatment Works and Bosplaas and are discussed below:

Approximately 3.2 ha of **Karula Lodge** is situated within Riparian Forest, with c. 13 guest chalets and the main lounge / deck area stretched out over a distance of 600 m along the Klaserie River. While some of the infrastructure is built on raised slits, the chalets are more solid in construction and this has resulted in a slight loss of riparian habitat. Disturbance levels on fauna do not appear to be high, with sightings of the elusive African Finfoot from the camp bearing evidence of this. However, several alien invasive plants have established, such as **Lantana camara*. The overall impact on the Riparian Forest in Karula is assessed as **Medium**.

Klaserie River Crossing 1 is a low concrete drift upstream of Klaserie River Crossing 2. This structure appears to have altered the course of the river through a significant increase in sediment (sand) deposits on the upstream side, forcing the river down the concrete spillway. The increase in sediments has resulted in an ideal environment for the establishment of alien invasive plant species such as **Xanthium spinosum*, **Ricinus communis* and **Sesbania punicea*. No significant loss of Riparian Forest habitat has taken place and the site only covers 0.2 ha. Therefore, the cumulative impacts are assessed as **Medium**.

Klaserie River Crossing 2, a large weir locally called Kubu Dam, is constructed over the Klaserie River downstream of the previous Application Site. Apart from the obvious, almost complete destruction of approximately 7.2 ha of Riparian habitat, this community is also providing disturbed habitat ideal for the establishment of alien invasive plant species such as **Salvinia adnata*, **Xanthium spinosum*, **Ricinus communis* and **Sesbania punicea*. Two positive impacts resulting from this development is the establishment of open water habitats which in turn benefit a wide variety of aquatic organisms and the sediment trapping the weir performs. However, the cumulative impact of this weir on Riparian Forest is assessed as **High**.

The **Water Purification Plant** is situated on the edge of the Riparian Forest community, adjacent to the previous Application Site. This new construction covers only 0.1 ha and, apart from a small loss of riparian habitat, did not appear to have any additional negative impacts. Therefore, the overall impact of this development is assessed as **Low**.

Bosplaas is a large, private residence situated in the far north-eastern portion of KGR and was under construction during the time of the survey. It straddles both Closed Woodland and Riparian Forest vegetation communities. The eastern portion of the building, covering just less than 0.2 ha in size, is situated within the Riparian Forest vegetation community, well within the 1/100-year flood line. This has resulted in a slight loss of riparian habitat. Current pollution levels are fairly high as much building rubble and litter is spread out around the construction site and it does not appear that an Environmental Control Officer (ECO) has been appointed. However, the significance of this impact is assessed as **Medium** due to the small size of the development.

Riparian Thicket

Two Application Sites are situated partially or wholly in Riparian Thicket, namely River Lodge and Buffalo Camp, as well as one proposed development, namely the Walkway at River Lodge. The impacts or potential impacts of these are discussed below:

River Lodge is situated in the north-western part of KGR and is the largest development site in within the reserve, containing over 160 beds, multiple entertainment / dining areas, a spa, large reception building, staff quarters and wastewater treatment works. The overall footprint measures approximately 8.4 ha, with 5.2 ha containing Riparian Thicket. Much of this vegetation is still present within the footprint. Some portions of the lodge have been constructed over two converging streams, which are dammed below the confluence just downstream of the camp. The central portions are situated within Riparian Thicket while the peripheral infrastructure is situated in Closed Woodland (discussed below). The proposed walkway may impede the movement of large herbivores such as African Savanna Elephant and Hippopotamus and may lead to the destruction of NT or protected plants. Despite the relatively large footprint, the confirmed presence of VU mammals such as Hippopotamus and African Elephant and a VU plant (*Ansellia africana*) and NT plant (*Elaeodendron transvaalense*), the impact of the lodge on Riparian Thicket is assessed as **Medium** due to the relatively intact state of the vegetation along the two ephemeral streams.

Buffalo Camp, a small 10-bed camp, is situated in the southern portion of KGR. Almost the entire camp is situated within the Riparian Thicket vegetation community. The tourist accommodation is built on tall stilts over the drainage line while the dining / entertainment and staff areas are solid constructions. Although a number of VU mammals were confirmed from the area, and a number of threatened birds potentially occur, the footprint is only 2 ha in size (1.4 ha in Riparian Thicket) and apart from some destruction of riparian habitat no additional negative impacts were observed. The overall impact of this camp on the Riparian Thicket is assessed as **Medium**.

Closed Woodland

Eleven Application Sites are partially or wholly situated within Closed Woodland and these are described below:

The western portion of **River Lodge**, now transformed into wastewater settling ponds and a staff village, as well as the far eastern portion where the reception building is now situated, would have contained 3.2 ha of Closed Woodland. In addition, the proposed community is rated as having High Conservation Value due to it being located within a CBA: Irreplaceable area, and the confirmed and potential presence of a number of threatened mammal and bird species, the ES is assessed as Medium and the impacts of the developments are also assessed as **Medium** given the small sizes of the areas that have been transformed and the amount of relatively intact Closed Woodland left around the buildings.

Drakensig Staff Village and Workshop is situated on what appears to be an old farm homestead in the western portion of KGR as many mature trees are present on the Site. This area covers approximately 2.8 ha and is assessed as having had **Medium** impact on the ecology of the area for the same reasons as River Lodge.

The **Main Gate** footprint covers only 0.5 ha and experiences fairly high traffic volumes throughout the day. This disturbance would ordinarily discourage most large bird species from nesting in the immediate vicinity, but the adjacent R40 tarred road would probably have created sufficient deterrent without the impact of the gate. Therefore, the small size and existing disturbance levels result in a **Low** impact on the ecology of the area.

Two large concrete **Reservoirs** and a cellphone tower are situated within Closed Woodland in the central part of KGR. This site measures only 0.2 ha and, despite the CBA status of the area and potential occurrence of several threatened fauna species, is assessed as having **Low** impact on the ecology of the site.

Southern Camp is a large lodge development situated in the southern portion of KGR. It covers 5.9 ha, all of which would have been located in Closed Woodland which, as stated above, has high conservation value but only a Medium ES. The camp contains extensive tracts of undisturbed Closed Woodland, and the actual footprint of the lodge, staff quarters and wastewater treatment plant is relatively low. However, the wastewater treatment works are not operating optimally, and considerable seepage is taking place into the surrounding vegetation. Therefore, the cumulative impacts on the ecology are assessed as **Medium**.

The western portions of **Karula Lodge**, including the Spa and Staff Quarters, are situated within the Closed Woodland vegetation community. This area measures 1.9 ha and transformation levels are moderate. As stated above, this community had Medium ES and the cumulative impacts result in a **Medium** assessment.

Closed Woodland formerly occurred in a small section of **Buffalo Camp**, although much of this community has been transformed. Although Closed Woodland has a Medium ES, the small size of the footprint results in a **Low** impact on the surrounding ecology.

Similarly, the western portion of the **Bosplaas Site** contains 0.2 ha of Closed Woodland which is situated within a CBA: Irreplaceable area with Medium ES. Several NFA-protected trees are scattered around, and some may have been destroyed, but the impact on the ecology in this area is still assessed as **Low**.

Four proposed developments are situated in Closed Woodland. A **Staff Village** and a **Laundry** are located adjacent to existing infrastructure at River Lodge. This area is already ecologically compromised due to high human disturbance levels, and the impact here is **Low**. There is a small chance of NT or protected plants being destroyed by construction. Two developments are planned for the area around the Drakensig Staff Village and Workshop, namely a **Solar Plant** and **New Staff Accommodation**. Both areas contain natural vegetation which may support populations of protected or NT plants. The impact of the Staff Accommodation is still **Low** due to the proximity to existing infrastructure and the high disturbance levels present. However, due to the larger size of the Solar Plant, likelihood

of protected or NT plant species being present and associated risks to avifauna, the impact of this development is **Medium**. Specific guidelines pertaining to solar developments are presented in Section 6.3.

Degraded Woodland

Four Application Sites are situated within Degraded Woodland, and are discussed below:

The **Airstrip** is situated in an area of land that appears to have been cultivated many years ago but is recovering and is now dominated by pioneer *Senegalia* and *Vachellia* species. This area is 18 ha in size and is classified as an ESA by the LPBCA. This vegetation community was assessed as having Low RSI, but High Conservation Value due to the potential occurrence of most of the threatened fauna species present on KGR. The overall ES Value is Medium, and the cumulative impacts, including loss of habitat for threatened fauna species, long footprint shape which may hinder game movement and disturbance through the noise of aircraft leads to an overall impact of **Medium**.

The Hongonyi Gate, situated in the far southern portion of KGR, is also assessed as an ESA in the LPBCA and was assessed as having Medium ES due to the confirmed and potential presence of SCC. However, the footprint is only 0.6 ha in size and situated adjacent to an existing district road and the overall impact on the ecology at the site is rated as **Low**.

The **Waste Incineration / Dump Site** is situated near the Drakensig Staff Quarters and Workshop, in the western portion of KGR. This site is used for the incineration of waste, presumably from River Lodge and associated staff housing sites, as well as for dumping of objects not suitable for the incinerator. The site also contains an old but seemingly renovated farmhouse and workshop area and has experienced habitat degradation for many decades. Therefore, the Site is classified as Degraded Woodland which has Medium ES. The dump site is unfenced and access for humans and animals is uncontrolled, potentially leading to injury or even death from the contents of the sites. Soft waste appears to be thrown into pits and burnt, leading to local pollution of the area. The site is only 1 ha in size, which leads to an impact assessment on the site of **Medium**.

The **Karula Lodge Wastewater Settling Pond** is situated in Degraded Woodland just outside the camp boundary. This site is extremely small, covering 0.1 ha, but is unfenced and animals have direct access to the pond. The impact on the immediate area is assessed as **Low**.

6.3 BirdLife South Africa Solar Guidelines

BirdLife South Africa has produced a set of guidelines to minimise the impact of solar facilities on birds in South Africa⁵⁰. In it is stressed that, although solar energy is beneficial to the environment in many ways, it must be developed with sensitivity to avoid environmental unsustainability. Solar arrays potentially negatively impact avifauna through collisions with photovoltaic panels or associated infrastructure (such as powerlines), habitat destruction, disturbance of SCC and chemical pollution using dust-suppressants and cleaning of panels. The mirror-like panels may also appear water-like and injure or kill waterbirds who are misled into landing on the apparent waterbody⁵¹. Almost 60 000 bird fatalities are estimated to occur annually at solar facilities in southern California alone⁵².

Critical factors to be considered when planning a solar facility include the following points:

1. Site selection – solar facilities should ideally be situated in areas that are already degraded or transformed.
2. Landscape management – clearing of natural vegetation should be kept to a minimum and infrastructure should not attract birds (e.g., settling ponds).
3. Choice of infrastructure – the use of Photovoltaic (PV) systems is preferred over Concentrated Solar Power (CSP) systems as their impact on avifauna is far less.
4. Infrastructure management – all infrastructure should be designed to minimise the impact on birds. This could include constructing solar infrastructure in areas that are already disturbed, minimising the use of lights that may attract insects (and therefore insectivorous birds) and marking of fences and powerlines to minimise collisions.
5. Deterrents – adequate bird deterrents should be employed, such as fencing off the solar facility and clearly marking powerlines.

⁵⁰ Jenkins *et al.*, 2017

⁵¹ Lovich & Ennen, 2011

⁵² Walston *et al.*, 2016

Table 10. Summary of Areas and Impact Assessment of the Application Sites within the Study Area

APPLICATION SITE	Vegetation Community	Veg Community Portion Size (ha)	Total Area (ha)	SEI	Ecological Impact Rating
EXISTING INFRASTRUCTURE					
River Lodge	Riparian Thicket	5,2	8,4	Medium	Medium
	Closed Woodland	3,2		Medium	Medium
Karula Lodge	Riparian Forest	3,2	5,2	Medium	Medium
	Closed Woodland	1,9		Medium	Medium
	Degraded Woodland	0,1		Medium	Low
Buffalo Camp	Riparian Thicket	1,4	1,8	Medium	Medium
	Closed Woodland	0,4		Medium	Low
Southern Camp	Closed Woodland	5,9	5,9	Medium	Medium
Drakensig Staff Village & Workshop	Closed Woodland	2,8	2,8	Medium	Medium
Waste Incineration Site	Degraded Woodland	1	1	Medium	Medium
Main Gate	Closed Woodland	0,5	0,5	Medium	Low
Hongonyi Gate	Degraded Woodland	0,6	0,6	Medium	Low
Reservoirs	Closed Woodland	0,2	0,2	Medium	Low
Airstrip	Degraded Woodland	18,1	18,1	Medium	Medium
Water Purification Plant	Riparian Forest	0,1	0,1	High	Low
Klaserie River Crossing 1	Riparian Forest	0,2	0,2	High	Medium
Klaserie River Crossing 2 (Kubu Dam)	Riparian Forest	7,2	7,2	High	High
Bosplaas	Riparian Forest	0,2	0,7	High	Medium
	Closed Woodland	0,5		Medium	Low
Subtotal			52,7		
PROPOSED INFRASTRUCTURE (2021 Additions)					
Walkway	Riparian Thicket	0,0115	0,0115	Medium	Low
Staff Village	Closed Woodland	0,035	0,035	Medium	Low
Laundry	Closed Woodland	0,022	0,022	Medium	Low
Staff Accommodation	Closed Woodland	0,2	0,2	Medium	Low
Solar Plant	Closed Woodland	0,6	0,6	Medium	Medium
Subtotal			0,8685		
TOTAL AREA OF APPLICATION SITES			53,5685		

7. CONCLUSION AND RECOMMENDATIONS

The ecological importance and impacts of existing and proposed developments on KGR was assessed as part of a retrospective and application under Section 24(G) of the NEMA. The various existing developments have impacted the ecology of the area, and include lodges, staff housing, workshops, waste incineration and dumping, weir construction, wastewater treatment works and a water purification plant. The construction and operation of this infrastructure has taken place over many years and has had a limited overall impact on the ecology of the area. Examples of this are the extensive tracts of natural vegetation left within the lodge grounds, the rehabilitation of formerly cultivated areas and the fencing off of most of the Application Sites to restrict access for humans and animals alike. In addition to the retrospective application, five proposed developments are now included in the scope. These are two staff quarters, a walkway, a solar platn and a laundry. All are situated adjacent to existing infrastructure.

Four vegetation communities were identified as having been impacted on by the Application Sites surveyed, with Riparian Forest being assessed as having High SEI. The remaining three communities (Riparian Thicket, Closed Woodland and Degraded Woodland) have been assessed as having Medium SEI. The primary drivers of these assessments include most of KGR is classified as a CBA: Irreplaceable area, confirmed presence of several CR, EN, VU and NT species and potential occurrence of a number of additional species. However, KGR is situated within Granite Lowveld adjacent to the c. 2 million ha GKNP which is all formally conserved and therefore does not have many ecological threats. Granite Lowveld is not listed as a Threatened Ecosystem and KGR is managed as a tourism enterprise, which is one of the permissible land uses for CBA: Irreplaceable areas in the LPBCA. Most of the impacts of the Application Sites have been assessed as either Low or Medium, with only one site (Klaserie River Crossing 2) being assessed as having a High impact on the Riparian Forest community. The cumulative impact of the unauthorised developments on KGR should also be taken into context; the area was formerly a cattle and crop farm and now protects some of the most threatened species in South Africa such as Hooded and White-backed Vultures, Leopard and Ground Pangolin. Biodiversity has significantly increased since agriculture ceased, and the tourism venture was initiated and it appears as if the reserve is being managed to maintain and even improve it.

While most of the construction work has already taken place, some preliminary recommendations and mitigation measures for KGR are listed below:

- It is recommended that no further development takes place on KGR without walk-through inspections of the five new (2021) proposed additional developments to search for protected plants or plant SCC.
- 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 is especially applicable to * *Lantana camara*, * *Datura stramonium*, * *Ricinus communis*, * *Xanthium spinosum*, * *Salvinia adnata*, * *Sesbania punicea* and * *Opuntia stricta*.
- It is important that weed control, if involving herbicides, be managed correctly to reduce the impact on the adjacent natural vegetation. Regular inspections should be made to determine if any additional alien plants have established.
- All existing roads should contain adequate stormwater drainage and erosion control measures.
- All litter and building rubble around the Bosplaas Application Site should be removed and disposed of in a suitable manner. Additionally, the contractors should be encouraged to maintain the site free of litter and rubble.
- The open dumps adjacent to the Waste Incinerator Site should be tidied up and adequately fenced off to prevent access, similar to what has been done around the Airstrip.
- All wastewater treatment sites / settling ponds should be fenced off to prevent access by animals. The leak below the Southern Camp settling ponds should be repaired.
- The solar plant site must be fenced off to prevent access and potential injury of fauna from the panels. The fence must be electrified with at least two strands to repel larger mammals such as elephant and giraffe and must contain visible markers to deter fauna.
- Trenching for pipes and cables around the solar plant should be kept to a minimum.
- Lights around the solar plant to be kept to a minimum to reduce the potential collision of nocturnal migrating birds into the panels, cables, fence etc.
- It is recommended that all construction labour teams are accommodated off-site, thereby reducing the risk of poaching during the night.
- Labour teams should be supervised during the day and no access to the natural habitat adjacent to the study area should be allowed.

Provided the recommendations suggested in this report are followed, there is no objection to the application for authorization under Section 24 (g) (Applications for rectification of unlawful commencement or continuation of listed activities under NEMA). However, if the mitigation measures given in Section 7 above are not implemented then we would object to the development application.

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9. APPENDICES

Appendix 1. Checklist of Flora recorded during fieldwork

Taxa	Growth Form	Red Data	Protected	NEMBA Alien Invasive Plant Category	Vegetation Communities			
					Riparian Forest	Riparian Thicket	Closed Woodland	Degraded Woodland
					Karula Lodge Klaserie River Crossing 1 Klaserie River Crossing 2 Bosplaas Water Purification Plant	River Lodge Buffalo Camp Proposed Walkway	River Lodge Drakensig Main Gate Reservoirs & Cell Tower Southern Camp Karula Lodge Buffalo Camp Bosplaas Proposed Solar Plant Proposed Staff Accomms Proposed Staff Village Proposed Laundry	Airstrip Hongonyini Gate Waste Incineration Karula Wastewater Works
Family Acanthaceae								
<i>Barleria elegans</i> S.Moore ex C.B.Clarke	herb				r	u		
<i>Barleria obtusa</i> Nees	climber					r		
<i>Hypoestes forskalii</i> (Vahl) R.Br.	herb					f		
<i>Justicia flava</i> (Vahl) Vahl	herb						u	u
<i>Ruellia patula</i> Jacq.	herb						r	r
Family Amaranthaceae								
* <i>Achyranthes aspera</i> L. var. <i>aspera</i>	herb						r	r
* <i>Alternanthera pungens</i> Kunth	herb						r	f
* <i>Gomphrena celosioides</i> Mart.	herb						r	u
* <i>Guilleminea densa</i> (Willd. ex Roem. & Schult.) Moq.	herb							u
<i>Kyphocarpa angustifolia</i> (Moq.) Lopr.	herb						f	
Family Amaryllidaceae								
<i>Crinum macowanii</i> Baker	geophyte						r	
Family Anacardiaceae								

<i>Lannea discolor</i> (Sond.) Engl.	tree							r
<i>Lannea schweinfurthii</i> (Engl.) Engl. var. <i>stuhlmannii</i> (Engl.) Kokwaro	tree					r	r	
<i>Ozoroa engleri</i> R.Fern. & A.Fern.	tree						r	
<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA		r	r	d	r
<i>Searsia queinzii</i> (Sond.) F.A.Barkley	tree				u	f		r
Family Apocynaceae								
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	shrub				r	u		
<i>Carissa spinarum</i> L.	climber					r		
<i>Cynanchum gerrardii</i> (Harv.) Liede	succulent					r		
<i>Cynanchum viminale</i> (L.) L.	succulent					r		
* <i>Nerium oleander</i> L.	tree			1b		r		r
Family Araceae								
<i>Stylochaeton natalensis</i> Schott	herb						r	
Family Asparagaceae								
<i>Asparagus falcatus</i> L.	climber					u	r	
<i>Asparagus setaceus</i> (Kunth) Jessop	climber				r	r		
Family Asphodelaceae								
<i>Aloe marlothii</i> A.Berger subsp. <i>marlothii</i>	succulent						r	
Family Asteraceae								
* <i>Acanthospermum australe</i> (Loefl.) Kuntze	herb			1b				u
* <i>Ageratum conyzoides</i> L.	herb					r		
* <i>Bidens pilosa</i> L.	herb						r	u
<i>Dicoma tomentosa</i> Cass.	herb						r	r
<i>Emilia transvaalensis</i> (Bolus) C.Jeffrey	herb							r
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i>	herb						r	
	dwarf							
<i>Gymnanthemum crataegifolium</i> (Hutch.) H.Rob.	shrub					r		
<i>Litogyne gariepina</i> (DC.) Anderb.	herb				r	r		
<i>Polydora steetziana</i> (Oliv. & Hiern) H.Rob.	herb					r	u	r
* <i>Schkuhria pinnata</i> (Lam.) Kuntze ex Thell.	herb						r	r
* <i>Tagetes minuta</i> L.	herb				r	r	r	u
* <i>Tridax procumbens</i> (L.) L.	herb				r			r
* <i>Xanthium spinosum</i> L.	herb			1b	r			r
* <i>Zinnia peruviana</i> (L.) L.	herb					r	r	u

Family Balanitaceae <i>Balanites maughamii</i> Sprague subsp. <i>maughamii</i>	tree		NFA				r		
Family Bignoniaceae * <i>Jacaranda mimosifolia</i> D.Don	tree			1b		r			
Family Boraginaceae <i>Ehretia amoena</i> Klotzsch <i>Ehretia obtusifolia</i> Hochst. ex A.DC. <i>Heliotropium strigosum</i> Willd.	tree tree herb					r r r	u	r	
Family Burseraceae <i>Commiphora neglecta</i> I.Verd. <i>Commiphora schimperi</i> (O.Berg) Engl.	tree tree					f u	r r		
Family Cactaceae * <i>Opuntia stricta</i> (Haw.) Haw.	succulent			1b			r	r	
Family Capparaceae <i>Capparis tomentosa</i> Lam.	climber					r	r		
Family Celastraceae <i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	tree	NT	NFA				r		
<i>Gymnosporia glaucophylla</i> Jordaan	tree						r	r	
<i>Gymnosporia maranguensis</i> (Loes.) Loes.	shrub						r	r	
<i>Gymnosporia senegalensis</i> (Lam.) Loes.	shrub					u	u		
<i>Mystroxydon aethiopicum</i> (Thunb.) Loes. subsp. <i>schlechteri</i> (Loes.) R.H.Archer	tree					f	f		
Family Combretaceae <i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i> <i>Combretum collinum</i> Fresen. subsp. <i>suluense</i> (Engl. & Diels) Okafor <i>Combretum erythrophyllum</i> (Burch.) Sond. <i>Combretum hereroense</i> Schinz <i>Combretum imberbe</i> Wawra <i>Combretum zeyheri</i> Sond. <i>Terminalia prunioides</i> M.A.Lawson <i>Terminalia sericea</i> Burch. ex DC.	tree tree tree tree tree tree tree tree		NFA				r d f r u r u	d r f u u r f	u u
Family Commelinaceae <i>Commelina benghalensis</i> L. <i>Commelina erecta</i> L.	herb herb					r		r	

Family Convolvulaceae <i>Evolvulus alsinoides</i> (L.) L. <i>Ipomoea magnusiana</i> Schinz <i>Ipomoea</i> sp. (no flowers)	herb climber climber						r r	
Family Crassulaceae <i>Cotyledon barbeyi</i> Schweinf. ex Baker <i>Kalanchoe paniculata</i> Harv. <i>Kalanchoe rotundifolia</i> (Haw.) Haw.	succulent succulent succulent					r r	r	
Family Cucurbitaceae <i>Cucumis zeyheri</i> Sond.	climber					r		
Family Cyperaceae <i>Cyperus dives</i> Delile <i>Cyperus sexangularis</i> Nees <i>Cyperus</i> sp. <i>Pycreus macranthus</i> (Boeckeler) C.B.Clarke	sedge sedge sedge sedge				u u r r	r		
Family Dioscoreaceae <i>Dioscorea cotinifolia</i> Kunth	climber					r		
Family Dracaenaceae <i>Sansevieria hyacinthoides</i> (L.) Druce	succulent					r	r	
Family Ebenaceae <i>Diospyros mespiliformis</i> Hochst. ex A.DC. <i>Euclea divinorum</i> Hiern <i>Euclea natalensis</i> A.DC. subsp. <i>angustifolia</i> F.White	tree tree tree				d r r	r d r	u r	u r
Family Euphorbiaceae <i>Croton menyharthii</i> Pax <i>Euphorbia ingens</i> E.Mey. ex Boiss. * <i>Ricinus communis</i> L. var. <i>communis</i> <i>Spirostachys africana</i> Sond.	shrub tree dwarf shrub tree					u r	r	
			LEMA	2	r r	u		
Family Fabaceae * <i>Sesbania bispinosa</i> (Jacq.) W.Wight var. <i>bispinosa</i> * <i>Sesbania punicea</i> (Cav.) Benth. <i>Aeschynomene indica</i> L. <i>Albizia harveyi</i> E.Fourn.	shrub shrub dwarf shrub tree					r r r	r	r
				1b	r r r	r		

<i>Bolusanthus speciosus</i> (Bolus) Harms	tree						u	r
<i>Chamaecrista absus</i> (L.) H.S.Irwin & Barneby	herb						u	
<i>Crotalaria</i> sp. (no flowers)	herb					r		
<i>Dalbergia melanoxyloides</i> Guill. & Perr.	tree	NT‡			r	u	r	
<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt	tree				r		f	f
<i>Indigofera</i> sp. (no flowers)	herb							r
<i>Mundulea sericea</i> (Willd.) A.Chev. subsp. <i>sericea</i>	tree					r	u	
<i>Ormocarpum trichocarpum</i> (Taub.) Engl.	tree					r	r	
<i>Peltophorum africanum</i> Sond.	tree					r	u	r
<i>Philenoptera violacea</i> (Klotzsch) Schrire	tree		NFA		r		r	
<i>Pterocarpus rotundifolius</i> (Sond.) Druce subsp. <i>rotundifolius</i>	tree						r	
<i>Rhynchosia caribaea</i> (Jacq.) DC.	climber					r	r	
<i>Schotia brachypetala</i> Sond.	tree				f	d		
<i>Senegalia burkei</i> (Benth.) Kyal. & Boatwr.	tree					r	u	r
<i>Senegalia nigrescens</i> (Oliv.) P.J.H.Hurter	tree					r	f	r
<i>Senna petersiana</i> (Bolle) Lock	tree						r	
	dwarf							
<i>Tephrosia rhodesica</i> Baker f. var. <i>rhodesica</i>	shrub							r
<i>Vachellia exuvialis</i> (L.Verd.) Kyal. & Boatwr.	shrub				r	u	r	
<i>Vachellia gerrardii</i> (Benth.) P.J.H.Hurter subsp. <i>gerrardii</i>	tree						u	
<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb. subsp. <i>kraussiana</i> (Benth.) Kyal. & Boatwr.	tree					r	r	d
<i>Vachellia robusta</i> (Burch.) Kyal. & Boatwr. subsp. <i>clavigera</i> (E.Mey.) & Kyal. & Boatwr.	tree				u	u		
<i>Vachellia sieberiana</i> (DC.) Kyal. & Boatwr. var. <i>woodii</i> (Burt Davy) Kyal. & Boatwr.	tree				r			
<i>Vachellia tortilis</i> (Forssk.) Gallaso & Banfi subsp. <i>heteracantha</i> (Burch.) Kyal. & Boatwr.	tree						r	d
<i>Vachellia xanthophloea</i> (Benth.) P.J.H.Hurter	tree				u	r		
Family Geraniaceae								
<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	herb							r
Family Hyacinthaceae								
<i>Drimia altissima</i> (L.f.) Ker Gawl.	bulb						r	
<i>Drimiopsis crenata</i> van der Merwe	bulb					r		
Family Lamiaceae								
<i>Leucas glabrata</i> (Vahl) Sm. var. <i>glabrata</i>	herb						r	r

<i>Ocimum americanum</i> L. var. <i>americanum</i>	herb						u	u
Family Loranthaceae								
<i>Oncocalyx bolusii</i> (Sprague) Wiens & Polhill	epiphyte					r		
<i>Plicosepalus kalachariensis</i> (Schinz) Danser	epiphyte				r	r		
Family Malpigiaceae								
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	climber						r	
Family Malvaceae								
<i>Abutilon austro-africanum</i> Hochr.	dwarf							
	shrub					r	f	u
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	tree						r	
<i>Grewia bicolor</i> Juss. var. <i>bicolor</i>	shrub					u	f	r
<i>Grewia flavescens</i> Juss.	shrub				r	f	u	
<i>Grewia hexamita</i> Burret	tree					u		
<i>Grewia villosa</i> Willd. var. <i>villosa</i>	shrub						r	
	dwarf							
<i>Hibiscus calyphyllus</i> Cav.	shrub					r		
	dwarf							
<i>Hibiscus micranthus</i> L.f. var. <i>micranthus</i>	shrub						r	
<i>Hibiscus praeteritus</i> R.A.Dyer	herb					r		
	dwarf							
<i>Pavonia burchellii</i> (DC.) R.A.Dyer	shrub							r
	dwarf							
<i>Sida dregei</i> Burtt Davy	shrub							u
<i>Waltheria indica</i> L.	herb					r	f	r
Family Meliaceae								
<i>Turrea obtusifolia</i> Hochst.	shrub					r		
Family Menispermaceae								
<i>Cocculus hirsutus</i> (L.) Diels	climber					r		
<i>Tinospora fragosa</i> Verdoorn & Troupin	climber					r		
Family Moraceae								
<i>Ficus sycomorus</i> L. subsp. <i>sycomorus</i>	tree					f		
Family Oleaceae								
<i>Jasminum fluminense</i> Vell. subsp. <i>fluminense</i>	climber					r	r	r
<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	tree						r	
Family Onagraceae								
<i>Ludwigia adscendens</i> subsp. <i>diffusa</i> (Forssk.) P.H.Raven	herb					u		

Family Orchidaceae								
<i>Ansellia africana</i> Lindl.	epiphyte	VU±			r	r	r	
Family Pedaliaceae								
<i>Ceratotheca triloba</i> (Bernh.) Hook.f.	herb						r	r
<i>Dicerocaryum senecioides</i> (Klotzsch) Abels	creeper						r	r
Family Phyllanthaceae								
<i>Flueggea virosa</i> (Roxb. ex Wild.)	shrub					r		
<i>Phyllanthus reticulatus</i> Poir. var. <i>reticulatus</i>	shrub				u	u	r	
Family Poaceae								
<i>Aristida adscensionis</i> L.	grass					r	u	r
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	grass					r	u	
<i>Brachiaria serrata</i> (Thunb.) Stapf	grass						u	u
<i>Cymbopogon nardus</i> (L.) Rendle	grass					r		
<i>Cynodon dactylon</i> (L.) Pers.	grass							u
<i>Dactyloctenium giganteum</i> Fisher & Schweick.	grass							r
<i>Digitaria eriantha</i> Steud.	grass					r		r
<i>Echinochloa colona</i> (L.) Link	grass				r		r	
<i>Eragrostis curvula</i> (Schrud.) Nees	grass						r	r
<i>Eragrostis gummiflua</i> Nees	grass						r	
<i>Eragrostis lehmanniana</i> Nees var. <i>lehmanniana</i>	grass					r	d	
<i>Eragrostis nindensis</i> Ficalho & Hiern	grass							r
<i>Eragrostis rigidior</i> Pilg.	grass						r	r
<i>Eragrostis superba</i> Peyr.	grass						f	u
<i>Eragrostis trichophora</i> Coss. & Durieu	grass						r	
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	grass						r	f
<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton	grass						r	
<i>Leersia hexandra</i> Sw.	grass				u			
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	grass					r	u	
<i>Panicum deustum</i> Thunb.	grass				r	r		
<i>Panicum maximum</i> Jacq.	grass				u	u	u	u
<i>Perotis patens</i> Gand.	grass						r	
<i>Phragmites australis</i> (Cav.) Steud.	reed				d			
<i>Phragmites mauritianus</i> Kunth	reed				u			
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	grass						u	

<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				r		u	
<i>Themeda triandra</i> Forssk.	grass						u	
<i>Urochloa mosambicensis</i> (Hack.) Dandy	grass						u	
Family Polygonaceae								
<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	herb					r		
Family Portulacaceae								
<i>Talinum cafrum</i> (Thunb.) Eckl. & Zeyh.	herb						r	
Family Rhamnaceae								
<i>Berchemia zeyheri</i> (Sond.) Grubov	tree				r	r		
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	tree				r	r	u	u
Family Rubiaceae								
<i>Agathisanthemum bojeri</i> Klotzsch subsp. <i>bojeri</i>	herb						u	r
<i>Breonadia salicina</i> (Vahl) Hepper & J.R.I.Wood	tree		NFA		r			
<i>Coddia rudis</i> (E.Mey. ex Harv.) Verdc.	shrub					u	r	
<i>Plectroniella armata</i> (K.Schum.) Robyns	tree						r	
<i>Pyrostria hystrix</i> (Bremek.) Bridson	shrub					r		
* <i>Richardia brasiliensis</i> Gomes	herb						r	f
Family Salvadoraceae								
<i>Azima tetracantha</i> Lam.	shrub					u		
Family Salviniaceae								
* <i>Salvinia adnata</i> Desv.	herb			1b		u		
Family Sapindaceae								
<i>Pappea capensis</i> Eckl. & Zeyh.	tree						u	
Family Selaginellaceae								
<i>Selaginella dregei</i> (C. Presl) Hieron.	fern						r	
Family Sinopteridaceae								
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	fern					r	r	
Family Solanaceae								
* <i>Datura stramonium</i> L.	dwarf shrub			1b		r		r
<i>Solanum campylacanthum</i> A. Rich. subsp. <i>panduriforme</i>	dwarf shrub						r	u
* <i>Solanum seforthianum</i> Andrews var. <i>disjunctum</i> O.E.Schulz	climber			1b		r		
Family Strychnaceae								

<i>Strychnos madagascariensis</i> Poir.	tree						u	
Family Typhaceae								
<i>Typha capensis</i> (Rohrb.) N.E.Br.	rush				r			
Family Verbenaceae								
* <i>Lantana camara</i> L.	dwarf shrub			1b	r			r
Family Vitaceae								
<i>Cissus cactiformis</i> Gilg	succulent					r		
<i>Cissus cornifolia</i> (Baker) Planch.	climber					r	u	
<i>Cissus rotundifolia</i> Vahl	succulent					r		
<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	climber				r	r	r	
TOTAL	197	3	7	11	61	96	107	65

NFA - National Forests Act	d = dominant
LEMA - Limpopo Environmental Management Act	f = frequent
VU - Vulnerable	u = uncommon
NT - Near Threatened	r = rare
‡ - IUCN assessment	
* - exotic species	

Appendix 2. Potentially occurring plant species of conservation concern

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)	Low	Suitable habitat present but none located during fieldwork
Family Apocynaceae Listed Sensitive Species (No. 1204)	VU	Lowveld savanna, often on sodic soils	Dec-May (flowering period, deciduous species)	Very Low	None located despite intensive searching, very rare in the SSW
Family Canellaceae Listed Sensitive Species (No. 738)	EN	Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets	Throughout the year (even when sterile)	Low	Very rare in the Lowveld, no nearby records
Family Celastraceae <i>Elaeodendron transvaalense</i>	NT	Woodland	Throughout the year (even when sterile)	Confirmed	
Family Dioscoreaceae Listed Sensitive Species (No. 1252)	VU	Forest	Oct-May (flowering period, deciduous species)	Low	No suitable habitat present
Family Fabaceae <i>Dalbergia melanoxylon</i>	NT‡	Savanna	Throughout the year (even when sterile)	Confirmed	
Family Hyacinthaceae <i>Bowiea volubilis</i> subsp. <i>volubilis</i>	VU	Scree slopes, rocky thickets	Oct-April (deciduous species)	Very low	No suitable habitat present
<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	Some suitable habitat present but a rare plant with only three known localities in widely scattered populations
Family Orchidaceae	VU‡	Riverine forest, tall	Throughout the year (even when sterile)	Confirmed	

<i>Ansellia africana</i>		woodland			
Family Zingiberaceae					
Listed Sensitive Species (No. 575)	CR	Tall open or closed woodland, wooded grassland or bushveld	Oct-May (flowering period, deciduous species)	Low	Very rare species only known from very few localities, no recent records from the area

NT - Near Threatened
 VU - Vulnerable
 EN - Endangered
 CR - Critically Endangered
 ‡ - IUCN assessment

Appendix 3. Co-ordinates of flora and fauna taxa of conservation-importance recorded during fieldwork

Species	Protected Status	Red Data	No. of Plants	GPS Co-ordinates	
				Lat	Long
<i>Ansellia africana</i>	LEMA	VU	1	-24.427399	31.027267
<i>Ansellia africana</i>	LEMA	VU	1	-24.427194	31.026847
<i>Ansellia africana</i>	LEMA	VU	1	-24.466513	31.051240
<i>Ansellia africana</i>	LEMA	VU	1	-24.457820	31.108092
<i>Ansellia africana</i>	LEMA	VU	1	-24.459021	31.106116
<i>Balanites maughamii</i>	NFA		1	-24.426479	31.027659
<i>Balanites maughamii</i>	NFA		1	-24.444098	31.051096
<i>Balanites maughamii</i>	NFA		1	-24.443938	31.051461
<i>Balanites maughamii</i>	NFA		1	-24.434242	31.019296
<i>Balanites maughamii</i>	NFA		1	-24.440716	31.100890
<i>Breonadia salicina</i>	NFA		1	-24.459128	31.106359
<i>Combretum imberbe</i>	NFA		1	-24.434512	31.017256
<i>Combretum imberbe</i>	NFA		1	-24.455982	31.082042
<i>Combretum imberbe</i>	NFA		1	-24.395763	31.097760
<i>Combretum imberbe</i>	NFA		1	-24.396921	31.097438
<i>Combretum imberbe</i>	NFA		1	-24.398176	31.101938
<i>Combretum imberbe</i>	NFA		1	-24.397862	31.101478
<i>Combretum imberbe</i>	NFA		1	-24.397670	31.101008
<i>Combretum imberbe</i>	NFA		1	-24.398163	31.100811
<i>Combretum imberbe</i>	NFA		1	-24.447016	31.109857
<i>Combretum imberbe</i>	NFA		1	-24.436306	31.113555
<i>Combretum imberbe</i>	NFA		1	-24.485530	31.074836
<i>Combretum imberbe</i>	NFA		1	-24.484174	31.074853
<i>Combretum imberbe</i>	NFA		1	-24.485574	31.075622
<i>Combretum imberbe</i>	NFA		2	-24.485501	31.075155
<i>Combretum imberbe</i>	NFA		1	-24.461009	31.103938
<i>Combretum imberbe</i>	NFA		1	-24.458598	31.106787
<i>Combretum imberbe</i>	NFA		1	-24.474170	31.098451
<i>Dalbergia melanoxylon</i>		NT	1	-24.426816	31.027783

<i>Dalbergia melanoxylon</i>		NT	1	-24.427424	31.026934
<i>Dalbergia melanoxylon</i>		NT	2	-24.428093	31.024423
<i>Dalbergia melanoxylon</i>		NT	1	-24.426873	31.024262
<i>Dalbergia melanoxylon</i>		NT	1	-24.434423	31.017294
<i>Dalbergia melanoxylon</i>		NT	1	-24.435347	31.017277
<i>Dalbergia melanoxylon</i>		NT	1	-24.429168	31.014326
<i>Dalbergia melanoxylon</i>		NT	1	-24.466615	31.050227
<i>Dalbergia melanoxylon</i>		NT	1	-24.466477	31.051374
<i>Dalbergia melanoxylon</i>		NT	1	-24.434057	31.018684
<i>Dalbergia melanoxylon</i>		NT	1	-24.456121	31.081214
<i>Dalbergia melanoxylon</i>		NT	1	-24.455843	31.081452
<i>Dalbergia melanoxylon</i>		NT	1	-24.460276	31.104993
<i>Dalbergia melanoxylon</i>		NT	1	-24.459205	31.106096
<i>Dalbergia melanoxylon</i>		NT	1	-24.458226	31.107273
<i>Dalbergia melanoxylon</i>		NT	1	-24.458914	31.106427
<i>Elaeodendron transvaalense</i>	NFA	NT	1	-24.426849	31.027788
<i>Elaeodendron transvaalense</i>	NFA	NT	1	-24.426943	31.023820
<i>Elaeodendron transvaalense</i>	NFA	NT	1	-24.426924	31.026116
<i>Philenoptera violacea</i>	NFA		1	-24.429869	31.014380
<i>Philenoptera violacea</i>	NFA		1	-24.429170	31.014144
<i>Philenoptera violacea</i>	NFA		1	-24.398027	31.101567
<i>Philenoptera violacea</i>	NFA		1	-24.398249	31.101112
<i>Philenoptera violacea</i>	NFA		1	-24.436282	31.113027
<i>Philenoptera violacea</i>	NFA		1	-24.441010	31.101704
<i>Philenoptera violacea</i>	NFA		1	-24.459579	31.104491
<i>Philenoptera violacea</i>	NFA		1	-24.459224	31.104856
<i>Philenoptera violacea</i>	NFA		1	-24.458869	31.106475
<i>Philenoptera violacea</i>	NFA		1	-24.473630	31.099144
<i>Philenoptera violacea</i>	NFA		1	-24.473845	31.098945
<i>Sclerocarya birrea</i>	NFA		1	-24.426422	31.027569
<i>Sclerocarya birrea</i>	NFA		1	-24.427113	31.028240
<i>Sclerocarya birrea</i>	NFA		1	-24.426917	31.024193

<i>Sclerocarya birrea</i>	NFA		1	-24.426618	31.023962
<i>Sclerocarya birrea</i>	NFA		2	-24.434399	31.017137
<i>Sclerocarya birrea</i>	NFA		1	-24.434765	31.017579
<i>Sclerocarya birrea</i>	NFA		1	-24.434098	31.016899
<i>Sclerocarya birrea</i>	NFA		1	-24.433369	31.016872
<i>Sclerocarya birrea</i>	NFA		3	-24.429645	31.014108
<i>Sclerocarya birrea</i>	NFA		1	-24.429379	31.013860
<i>Sclerocarya birrea</i>	NFA		1	-24.433813	31.018949
<i>Sclerocarya birrea</i>	NFA		1	-24.429237	31.013615
<i>Sclerocarya birrea</i>	NFA		1	-24.429263	31.014127
<i>Sclerocarya birrea</i>	NFA		1	-24.455252	31.084466
<i>Sclerocarya birrea</i>	NFA		1	-24.455035	31.083644
<i>Sclerocarya birrea</i>	NFA		1	-24.466472	31.051088
<i>Sclerocarya birrea</i>	NFA		1	-24.466266	31.050990
<i>Sclerocarya birrea</i>	NFA		1	-24.444193	31.051034
<i>Sclerocarya birrea</i>	NFA		1	-24.433935	31.020294
<i>Sclerocarya birrea</i>	NFA		2	-24.434126	31.020366
<i>Sclerocarya birrea</i>	NFA		1	-24.434356	31.019661
<i>Sclerocarya birrea</i>	NFA		1	-24.434540	31.019031
<i>Sclerocarya birrea</i>	NFA		1	-24.433823	31.019217
<i>Sclerocarya birrea</i>	NFA		1	-24.454525	31.082255
<i>Sclerocarya birrea</i>	NFA		1	-24.454522	31.082906
<i>Sclerocarya birrea</i>	NFA		1	-24.454789	31.083348
<i>Sclerocarya birrea</i>	NFA		1	-24.455081	31.083807
<i>Sclerocarya birrea</i>	NFA		1	-24.456097	31.081827
<i>Sclerocarya birrea</i>	NFA		1	-24.388492	31.080198
<i>Sclerocarya birrea</i>	NFA		1	-24.388796	31.080496
<i>Sclerocarya birrea</i>	NFA		1	-24.396051	31.098053
<i>Sclerocarya birrea</i>	NFA		1	-24.395624	31.097675
<i>Sclerocarya birrea</i>	NFA		1	-24.396627	31.098477
<i>Sclerocarya birrea</i>	NFA		1	-24.398639	31.101610
<i>Sclerocarya birrea</i>	NFA		1	-24.397999	31.101756

<i>Sclerocarya birrea</i>	NFA		1	-24.397868	31.100958
<i>Sclerocarya birrea</i>	NFA		1	-24.398341	31.101242
<i>Sclerocarya birrea</i>	NFA		1	-24.398523	31.101162
<i>Sclerocarya birrea</i>	NFA		1	-24.398336	31.100781
<i>Sclerocarya birrea</i>	NFA		1	-24.398058	31.100617
<i>Sclerocarya birrea</i>	NFA		1	-24.440774	31.100687
<i>Sclerocarya birrea</i>	NFA		1	-24.440216	31.101129
<i>Sclerocarya birrea</i>	NFA		1	-24.460286	31.104350
<i>Sclerocarya birrea</i>	NFA		1	-24.459742	31.104778
<i>Sclerocarya birrea</i>	NFA		1	-24.474539	31.098520
<i>Spirostachys africana</i>	LEMA		2	-24.426662	31.027581
<i>Spirostachys africana</i>	LEMA		1	-24.466074	31.051326
<i>Spirostachys africana</i>	LEMA		1	-24.458472	31.107275
<i>Spirostachys africana</i>	LEMA		1	-24.459763	31.105391

Appendix 4. Checklist of fauna recorded during fieldwork

Common Name	Scientific Name	Red Data	Endemic	Protected	Assemblage		
					Woodland	Riparian Forest / Thicket	Aquatic Habitats
Mammals							
ORDER: PRIMATES							
Family Cercopithecidae (Old World monkeys)							
Vervet Monkey	<i>Chlorocebus pygerythrus</i>				x	x	
Chacma Baboon	<i>Papio ursinus</i>				x		
ORDER: LAGOMORPHA							
Family Leporidae (rabbits and hares)							
African Savanna Hare	<i>Lepus victoriae</i>				x		
ORDER: RODENTIA							
Family Sciuridae (squirrels)							
Tree Squirrel	<i>Paraxerus cepapi</i>				x		
Family Hystricidae (Old World porcupines)							
Cape Porcupine	<i>Hystrix africaeaustralis</i>				x		
ORDER: CARNIVORA							
Family Herpestidae (mongooses)							
Dwarf Mongoose	<i>Helogale parvula</i>				x		
Slender Mongoose	<i>Herpestes sanguineus</i>				x		
Banded Mongoose	<i>Mungos mungo</i>				x		
Family Hyaenidae (hyaenas)							
Spotted Hyaena	<i>Crocuta crocuta</i>	NT		NEMBA (PR)	x		
Family Felidae (cats)							
Leopard	<i>Panthera pardus</i>	VU		NEMBA (PR)	x		

Lion	<i>Panthera leo</i>	VU‡		LEMA	x		
ORDER: PROBOSCIDEA Family Elephantidae (elephants)							
African Elephant	<i>Loxodonta africana</i>	VU		NEMBA (PR)	x	x	x
ORDER: PERRISODACTYLA Family Equidae (horses)							
Plains (Burchell's) Zebra	<i>Equus quagga burchellii</i>			NEMBA (PR)	x		
Family Rhinocerotidae (rhinoceros's)							
Southern White Rhinoceros	<i>Ceratotherium simum simum</i>	NT		NEMBA (PR)	x		
ORDER: CETARTIODACTYLA Family Hippopotamidae (hippopotamus)							
Hippopotamus	<i>Hippopotamus amphibius</i>	VU‡		LEMA		x	x
Family Suidae (pigs)							
Common Warthog	<i>Phacochoerus africanus</i>				x		
Family Giraffidae (giraffes)							
South African Giraffe	<i>Giraffa camelopardalis giraffa</i>			LEMA	x		
Family Bovidae (antelope, cattle)							
African Buffalo	<i>Syncerus caffer</i>			LEMA	x		
Greater Kudu	<i>Tragelaphus strepsiceros</i>				x		
Nyala	<i>Tragelaphus angasii</i>					x	
Southern Bushbuck	<i>Tragelaphus sylvaticus</i>					x	
Blue Wildebeest	<i>Connochaetes taurinus taurinus</i>				x		
Common Waterbuck	<i>Kobus ellipsiprymnus ellipsiprymnus</i>				x		
Steenbok	<i>Raphicerus campestris</i>				x		
Common Duiker	<i>Sylvicapra grimmia</i>				x	x	
Impala	<i>Aepyceros melampus</i>				x	x	
Subtotal	26	15	8	14	23	7	2
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 Francolion	<i>Dendroperdix sephaena</i>					x	
Natal Spurfowl	<i>Pternistis natalensis</i>					x	x
ORDER: PODICIPEDIFORMES							
Family Podicipedidae (grebes)							
Little Grebe	<i>Tachybaptus ruficollis</i>						x
ORDER: CICONIIFORMES							
Family Ciconiidae (storks)							
Marabou Stork	<i>Leptoptilos crumenifer</i>	NT					x
ORDER: PELECANIFORMES							
Family Threskiornithidae (ibises and spoonbills)							
Hadedda Ibis	<i>Bostrychia hagedash</i>						x
Family Ardeidae (herons and bitterns)							
Western Cattle Egret	<i>Bubulcus ibis</i>						x
Grey Heron	<i>Ardea cinerea</i>						x
Striated Heron	<i>Butorides striata</i>						x
Family Scopidae (Hamerkop)							
Hamerkop	<i>Scopus umbretta</i>						x
ORDER: ACCIPITRIFORMES							
Family Accipitridae (kites, hawks and eagles)							
African Harrier-Hawk	<i>Polyboroides typus</i>						x
Hooded Vulture	<i>Necrosyrtes monachus</i>	CR		EN (NEMBA)	x		
White-backed Vulture	<i>Gyps africanus</i>	CR		EN (NEMBA)	x		
African Fish Eagle	<i>Haliaeetus vocifer</i>					x	x
Black-chested Snake Eagle	<i>Circaetus pectoralis</i>				x		
Bateleur	<i>Terathopius ecaudatus</i>	EN		EN (NEMBA)	x		
African Hawk-Eagle	<i>Aquila spilogaster</i>				x		
Wahlberg's Eagle	<i>Hieraaetus wahlbergi</i>				x	x	

Gabar Goshawk	<i>Micronisus gabar</i>				x		
ORDER: OTIDIFORMES							
Family Otididae (bustards)							
Red-crested Korhaan	<i>Lophotis ruficrista</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)							
Crowned Lapwing	<i>Vanellus coronatus</i>				x		
African Wattled Lapwing	<i>Vanellus senegallus</i>						x
Blacksmith Lapwing	<i>Vanellus armatus</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)							
Wood Sandpiper	<i>Tringa glareola</i>						x
ORDER: COLUMBIFORMES							
Family Columbidae (pigeons and doves)							
African Green Pigeon	<i>Treron calvus</i>					x	
Ring-necked Dove	<i>Streptopelia capicola</i>				x		
Red-eyed Dove	<i>Streptopelia semitorquata</i>					x	
Laughing Dove	<i>Spilopelia senegalensis</i>				x		
Namaqua Dove	<i>Oena capensis</i>				x		
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>				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 burchellii</i>				x		
Great Spotted Cuckoo	<i>Clamator glandarius</i>				x		
Jacobin Cuckoo	<i>Clamator jacobinus</i>				x		

Levaillant's Cuckoo Klaas's Cuckoo	<i>Clamator levaillantii</i> <i>Chrysococcyx klaas</i>				x	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		
ORDER: APODIFORMES Family Apodidae (swifts) African Palm Swift Alpine Swift African Black Swift Little Swift	<i>Cypsiurus parvus</i> <i>Tachymartus melba</i> <i>Apus barbatus</i> <i>Apus affinis</i>				over over over over	over over over over	over over over over
ORDER: CORACIIFORMES Family Coraciidae (rollers) Lilac-breasted Roller Family Alcedinidae (kingfishers) Woodland Kingfisher Brown-hooded Kingfisher	<i>Coracias caudatus</i> <i>Halcyon senegalensis</i> <i>Halcyon albiventris</i>				x x x		
Family Meropidae (bee-eaters) Little Bee-eater White-fronted Bee-eater European Bee-eater	<i>Merops pusillus</i> <i>Merops bullockoides</i> <i>Merops apiaster</i>				x x	x	
ORDER: BUCEROTIFORMES Family Upupidae (hoopoes) African Hoopoe Family Phoeniculidae (wood-hoopoes) Green Wood-hoopoe Common Scimitarbill Family Bucerotidae (hornbills) Crowned Hornbill African Grey Hornbill Southern Red-billed Hornbill	<i>Upupa africana</i> <i>Phoeniculus purpureus</i> <i>Rhinopomastus cyanomelas</i> <i>Lophoceros alboterminatus</i> <i>Tockus nasutus</i> <i>Tockus rufirostris</i>				x x x x x x	x	

Southern Yellow-billed Hornbill	<i>Tockus leucomelas</i>				x		
ORDER: COLIIFORMES							
Family Coliidae (mousebirds)							
Speckled Mousebird	<i>Colius striatus</i>					x	
Red-faced Mousebird	<i>Urocolius indicus</i>				x		
ORDER: PICIFORMES							
Family Lybiidae (African barbets)							
Black-collared Barbet	<i>Lybius torquatus</i>						x
Crested Barbet	<i>Trachyphonus vaillantii</i>				x		
Yellow-fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>				x		
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>				x		
Family Indicatoridae (honeyguides)							
Lesser Honeyguide	<i>Indicator minor</i>						x
Family Picidae (woodpeckers)							
Bearded Woodpecker	<i>Chloropicus namaquus</i>				x		
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>				x		
Golden-tailed Woodpecker	<i>Campethera abingoni</i>				x	x	
ORDER: PSITTACIFORMES							
Family Psittacidae (parrots)							
Brown-headed Parrot	<i>Poicephalus cryptoxanthus</i>				x		
ORDER: PASSERIFORMES							
Family Platysteiridae (wattle-eyes and batises)							
Chin-spot Batis	<i>Batis molitor</i>				x		
Family Prionopidae (helmetshrikes)							
White-crested Helmetshrike	<i>Prionops plumatus</i>				x		
Family Malaconotidae (bushshrikes)							
Orange-breasted Bushshrike	<i>Chlorophoneus sulfureopectus</i>				x		
Grey-headed Bushshrike	<i>Malaconotus blanchoti</i>				x	x	
Black-backed Puffback	<i>Dryoscopus cubla</i>				x	x	
Black-crowned Tchagra	<i>Tchagra senegalus</i>				x		
Brown-crowned Tchagra	<i>Tchagra australis</i>				x		
Brubru	<i>Nilaus afer</i>				x		
Southern Boubou	<i>Laniarius ferrugineus</i>						x
Family Laniidae (shrikes)							
Southern White-crowned Shrike	<i>Eurocephalus anguitimens</i>				x		

Lesser Grey Shrike	<i>Lanius minor</i>					x		
Red-backed Shrike	<i>Lanius collurio</i>					x		
Magpie Shrike	<i>Urolestes melanoleucus</i>					x		
Family Oriolidae (figbirds and orioles)								
Black-headed Oriole	<i>Oriolus larvatus</i>					x	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>Parus niger</i>					x		
Family Remizidae (penduline tits)								
Grey Penduline Tit	<i>Anthoscopus caroli</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)								
Lesser Striped Swallow	<i>Cecropis abyssinica</i>					x	x	x
Red-breasted Swallow	<i>Cecropis semirufa</i>					x		
Wire-tailed Swallow	<i>Hirundo smithii</i>							x
Barn Swallow	<i>Hirundo rustica</i>					x	x	x
Common House Martin	<i>Delichon urbicum</i>					x		
Family Macrosphenidae (crombecs and African warblers)								
Long-billed Crombec	<i>Sylvietta rufescens</i>					x		
Family Phylloscopidae (leaf warblers and allies)								
Willow Warbler	<i>Phylloscopus trochilus</i>					x		
Family Acrocephalidae (reed warblers and allies)								
Marsh Warbler	<i>Acrocephalus palustris</i>						x	
Family Cisticolidae (cisticolas and allies)								
Rattling Cisticola	<i>Cisticola chiniana</i>					x		
Red-faced Cisticola	<i>Cisticola erythrops</i>						x	

Neddicky	<i>Cisticola fulvicapilla</i>					x	
Tawny-flanked Prinia	<i>Prinia subflava</i>					x	x
Yellow-breasted Apalis	<i>Apalis flavida</i>					x	
Green-backed Camaroptera	<i>Camaroptera brachyura</i>						x
Burnt-necked Eremomela	<i>Eremomela usticollis</i>					x	
Stierling's Wren-Warbler	<i>Calamonastes stierlingi</i>					x	
Family Leiotherichidae (laughingthrushes)							
Arrow-marked Babbler	<i>Turdoides jardineii</i>					x	
Family Sturnidae (starlings)							
Cape Glossy Starling	<i>Lamprotornis nitens</i>					x	
Burchell's Starling	<i>Lamprotornis australis</i>					x	
Violet-backed Starling	<i>Cinnyricinclus leucogaster</i>					x	x
Family Buphagidae (oxpeckers)							
Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>					x	
Family Turdidae (thrushes)							
Kurrichane Thrush	<i>Turdus libonyanus</i>					x	x
Family Muscicapidae (chats and Old World flycatchers)							
Spotted Flycatcher	<i>Muscicapa striata</i>					x	
Ashy Flycatcher	<i>Muscicapa caerulescens</i>						x
Grey Tit-Flycatcher	<i>Myioparus plumbeus</i>						x
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>					x	x
White-browed Scrub Robin	<i>Erythropygia leucophrys</i>					x	
White-throated Robin-Chat	<i>Cossypha humeralis</i>						x
White-browed Robin-Chat	<i>Cossypha heuglini</i>						x
Family Nectariniidae (sunbirds)							
Marico Sunbird	<i>Cinnyris mariquensis</i>					x	
White-bellied Sunbird	<i>Cinnyris talatala</i>					x	
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>					x	
Collared Sunbird	<i>Hedydipna collaris</i>						x
Family Passeridae (Old World sparrows)							
Southern Grey-headed Sparrow	<i>Passer diffusus</i>					x	
House Sparrow	<i>Passer domesticus</i>					x	
Yellow-throated Petronia	<i>Gymnoris superciliiaris</i>					x	
Family Ploceidae (weavers and widowbirds)							

Spectacled Weaver	<i>Ploceus ocularis</i>						x	
Village Weaver	<i>Ploceus cucullatus</i>					x		
Lesser Masked Weaver	<i>Ploceus intermedius</i>					x	x	
Southern Masked Weaver	<i>Ploceus velatus</i>					x		
Red-billed Buffalo Weaver	<i>Bubalornis niger</i>					x		
Red-headed Weaver	<i>Anaplectes rubriceps</i>					x		
Red-billed Quelea	<i>Quelea quelea</i>					x		
White-winged Widowbird	<i>Euplectes albonotatus</i>					x		
Family Estrildidae (waxbills, munias and allies)								
Common Waxbill	<i>Estrilda astrild</i>						x	
Blue Waxbill	<i>Uraeginthus angolensis</i>					x		
Red-billed Firefinch	<i>Lagonosticta senegala</i>					x		
Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>					x		
Green-winged Pytilia	<i>Pytilia melba</i>					x		
Quail-Finch	<i>Ortygospiza fuscocrissa</i>					x		
Bronze Mannikin	<i>Lonchura cucullata</i>						x	
Cut-throat Finch	<i>Amadina fasciata</i>					x		
Family Viduidae (indigobirds and whydahs)								
Long-tailed Paradise Whydah	<i>Vidua paradisaea</i>					x		
Pin-tailed Whydah	<i>Vidua macroura</i>					x		
Purple Indigobird	<i>Vidua purpurascens</i>					x		
Village Indigobird	<i>Vidua chalybeata</i>					x		
Family Motacillidae (wagtails and pipits)								
African Pipit	<i>Anthus cinnamomeus</i>					x		
African Pied Wagtail	<i>Motacilla aguimp</i>							x
Family Fringillidae (finches and canaries)								
Yellow-fronted Canary	<i>Crithagra mozambica</i>					x	x	
Family Emberizidae (buntings and New World sparrows)								
Cinnamon-breasted Bunting	<i>Emberiza tahapisi</i>					x		
Subtotal	157	4	0	3	111	46	26	
Reptiles								
ORDER: TESTUDINES								
Family Testudinidae (tortoises)								
Speke's Hinged Tortoise	<i>Kinixys spekii</i>					x		

Leopard Tortoise	<i>Stigmochelys pardalis</i>				x		
Family Pelomedusidae (freshwater turtles)							
Serrated Hinged Terrapin	<i>Pelusios sinuatus</i>						x
ORDER: SQUAMATA							
Family Lacertidae (true lizards)							
Bushveld Lizard	<i>Heliobolus lugubris</i>				x		
Family Scincidae (skinks)							
Striped Skink	<i>Trachylepis striata</i>				x		
Variable Skink	<i>Trachylepis varia</i>				x		
Family Gerrhosauridae (plated lizards)							
Eastern Black-lined Plated Lizard	<i>Gerrhosaurus intermedius</i>				x		
Common Giant Plated Lizard	<i>Matobosaurus validus</i>				x		
Family Varanidae (monitor lizards)							
Water Monitor	<i>Varanus niloticus</i>						x
Subtotal	9	0	0	0	7	0	2
Frogs							
ORDER: ANURA							
Family Rhacophoridae (moss or bush frogs)							
Southern Foam Nest Frog	<i>Chiromantis xerampelina</i>					x	
Subtotal	1	0	0	0	5	1	1
TOTAL	193	19	8	17	146	54	31

PR - Protected
 NT - Near Threatened
 VU - Vulnerable
 EN - Endangered
 CR - Critically Endangered
 NEMBA - National Environmental Management: Biodiversity Act
 LEMA = Limpopo Environmental Management Act
 ‡ - IUCN assessment

Appendix 5. Potentially occurring fauna of conservation concern

Common Name	Scientific Name	Red Data	Protected	Habitat	SABAP2 Reporting Rate for Kapama Area (%)	Likelihood	Justification
Mammals							
Cheetah	<i>Acinonyx jubatus</i>	VU	NEMBA (VU)	Savanna, semi desert		Moderate	May only occasionally passes through
African Clawless Otter	<i>Aonyx capensis</i>	NT	LEMA	Rivers and streams		High	Suitable breeding and foraging habitat present along the Klaserie River
Side-striped Jackal	<i>Canis adustus</i>		LEMA	Savanna, grassland		High	Suitable habitat present
White Rhinoceros	<i>Ceratotherium simum</i>	NT	NEMBA (PR)	Savanna, semi desert		Confirmed	
Samango Monkey (MPU & Lim)	<i>Cercopithecus albogularis schwarzi</i>	EN		Escarpment forest		Very Low	No suitable habitat present, unrecorded from KGR
Rough-haired Golden Mole	<i>Chrysothalax villosus</i>	VU		Sandy soils in grasslands, meadows and along edges of marshes in Savannah and Grassland biomes		Very Low	This species is extremely rare and secretive. Only three specimens have been collected since 1980. All existing records are further west than KGR
African Civet	<i>Civettictis civetta</i>		LEMA	Savanna		High	Suitable habitat present
Blue Wildebeest	<i>Connochaetes taurinus</i>		NEMBA (PR)	Savanna, grassland		Confirmed	
Swamp Musk Shrew	<i>Crocidura mariquensis</i>	NT		Wetlands in savanna		Low	Unsuitable habitat present
Spotted Hyaena	<i>Crocuta crocuta</i>	NT	NEMBA (PR)	Wide variety of habitats		Confirmed	

Robert's Marsh Rat	<i>Dasymys robertsi</i>	VU		Wetlands		Low	No regional records, edge of distribution range
Burchell's Zebra	<i>Equus quagga burchelli</i>		NEMBA (PR)	Savanna, grassland		Confirmed	
African Wildcat	<i>Felis silvestris</i>		LEMA	Wide variety of habitats		High	Suitable habitat present
Southern Lesser Galago	<i>Galago moholi</i>		LEMA	Savanna		High	Suitable habitat present
Giraffe	<i>Giraffa camelopardalis</i>	VU‡	LEMA	Savanna		Confirmed	
Hippopotamus	<i>Hippopotamus amphibius</i>	VU‡	LEMA	Wetlands		Confirmed	
Sable	<i>Hippotragus niger</i>	VU	NEMBA (VU)	Savanna		Low	Very rare in Kapama
Serval	<i>Leptailurus serval</i>	NT	NEMBA (PR)	Grassland, wetlands		Low	Very rare in the area, limited suitable habitat present
African Savanna Elephant	<i>Loxodonta africana</i>	EN‡	NEMBA (PR)	Wide variety of habitats		Confirmed	
African Wild Dog	<i>Lycaon pictus</i>	EN	NEMBA (EN)	Wide variety of habitats		Low	Not resident on Kapama, only occasionally passes through
Honey Badger	<i>Mellivora capensis</i>		LEMA	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
Thick-tailed Greater Galago	<i>Otolemur crassicaudatus</i>		LEMA	Moist woodland and forest		High	Suitable habitat present
Lion	<i>Panthera leo</i>	VU‡	NEMBA (VU)	Wide variety of habitats		Confirmed	
Leopard	<i>Panthera pardus</i>	VU	NEMBA (VU)	Wide variety of habitats		Confirmed	
African Weasel	<i>Poecilogale albinucha</i>	NT		Wide variety of habitats		Very Low	Very rare in the Lowveld
Aardwolf	<i>Proteles cristatus</i>		LEMA	Wide variety of habitats		Low	Rare in the Lowveld, may occasionally pass through
Steenbok	<i>Raphicerus campestris</i>		LEMA	Wide variety of habitats		Confirmed	
Ground Pangolin	<i>Smutsia temminckii</i>	VU	NEMBA (VU)	Wide variety of habitats		Moderate	Resident on Kapama although in low numbers
African Buffalo	<i>Syncerus caffer</i>		LEMA	Wide variety of habitats		Confirmed	
<i>Subtotal</i>	30	19	25				
Birds							

Half-collared Kingfisher	<i>Alcedo semitorquata</i>	NT		Streams with overhanging vegetation	0,4%	Very Low	Rare in the Lowveld, only one record
Steppe Eagle	<i>Aquila nipalensis</i>	EN‡		Savanna	0,4%	Very Low	Very rare in the area
Tawny Eagle	<i>Aquila rapax</i>	EN	NEMBA (EN)	Savanna	14,1%	Moderate	May be resident in low numbers in Kapama, suitable breeding and foraging habitat present within study area
Verreaux's Eagle	<i>Aquila verreauxii</i>	VU		Arid, mountainous areas	-	Very Low	No suitable habitat present
Kori Bustard	<i>Ardeotis kori</i>	NT	NEMBA (PR)	Savanna	-	Low	Unsuitable habitat present
Southern Ground-Hornbill	<i>Bucorvus leadbeateri</i>	EN	NEMBA (EN)	Savanna	5,6%	Moderate	Suitable breeding and foraging habitat present
Curlew Sandpiper	<i>Calidris ferruginea</i>	NT‡		Mudflats, tidal wetlands	0,4%	Very Low	Rare in the Lowveld
Abdim's Stork	<i>Ciconia abdimii</i>	NT		Wide variety of habitats	0,4%	Low	Limited suitable habitat present, occasional influxes possible
Black Stork	<i>Ciconia nigra</i>	VU		Forages in wetlands and breeds on cliffs	0,4%	Low	Suitable habitat present but very rare in the area
Pallid Harrier	<i>Circus macrourus</i>	NT		Open grassland and semi-desert	-	Low	No suitable habitat present
African Marsh Harrier	<i>Circus ranivorus</i>	EN		Moist grassland and wetland	-	Low	No suitable habitat present, very rare in the Lowveld
European Roller	<i>Coracias garrulus</i>	NT		Savanna	12,9%	High	Suitable foraging habitat present
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	EN		Large rivers, dams and pans	3,6%	Low	Suitable habitat present but very rare in the area
Lanner Falcon	<i>Falco biarmicus</i>	VU		Wide variety of habitats	2,4%	Low	Suitable foraging habitat present but very rare in the area
White-backed Night-Heron	<i>Gorsachius leuconotus</i>	VU		Streams with overhanging vegetation	0,4%	Low	Suitable habitat present along the Klaserie River but very rare in the general area
White-backed Vulture	<i>Gyps africanus</i>	CR	NEMBA (EN)	Savanna	76,2%	Confirmed	

Cape Vulture	<i>Gyps coprotheres</i>	EN	NEMBA (EN)	Wide variety of habitats	2,0%	Moderate	Suitable foraging habitat present although rare in the area
Marabou Stork	<i>Leptoptilos crumeniferus</i>	NT		Wide variety of habitats	23,4%	Confirmed	
Bat Hawk	<i>Macheiramphus alcinus</i>	EN		Tall woodland along rivers	-	Low	Very rare in the Lowveld, no recent records
Lesser Jacana	<i>Microparra capensis</i>	VU		Floating vegetation on tropical wetlands	-	Low	Limited suitable habitat present but very rare in the Lowveld and no recent records from the Kapama area
Yellow-billed Stork	<i>Mycteria ibis</i>	EN		Wide variety of wetlands	4,0%	Low	Limited suitable habitat present, rare in the area
Hooded Vulture	<i>Necrosyrtes monachus</i>	CR	NEMBA (EN)	Wide variety of wetlands	32,7%	Confirmed	
African Pygmy Goose	<i>Nettapus auritus</i>	VU		Tropical wetlands with floating vegetation	-	Low	Limited suitable habitat present but very rare in the Lowveld and no recent records from the Kapama area
Great White Pelican	<i>Pelecanus onocrotalus</i>	VU		Large pools, rivers and lakes	-	Low	Limited suitable habitat present but very rare in the Lowveld and no recent records from the Kapama area
Pink-backed Pelican	<i>Pelecanus rufescens</i>	VU		Large pools, rivers and lakes	-	Low	Limited suitable habitat present but very rare in the Lowveld and no recent records from the Kapama area
Greater Flamingo	<i>Phoenicopterus roseus</i>	NT		Saline wetlands	-	Low	No suitable habitat present
African Finfoot	<i>Podica senegalensis</i>	VU		Rivers and streams with overhanging vegetation	0,4%	Moderate	Low reporting rate but a secretive species, has been reported from the Klaserie River at Karula Lodge

Martial Eagle	<i>Polemaetus bellicosus</i>	EN	NEMBA (EN)	Wide variety of habitats	7,7%	Moderate	May be resident in low numbers in Kapama, suitable breeding and foraging habitat present within study area
Greater Painted-snipe	<i>Rostratula benghalensis</i>	NT		Wetlands	0,4%	Low	Suitable breeding and foraging habitat present but rare in general area
African Skimmer	<i>Rynchops flavirostris</i>	NT‡		Open water; rivers and dams	-	Very Low	Although recently confirmed breeding within the adjacent Timbavati Game Reserve, it has not yet been found within Kapama
Secretarybird	<i>Sagittarius serpentarius</i>	VU		Open savanna and grassland	-	Very Low	Limited suitable breeding and foraging habitat present
Pel's Fishing Owl	<i>Scotopelia peli</i>	EN		Rivers and streams with overhanging vegetation	-	Low	Suitable habitat present along the Klaserie River, but no recent records from the Kapama area
Crowned Eagle	<i>Stephanoaetus coronatus</i>	VU		Forest	-	Very Low	No suitable habitat present, no recent records
Bateleur	<i>Terathopius ecaudatus</i>	EN	NEMBA (EN)	Savanna	37,1%	Confirmed	
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN	NEMBA (EN)	Savanna	6,5%	Moderate	May be resident in low numbers in Kapama, suitable breeding and foraging habitat present within study area
White-headed Vulture	<i>Trigonoceps occipitalis</i>	CR	NEMBA (EN)	Savanna	3,2%	Moderate	May be resident in low numbers in Kapama, suitable breeding and foraging habitat present within study area
<i>Subtotal</i>	36	36	10				
Reptiles							

Listed Sensitive Species No. 2		VU	NEMBA (VU)	Wetlands		High	Suitable breeding and foraging habitat present
Natal Hinged Tortoise	<i>Kinixyx natalensis</i>	VU		Dry rocky habitat in thornveld, valley bushveld, dry thicket or bushveld savanna		Low	Limited suitable habitat present, only one recent record for the QDGS
Southern African Python	<i>Python natalensis</i>		NEMBA (PR)	Wide variety of habitats, but usually near water or rocky outcrops		High	Suitable breeding and foraging habitat present
<i>Subtotal</i>	2	2	2				
TOTAL	68	57	37				

CR - Critically Endangered

EN - Endangered

VU - Vulnerable

NT - Near Threatened

NEMBA - National Environmental Management: Biodiversity Act

LEMA - Limpopo Environmental Management Act

‡ - IUCN assessment

Appendix 6. 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: 13
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
- Botanical Society of South Africa

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, Guinea, Swaziland, Sierra Leone (Consulting Ecologist)

OVERVIEW OF EXPERIENCE

- 13 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
- Member of the Kwa-Zulu-Natal Bird Rarities Committee

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 7. 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;
- 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

03/05/2021

Date