

LAPALALA RUNWAY EXTENSION AND WILDERNESS SCHOOL ACCESS ROAD

TERRESTRIAL ECOLOGICAL ASSESSMENT



OCTOBER 2019

Prepared for: Peter Velcich
NuLeaf Planning and Environmental
PostNet Suite 168
Private Bag X 844
Silverton 0127

Prepared by: ECOREX Consulting Ecologists CC
Postnet Suite #192,
Private Bag X2
Raslouw 0109

Author: Duncan McKenzie

Reviewer: Warren McClelland (ECOREX)



TABLE OF CONTENTS

| | |
|---|----|
| LIST OF TABLES..... | 3 |
| LIST OF FIGURES..... | 3 |
| ABBREVIATIONS..... | 5 |
| TERMINOLOGY..... | 5 |
| DECLARATION OF INDEPENDENCE | 6 |
| 1. INTRODUCTION..... | 7 |
| 2. OBJECTIVES..... | 8 |
| 3. STUDY AREA | 9 |
| 4. METHODS..... | 11 |
| 4.1 FLORA..... | 11 |
| 4.2 FAUNA..... | 12 |
| 4.3 ECOLOGICAL IMPORTANCE | 13 |
| 4.4 ASSUMPTIONS, LIMITATIONS AND KNOWLEDGE GAPS | 18 |
| 4.4.1 Seasonality..... | 18 |
| 4.4.2 Overlooked Species..... | 18 |
| 5. BIODIVERSITY BASELINE DESCRIPTION | 19 |
| 5.1 FLORA..... | 19 |
| 5.1.1 Regional Context..... | 19 |
| 5.1.2 Local Context – Plant Species Richness and Vegetation Assemblages..... | 20 |
| 5.1.3 Plant Species of Conservation Concern..... | 22 |
| 5.1.4 Endemic Species | 24 |
| 5.1.5 Invasive Alien Species | 24 |
| 5.2 TERRESTRIAL FAUNA..... | 28 |
| 5.2.1 Mammals..... | 28 |
| 5.2.2 Birds..... | 31 |
| 5.2.3 Reptiles..... | 33 |
| 5.2.4 Frogs..... | 34 |
| 5.3 ECOLOGICAL IMPORTANCE..... | 35 |
| 5.3.1 Limpopo Province Biodiversity Conservation Assessment..... | 35 |
| 5.3.2 Environmental Screening Tool..... | 36 |
| 5.3.4 Site-specific Ecological Importance Analysis..... | 37 |
| 6. KEY POTENTIAL IMPACTS..... | 39 |
| 7. DISCUSSION AND RECOMMENDATIONS..... | 40 |
| 8. REFERENCES | 42 |
| 9. APPENDICES | 44 |
| APPENDIX 1. CHECKLIST OF FLORA RECORDED DURING FIELDWORK..... | 44 |
| APPENDIX 2. POTENTIALLY OCCURRING PLANT SPECIES OF CONSERVATION CONCERN | 48 |
| APPENDIX 3. CHECKLIST OF FAUNA RECORDED DURING FIELDWORK..... | 49 |
| APPENDIX 4. POTENTIALLY OCCURRING FAUNA OF CONSERVATION CONCERN | 54 |
| APPENDIX 5. CURRICULUM VITAE OF DUNCAN MCKENZIE | 58 |
| APPENDIX 6. SPECIALISTS DECLARATION | 59 |

List of Tables

| | |
|---|----|
| Table 1. Criteria for Determining Conservation Value of a Receptor | 14 |
| Table 2. Criteria for Determining Functional Integrity of a Receptor | 15 |
| Table 3. Biodiversity Value Two-way Matrix | 16 |
| Table 4. Receptor Sensitivity Two-way Matrix..... | 16 |
| Table 5. Ecological Importance Two-way Matrix..... | 17 |
| Table 6. Guidelines for interpreting Ecological Importance of Receptors in terms of project impacts.. | 17 |
| Table 7. Plant SCC confirmed in the study area during fieldwork | 25 |
| Table 8. Co-ordinates of plant SCC confirmed in the study area during fieldwork | 26 |
| Table 9. Overview of the calculation of Ecological Importance of Vegetation Communities in the Project Area | 37 |

List of Figures

| | |
|--|----|
| Figure 1. Location of Study Area | 10 |
| Figure 2. Photographs of Rocky Woodland | 21 |
| Figure 3. Photographs of Plains Woodland | 22 |
| Figure 4. Photograph of the Near Threatened plant <i>Elaeodendron transvaalense</i> located during fieldwork | 23 |
| Figure 5. Vegetation communities identified within the Study Area | 27 |
| Figure 6. MBSP CBA Map of the Study Area | 35 |
| Figure 7. Environmental Screening Tool assessment of Terrestrial Biodiversity Features in the Study Area..... | 36 |
| Figure 8. Ecological Importance of the Vegetation Communities in the Study Area | 38 |

EIA REGULATIONS SPECIALISTS REPORT CHECKLIST

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

(a) details of-

| | | |
|-------------------------|---|---------|
| ✓ | (i) the specialist who prepared the report; and | page 07 |
| ✓ | (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae; | page 58 |
| ✓ | (b) a declaration that the specialist is independent in a form as may be specified by the competent authority; | page 59 |
| ✓ | (c) an indication of the scope of, and the purpose for which, the report was prepared; | page 07 |
| ✓ | (d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment; | page 11 |
| ✓ | (e) a description of the methodology adopted in preparing the report or carrying out the specialised process; | page 11 |
| ✓ | (f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure; | page 37 |
| ✓ | (g) an identification of any areas to be avoided, including buffers; | page 40 |
| ✓ | (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers; | page 38 |
| ✓ | (i) a description of any assumptions made and any uncertainties or gaps in knowledge; | page 18 |
| ✓ | (j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment; | page 39 |
| ✓ | (k) any mitigation measures for inclusion in the EMP; and | page 40 |
| ✓ | (l) any conditions for inclusion in the environmental authorisation; | page 40 |
| ✓ | (m) any monitoring requirements for inclusion in the EMP or environmental authorisation; | page 40 |
| (n) a reasoned opinion- | | |
| ✓ | (i) as to whether the proposed activity or portions thereof should be authorised; and | page 41 |
| ✓ | (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMP, and where applicable, the closure plan; | page 41 |
| X | (o) a description of any consultation process that was undertaken during the course of preparing the specialist report; | n/a |
| X | (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and | n/a |
| ✓ | (q) any other information requested by the competent authority. | none |

Abbreviations

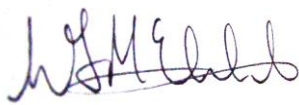
| | |
|------------|--|
| DEA | Department of Environmental Affairs |
| EST | Environmental Screening Tool |
| FEPA | Freshwater Ecosystem Priority Area |
| IBA | Important Bird & Biodiversity Area |
| IUCN | International Union for Conservation of Nature |
| LEMA | Limpopo Environmental Management Act (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 (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 2431 AB |
| 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 diversity of living organisms, including the terrestrial and aquatic ecosystems they inhabit; this can be measured at gene, species or ecosystem level. |
| Geophyte | Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire. |

Declaration of Independence

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



W.L. McClelland

10 October 2019



D.R. McKenzie

10 October 2019

1. INTRODUCTION

ECOREX Consulting Ecologists CC was appointed by Peter Velcich of NuLeaf Planning & Environmental to conduct the terrestrial ecology study (flora, mammals, birds, reptiles and frogs) for the proposed expansion of the existing Lapalala runway and access road to the proposed Lapalala Wilderness School in Lapalala Wilderness, Limpopo Province, South Africa.

The study team was as follows:

Duncan McKenzie (Terrestrial Ecologist). Duncan has been involved in biodiversity assessments for ECOREX for eleven years and countries of work experience include Lesotho, Swaziland, Mali, Mozambique, Guinea, Sierra Leone, South Africa, Tanzania and Democratic Republic of the Congo. Duncan has previously worked as a Regional Coordinator for the Mondi Wetlands Project and lectures on many aspects of conservation in Mbombela and the Kruger National Park. He is currently the Mpumalanga Regional Coordinator for the South African Bird Atlas Project, formerly sat on the KZN Bird Rarities Committee and is a co-author on the Birds of Mbombela book and Wildflowers of the Kruger National Park project. A more detailed CV is presented in Appendix 5.

Linda McKenzie (GIS Specialist). Linda is a GIS Specialist/GIS Analyst with over 13 years' experience in the industry. For the last six years she has operated her own GIS Consultancy called Digital Earth. She has extensive experience in both the private and public sector, and has worked on a wide variety of projects and GIS applications. Most recently, these include 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 has served as Vice Chairperson and Treasurer for GISSA Mpumalanga and is a registered Professional GISc Practitioner (PGP0170).

2. OBJECTIVES

The objectives of the Ecology Survey are to:

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

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

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

3. STUDY AREA

The Lapalala runway is situated on the farm Landmanslust 595 LR in the south-central part of the c. 45 000 hectare Lapalala Wilderness, which in turn is part of the Waterberg Biosphere Reserve. The reserve is situated approximately 50 km north of Vaalwater and 80 km west of Mokopane, Lephalale Local Municipality, Limpopo Province (Figure 1). The area surveyed covers approximately 2.8 hectares and is located at the northern side of the existing runway, as far north as a rocky ridge that runs perpendicular to the Lapalala Headquarters.

The proposed access road to the Lapalala Wilderness School is situated on the farm Frischgewaagd 649 LR, approximately 4 km from the South Gate of Lapalala Wilderness. This proposed development is an addition to a previous ecological survey that was performed by Ecorex in 2016. The proposed alignment descends down a rocky ridge situated between two level plains to the proposed Wilderness School site below. This site is approximately 0.4 ha in size and is situated outside of the Lapalala Wilderness, in an area used for cattle ranching. An existing, eroded track is present within the rocky ridge.

The two sites together measure 3.2 ha and are situated within the quarter-degree grid 2328 CD at an elevation of just under 1200 mamsl. The topography of the general area comprises undulating, rocky hills with level plains situated between them. Lapalala falls within the upper Lephalale River catchment which drains into the Limpopo River.

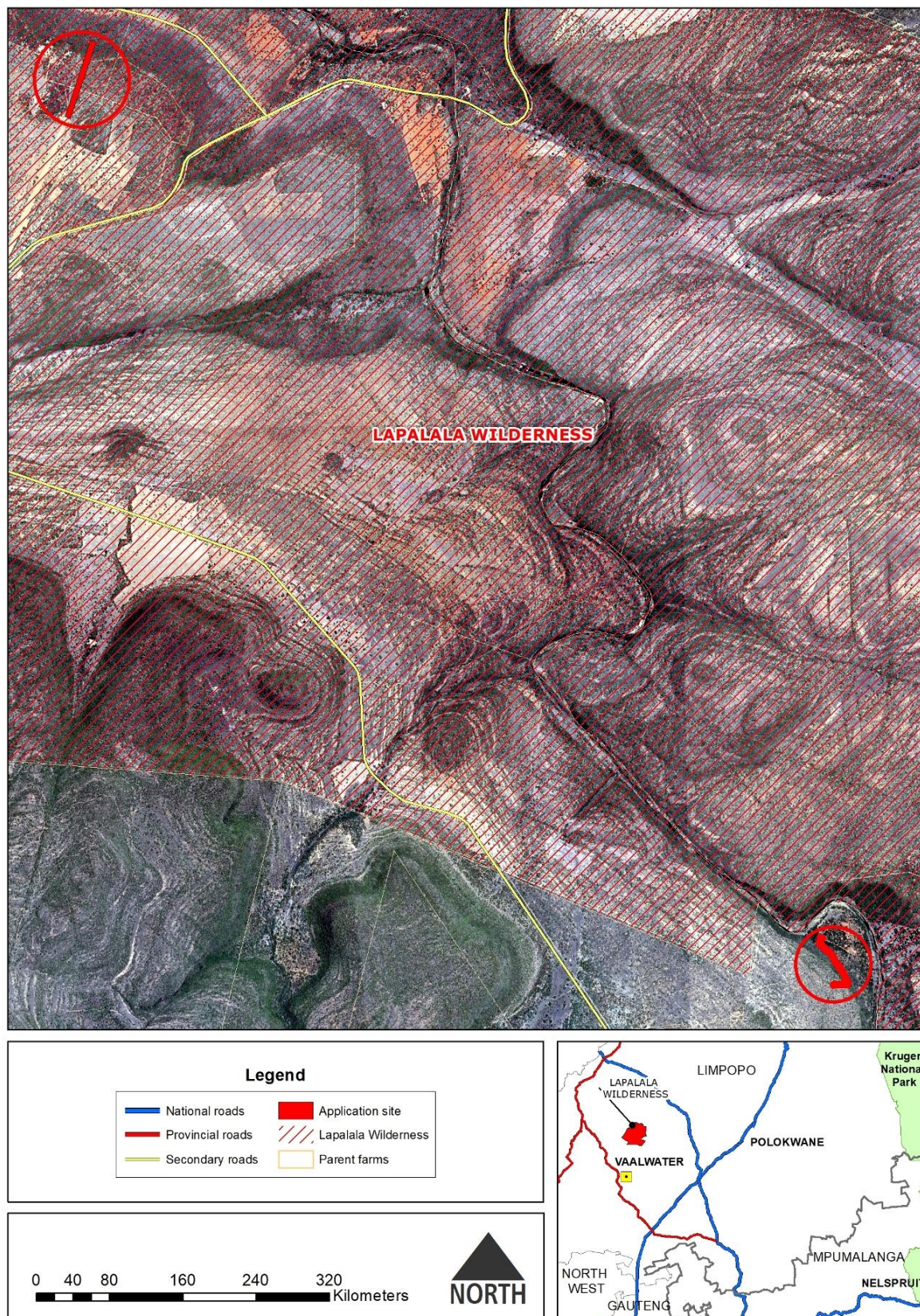


Figure 1. Location of Study Area

4. METHODS

An initial screening of the study area was undertaken using the Environmental Screening Tool (EST) of the Department of Environmental Affairs (DEA). This indicated that the study area had a Very High Terrestrial Biodiversity theme. More detail in this regard is provided in section 5.3.2 of this report.

4.1 Flora

Desktop

Vegetation communities were identified prior to fieldwork using satellite imagery supplied by Digital Earth. Red Data plant species listed for the QDGS 2328 CD in the PRECIS data from the South African National Biodiversity Institute (SANBI) was used to produce a list of the most likely threatened species, which were searched for during fieldwork.

Fieldwork

Vegetation communities identified in the desktop phase were ground-truthed over a single day in early October 2019. The boundaries of the proposed developments were supplied by NuLeaf and pre-loaded onto a Samsung S7 phone using LocusMap Pro™ software. These two areas were surveyed on foot, following the proposed alignments. The locations of any Species of Conservation Concern (SCC) were loaded onto the Samsung S7 phone using LocusMap Pro™ software. Species lists were compiled for each vegetation community, and specific attention was given to habitats that potentially host SCC. These include species listed under SANBI's Red List of South African Plants, as well as the website of the International Union for the Conservation of Nature (IUCN). Within the context of this study, SCC also include range-restricted and endemic species as well as those protected under the following legislation:

- National Forests Act (No. 30 of 1998) (NFA)
- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) (NEMBA ToPS)
- Limpopo Environmental Management Act (No. 7 of 2003) (LEMA)

4.2 Fauna

Desktop

Lists of mammal, bird, reptile and frog SCC¹ potentially occurring within the study area were prepared using data from the Lapalala Management Plan (2016 update), Child *et al.* (2016), the Southern African Bird Atlas Project 2 <http://sabap2.adu.org.za/>, Taylor *et al.* (2016), Minter *et al.* (2004), Bates *et al.* (2014), the IUCN Red List of Threatened Species and the following two relevant Acts:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015)
- Limpopo Environmental Management Act (No. 7 of 2003) (LEMA)

Information was also extracted from the following previous Ecorex ecological reports from the Lapalala area:

- Founders Lodge Ecological Sensitivity Screening (2016)
- Lapalala Custodian Sites Terrestrial Ecology Study (2016)
- Lapalala Wilderness School Terrestrial Ecology Study (2016)
- Founders Lodge Extension Terrestrial Ecology Study (2018)
- Lapalala Staff Housing Terrestrial Ecology Study (2018)

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.

¹ The same approach as Raimondo *et al.* (2009) has been followed here regarding species of conservation concern (i.e. those with a status of Declining, Near Threatened and Data Deficient) and threatened species (Vulnerable, Endangered and Critically Endangered)

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. Special attention was paid to locating nests of SCC and raptors. 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 Ecological Importance

Ecological Importance (EI) 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. EI is a function of the Biodiversity Value (BV) of the receptor (e.g. the vegetation/fauna community or habitat type¹) and its sensitivity to impacts (Receptor Sensitivity) as follows:

$$EI = BV + RS$$

BV in turn is a function of Conservation Value (CV) and the Functional Integrity (FI) of the receptor as follows:

$$BV = CV + FI$$

Conservation Value (CV) is defined here as the value of the impact receptor (flora/fauna community / habitat) in conserving significant areas of threatened vegetation types, populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), range-restricted species, globally significant populations of congregatory species and unique plant / faunal assemblages (Enviro-Insight, 2019). The method of determining CV is given in Table 1.

¹ Note that the habitat type may be independent of the vegetation community and that it may even be artificial e.g. excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis

Table 1. Criteria for Determining Conservation Value of a Receptor

| Conservation Value | Fulfilling Criteria |
|--------------------|---|
| Very High | Confirmed or highly likely occurrence of individuals of CR , EN or Critically Rare species Any area of a CR vegetation type or large area (> 0.1 % of the total vegetation type extent ¹) of EN vegetation type Globally significant populations of congregatory species (>10% of global population) |
| High | Confirmed populations of VU species Small area (>0.01% but < 0.1 % of the total vegetation type extent) of EN vegetation type or large area (> 0.1 %) of VU vegetation type Presence of range-restricted fauna species or high proportion (> 10 %) of range-restricted flora species Presence of unique plant / faunal assemblages Globally significant populations of congregatory species (>1% but <10% of global population) |
| Medium | Confirmed populations of NT species or Rare plant species Any area of threatened vegetation type with status of VU Moderate to low numbers of range-restricted flora species > 50 % of Natural Habitat |
| Low | No confirmed or highly likely populations of SCC 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”. Criteria for determining FI are given in Table 2.

¹ This can be calculated from the vegetation map of South Africa shapefile available from the SANBI National Vegetation Map Project

Table 2. Criteria for Determining Functional Integrity of a Receptor

| Functional Integrity | Fulfilling Criteria |
|----------------------|---|
| Very High | <p>Very large (>100 ha) intact area for any conservation status of regional vegetation type or >5 ha for CR regional vegetation types</p> <p>High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches</p> <p>No or minimal current ecological impacts with no signs of major past disturbance (e.g. ploughing)</p> |
| High | <p>Large (>20 ha but <100 ha) intact area for any conservation status of regional vegetation type or >10 ha for EN regional vegetation types</p> <p>Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches</p> <p>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</p> |
| Medium | <p>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</p> <p>Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches</p> <p>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</p> |
| Low | <p>Small (>1 ha but <5 ha) area</p> <p>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</p> <p>Several minor and major current ecological impacts</p> |
| Very Low | <p>Very small (<1 ha) area</p> <p>No habitat connectivity except for flying species or flora with wind-dispersed seeds.</p> <p>Several major current ecological impacts</p> |

BV, which is a function of CV and FI, can be determined through use of the matrix in Table 3.

Table 3. Biodiversity Value Two-way Matrix

| Biodiversity Value | | Conservation Value | | | | |
|----------------------|-----------|--------------------|-----------|----------|----------|----------|
| | | Very High | High | Medium | Low | Very Low |
| Functional Integrity | Very High | Very High | Very High | High | Medium | Low |
| | High | Very High | High | Medium | Low | Low |
| | Medium | High | Medium | Medium | Low | Very Low |
| | Low | Medium | Low | Low | Low | Very Low |
| | Very Low | Low | Low | Very Low | Very Low | Very Low |

Receptor Sensitivity (RS) is considered to be a function of both Vulnerability (V) and Resilience (R) of the receptor: $RS = V + R$

Vulnerability (V) is defined here as “the likelihood that a receptor will be negatively impacted by the proposed project activities” and Resilience (R) 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*”. RS is determined through the use of a two-way matrix as indicated in Table 4.

Table 4. Receptor Sensitivity Two-way Matrix

| Receptor Sensitivity | | Resilience | | | | |
|----------------------|-----------|------------|----------|----------|----------|-----------|
| | | Very Low | Low | Medium | High | Very High |
| Vulnerability | Very High | Very High | High | Medium | Low | Low |
| | High | High | High | Medium | Low | Very Low |
| | Medium | Medium | Medium | Medium | Low | Very Low |
| | Low | Low | Low | Low | Low | Very Low |
| | Very Low | Low | Very Low | Very Low | Very Low | Very Low |

Once BV and RS have been calculated through the use of the above two matrices, EI can be determined using the matrix in Table 5.

Table 5. Ecological Importance Two-way Matrix

| Ecological Importance | | Biodiversity Value | | | | |
|-----------------------|-----------|--------------------|-----------|----------|----------|----------|
| | | Very High | High | Medium | Low | Very Low |
| Receptor Sensitivity | Very High | Very High | Very High | High | Medium | Low |
| | High | Very High | High | Medium | Low | Low |
| | Medium | High | Medium | Medium | Low | Very Low |
| | Low | Medium | Low | Low | Low | Very Low |
| | Very Low | Low | Low | Very Low | Very Low | Very Low |

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

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

| Ecological Importance | Interpretation in relation to proposed development activities | Example Habitats |
|-----------------------|--|---|
| Very High | Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not acceptable. | Many Fynbos and Highveld Grassland vegetation types; high priority Ramsar wetlands |
| 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. | Escarpment Grassland and certain Succulent Karoo vegetation types; sites in Centres of Plant Endemism |
| Medium | Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities | Savannah vegetation types |
| Low | Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities | Modified habitat such as fallow agricultural fields |
| Very Low | Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required | Modified Habitat such as historic mining areas, urban settlements, extensive cultivation |

The Ecological Importance values for each vegetation community are indicated spatially in Figure 8.

4.4 Assumptions, Limitations and Knowledge Gaps

4.4.1 Seasonality

The assessment was based on fieldwork covering one day at the end of the dry season. Most plants were still in dry season dormancy and very few contained leaves or flowers. It is possible that plants which flower at other times of the year are 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 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.

5. BIODIVERSITY BASELINE DESCRIPTION

5.1 Flora

5.1.1 Regional Context

5.1.1.1 National Vegetation Types

According to Mucina & Rutherford (2006), the study area is situated within the Waterberg Mountain Bushveld vegetation type, which is in the Central Bushveld Bioregion of the Savanna Biome. This vegetation type is described briefly below, based on the account in Mucina & Rutherford (2006).

Waterberg Mountain Bushveld

Waterberg Mountain Bushveld is located in the foothills, escarpment and tablelands of the Waterberg Mountains between Lephalale, Marken and Bela-Bela in the north-western region of Limpopo Province, South Africa. Vegetation structure comprises low to mid-high woodland that is dominated by deciduous, broad-leaved tree species, and has a grass-dominated herbaceous layer. Soils are mostly sandstone, subordinate conglomerate, siltstones and shale of the Kransberg Subgroup. Dominant canopy tree species within this vegetation type include *Burkea africana*, *Combretum apiculatum*, *Acacia caffra* and *Acacia robusta*. Other commonly recorded tree species include *Heteropyxis natalensis*, *Combretum molle*, *Pseudolachnostylis maprouneifolia* and *Terminalia sericea*. Common shrubs include *Dichrostachys cinerea*, *Euclea crispa* and *Olea capensis*. Waterberg Mountain Bushveld was assessed by Mucina & Rutherford (2006) as **Least Threatened** because of a low level of transformation (3%) and because 9% of the protection target of 24% is conserved in Marakele National Park and Moepel Nature Reserve.

5.1.1.2 Centres of Plant Endemism

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

5.1.1.3 Threatened Ecosystems

The study area is not situated within any listed Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

5.1.2 Local Context – Plant Species Richness and Vegetation Assemblages

SANBI's Botanical Database of Southern Africa (BODATSA) lists 483 plant species from 102 families for a 20 km radius of the project area. Due to the small size and dry conditions within the study area, only 85 plant species from 33 families were recorded during October 2019 fieldwork, representing 18% of the BODATSA total. The true plant species diversity of the study area is likely to be higher, particularly with regard to grasses and herbaceous species, which are more conspicuous in the wet season. The full list of plant species confirmed to occur in the study area during fieldwork is provided in Appendix 1. The dominant plant families are Poaceae (14 spp.), Fabaceae (13 spp.) and Combretaceae (7 spp.).

Two 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.). These communities are described in detail below (alien plant species are indicated by an asterisk).

5.1.2.1 *Maytenus albata* – *Spirostachys africana* Rocky Woodland

Rocky Woodland is found across the sandstone ridges that occur at both proposed developments. At the proposed Lapalala runway extension, it is found at the very far northern portion on the steep ridge adjacent to the Lapalala Headquarters, and at the Wilderness School access road it occurs over most of the site on the rocky ridge above the terrace below (Figure 5). Rocky Woodland covers 0.9 ha which equates to approximately 28% of the area surveyed. Vegetation structure is Low to Tall Closed Woodland (*sensu* Edwards, 1983) (Figure 2). The trees *Maytenus albata* and *Spirostachys africana* dominate the canopy, which supports a fairly diverse variety of trees. Other common canopy species include *Kirkia acuminata*, *Combretum zeyheri*, *Olea europaea* subsp. *africana*, *Pappea capensis*, *Acacia gerrardii*, *Englerophytum magalismsontanum*, *Ziziphus mucronata*, *Mimusops zeyheri*, *Peltophorum africanum* and *Lannea discolor*. The understory is dominated by the shrubs *Pyrostria hystrix*, *Croton gratissimus*, *Euclea natalensis* subsp. *angustifolia*, *Gymnosporia maranguensis*, *Grewia bicolor*, *G. flavescens* and *Dichrostachys cinerea* subsp. *africana*. Grasses are relatively scarce but include *Elionurus muticus* and *Panicum maximum*. Herbaceous plants were not abundant due to winter dormancy but included *Hypoestes forsskaolii*.

A total of 55 species (65% of the entire list) was recorded from Rocky Woodland during fieldwork; the lower of the two communities present (Appendix 1). Species fidelity is high, with 26 species (48% of the community list) occurring nowhere else in the study area. One SCC was recorded, namely *Elaeodendron transvaalense* which is classified as Near Threatened and is protected under the NFA (Table 7). Additionally, the tree *Spirostachys africana* is protected under the LEMA and the small tree *Combretum nelsonii* is endemic to Limpopo (Table 7).



Figure 2. Photographs of Rocky Woodland

5.1.2.2 *Terminalia sericea* – *Combretum zeyheri* Plains Woodland

This vegetation community is situated on level plains above the rocky ridges at both of the proposed development sites (Figure 5). Vegetation structure is mostly Short Closed Woodland (*sensu* Edwards, 1983) and characterised by a moderate diversity of deciduous trees and shrubs. The trees *Terminalia sericea* and *Combretum zeyheri* are the dominant large trees in the canopy. Other common trees include *Burkea africana*, *Combretum apiculatum*, *C. hereroense*, *Pseudolachnostylis maprouneifolia*, *Peltophorum africanum* and *Ziziphus mucronata*. The shrubs *Euclea natalensis* subsp. *angustifolia*, *Dichrostachys cinerea* subsp. *africana* and *Grewia flavescens* are dominant below the canopy. Grasses are represented by *Aristida adscensionis*, *A. congesta* subsp. *barbicollis*, *A. meridionalis*, *Eragrostis* sp. and *Loudetia simplex*. Herbs were mostly dormant at the time of the survey but did include *Psiadia punctulata* and *Polydora poskeana*.

Fifty-nine species (69% of the entire list) were recorded from Plains Woodland (Appendix 1) although a wet season survey would significantly increase this total with the addition of herbaceous species. No SCC were recorded, but the tree *Sclerocarya birrea* is protected under the NFA (Table 7).



Figure 3. Photographs of Plains Woodland

5.1.3 Plant Species of Conservation Concern

One SCC was recorded from within the study area, namely the tree *Elaeodendron transvaalense*, which has been assessed as NT¹ and is protected under the NFA. This tree is discussed briefly below. The tree *Sclerocarya birrea* is protected under the same act, while the tree *Spirostachys africana* is protected under the LEMA. The small tree *Combretum nelsonii* is endemic to Limpopo (Table 7).

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

This is a small to medium-sized evergreen tree occurring in northern and eastern South Africa, and further afield through Namibia, Botswana, Zimbabwe, Mozambique and Zambia. The species is heavily harvested in South Africa for traditional medicine and some sub-populations have declined as a result; as such it has been assessed as NT (Williams *et al.*, 2008). One small tree was located within Rocky Woodland along the proposed Lapalala Wilderness School road alignment (Figure 4).

Ten plant SCC potentially occur within the study area (Appendix 2). These plants have either been recorded from similar habitat within the quarter-degree grid 2328 CD and surrounding grids or are widespread in Waterberg Mountain Bushveld and are likely to occur within Lapalala Wilderness. Only one of these has a moderate chance of occurring within the study area, and is discussed below.

Snake-root *Drimia sanguinea* (Schinz) Jessop

This bulbous species is confined to southern Africa, occurring from western Free State and Northern Cape through northern South Africa to Namibia, Botswana and Zimbabwe. Snake-root is a well-known, highly poisonous species which has resulted in large-scale mortality in

¹ Raimondo *et al.* (2009)

livestock in the past. It is also one of the most widely traded species in traditional medicine markets and populations have declined by 20-25% as a result; the species has therefore been assessed as Near Threatened (Williams *et al.*, 2008b). This is an inconspicuous plant when not in flower and may have been overlooked during fieldwork. It has been confirmed to occur within the Lapalala Wilderness¹, and potentially occurs within the Plains Woodland vegetation community.

The remaining SCC have a low likelihood of occurrence due to lack of suitable habitat, being highly conspicuous species that are unlikely to be overlooked during fieldwork or regional rarity (Appendix 2).



Figure 4. Photograph of the Near Threatened plant *Elaeodendron transvaalense* located during fieldwork

The co-ordinates of the conservation-important plants located during fieldwork are presenting in

¹ ECOREX, 2016a

Table 8. These localities are meant to guide the developers during the planning and construction phases. The points are spatially presented in Figure 5.

5.1.4 Endemic Species

One plant endemic to Limpopo was recorded during fieldwork, namely *Combretum nelsonii*, which is mostly confined to the Waterberg and a small area in north-western Mpumalanga.

5.1.5 Invasive Alien Species

Only two alien plant species were recorded during fieldwork, one of which is invasive species as listed in the Conservation of Agricultural Resources Act, Act No. 43 of 1983 (CARA), namely * *Opuntia stricta* (Appendix 1). This succulent occurs in low numbers within the Rocky Woodland vegetation community.

Table 7. Plant SCC confirmed in the study area during fieldwork

| Taxa | Growth Form | Red Data | Protected | Limpopo Endemic | Vegetation Communities | |
|---|-------------|----------|-----------|-----------------|------------------------|-----------------|
| | | | | | Rocky Woodland | Plains Woodland |
| Family Anacardiaceae <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro | tree | | NFA | | | r |
| Family Celastraceae <i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer | tree | NT | NFA | | r | |
| Family Combretaceae <i>Combretum nelsonii</i> Dummer | tree | | | E | r | r |
| Family Euphorbiaceae <i>Spirostachys africana</i> Sond. | tree | | LEMA | | d | |
| TOTAL | 4 | 1 | 3 | | 3 | 2 |

NT = Near Threatened
 NFA = National Forests Act
 LEMA = Limpopo Environmental Management Act

d = dominant
 r = rare

Table 8. Co-ordinates of plant SCC confirmed in the study area during fieldwork

| Species | Red data | Protected Status | No. of Plants | GPS Co-ordinates | |
|-----------------------------------|----------|------------------|---------------|------------------|-----------|
| | | | | Lat | Long |
| <i>Elaeodendron transvaalense</i> | NT | NFA | 1 | -23.940045 | 28.363598 |
| <i>Sclerocarya birrea</i> | | NFA | 2 | -23.877531 | 28.308545 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.876093 | 28.308998 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.876003 | 28.308739 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.876184 | 28.308798 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.938608 | 28.362299 |
| <i>Spirostachys africana</i> | | LEMA | 2 | -23.938747 | 28.362359 |
| <i>Spirostachys africana</i> | | LEMA | 2 | -23.938874 | 28.362417 |
| <i>Spirostachys africana</i> | | LEMA | 3 | -23.938902 | 28.362552 |
| <i>Spirostachys africana</i> | | LEMA | 3 | -23.939043 | 28.362713 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.939249 | 28.362955 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.939383 | 28.363056 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.939657 | 28.363312 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.940140 | 28.363663 |
| <i>Spirostachys africana</i> | | LEMA | 3 | -23.940353 | 28.363810 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.940558 | 28.363953 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.940814 | 28.364083 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.941128 | 28.364247 |
| <i>Spirostachys africana</i> | | LEMA | 1 | -23.941248 | 28.364320 |

NT = Near Threatened

NFA = National Forests Act

LEMA = Limpopo Environmental Management Act

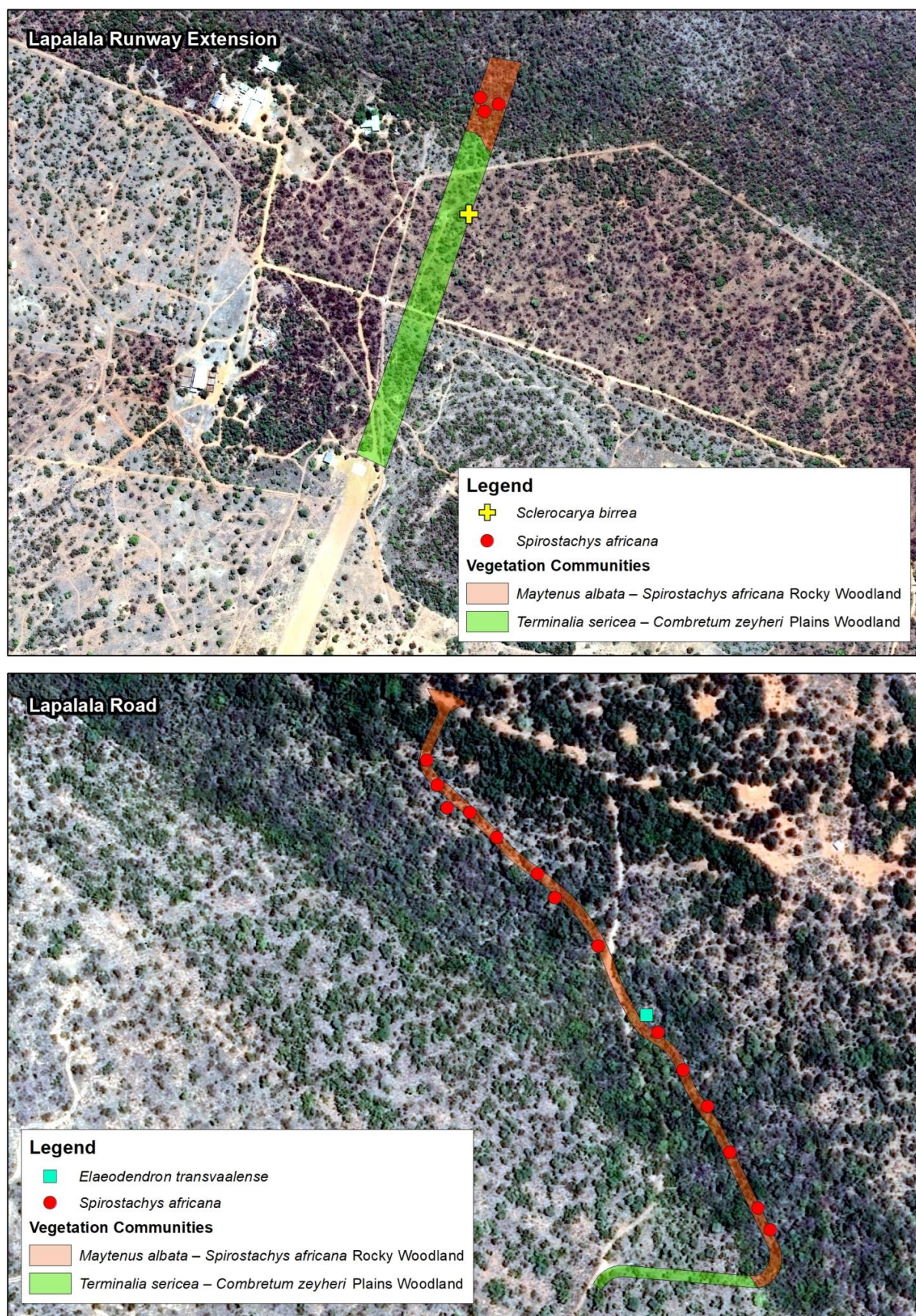


Figure 5. Vegetation communities identified within the Study Area

5.2 Terrestrial Fauna

5.2.1 Mammals

5.2.1.1 Regional Overview

The Waterberg region is well protected with a high number of state, provincial and private reserves present such as Marakele National Park, Mokolo Dam Nature Reserve, Moepel Nature Reserve, Vier-en-Twintig Riviere Game Reserve and many more. The study area is situated within the savanna biome mostly within the c. 45 000 ha Lapalala Wilderness which is home to a wide diversity of naturally occurring and re-introduced mammal species, including many threatened species such as Black Rhinoceros *Diceros bicornis minor* and Hippopotamus *Hippopotamus amphibius*¹. The mammal diversity for the reserve is high, although this includes small mammals such as rodents, insectivores and bats, most of which would not be located through active searching methods employed during daylight. A total of 81 mammal species have been confirmed for the degree grid 2328 to date as reflected in the Animal Demography Unit's Virtual Museum's database², although true diversity in Lapalala would be higher as many mammals are either small, cryptic or nocturnal in habit and therefore difficult to photograph³.

The proposed Lapalala Wilderness School access road is situated adjacent to the Lapalala Wilderness in an area used primarily for cattle ranching. Although still supporting common and widespread mammal species, this area does not provide refuge for larger SCC such as Elephant *Loxodonta africana* and Black Rhinoceros.

5.2.2.2 Confirmed Species

Fourteen mammal species were confirmed to occur within the two sites during fieldwork (Appendix 3). Some are common and widespread savanna species such as Scrub Hare *Lepus saxatilis*, Vervet Monkey *Chlorocebus pygerythrus*, Chacma Baboon *Papio ursinus*, Impala *Aepyceros melampus* and Tree Squirrel *Paraxerus cepapi*. Two confirmed SCC, namely Sable *Hippotragus niger* (VU) and Roan *Hippotragus equinus* (EN) are confined to breeding enclosures along the proposed runway extension and will not be considered for the EI assessment. Additional fieldwork, including small mammal trapping and camera traps,

¹ Masterplan for Lapalala Wilderness, 2016

² http://vmus.adu.org.za/vm_sp_list.php Accessed 04/10/2019

³ All virtual museum submissions require the inclusion of at least one photograph of the organism

would result in a fair number of additions but it is unlikely that this would have produced data that would have changed the ecological importance analysis of this report.

5.2.1.3 Conservation-Important Species

A total of 35 conservation-important mammals potentially occur within the general vicinity of the proposed development footprints (Appendix 4). Of these, 19 species are considered to be SCC. Apart from the captive-bred Sable and Roan, only two of these were confirmed during fieldwork, and are discussed below.

African Elephant *Loxodonta africana*

Although not listed in South Africa, the International Union for the Conservation of Nature (IUCN) has assessed the African Elephant as VU¹ due to dramatic population declines in most African countries due to poaching for their ivory. This species was recently re-introduced into Lapalala Wilderness and faeces were observed from within the small section of rocky woodland at the end of the proposed runway.

Brown Hyaena *Parahyaena brunnea*

Brown Hyaena is listed as NT in South Africa mainly due to persecution from stock farmers². It was confirmed during previous Ecorex surveys from both Lapalala³ and the Wilderness School areas⁴ and faeces were observed along the proposed road alignment. It probably forages regularly within this area.

A further three SCC have a moderate or higher likelihood of occurrence and could potentially occur anywhere in natural habitat within the study area but due to the small size of the development footprint probably only as occasional visitors. These three are described below:

Black Rhinoceros *Diceros bicornis*

Black Rhino numbers in Africa have declined by more than 90% since 1960; mainly due to poaching. Due to this decline the local subspecies *D. b. minor* has been assessed as VU⁵. This species is resident in Lapalala (*pers. obs.*) and may occasionally forage within the

¹ Blanc, 2008

² Child *et al.*, 2016

³ Ecorex, 2016a

⁴ Ecorex 2016b

⁵ Child *et al.*, 2016

Rocky Woodland section of the proposed runway site but will not remain for long periods of time.

Leopard *Panthera pardus*

This large cat is listed as Vulnerable due to hunting and habitat loss¹ although the local population is probably stable due to the amount of protection afforded. These territorial animals are likely to regularly occur within both portions of the study area, but only for short periods of time.

Lion *Panthera leo*

Although listed as Least Concern by Child *et al.* (2016), 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 depletion². This species has recently been introduced into Lapalala and may forage in the general vicinity of the proposed runway extension but would not remain for extended periods of time.

The remaining potentially occurring SCC have a Low likelihood of occurrence due to a lack of suitable habitat, human disturbance or regional scarcity.

Thirty-four SCC are protected either under the NEMBA ToPS or the LEMA (Appendix 4). Six of these were confirmed during fieldwork (Appendix 3), and it is very likely that a number of other protected species will utilise the study area for brief periods.

¹ Child *et al.*, 2016

² Bauer *et al.*, 2016

5.2.2 Birds

5.2.2.1 Regional Overview

The mesic savannas of southern Africa support the highest diversity of bird species within the sub-region, but are low in endemism as they extend into central Africa¹. The study area, situated within the quarter-degree grid 2328 CD, has had 228 species recorded to date by the second Southern African Bird Atlas Projects (SABAP2)². This total is reliant on the number of checklists submitted to the project and the remoteness of the area has resulted in very few submissions. At a finer scale, data from SABAP2 indicate that 209 bird species from 24 full protocol lists³ have already been recorded from the two pentads (mapping units) in which the study area is situated (2350_2815 and 2355_2820)⁴. To date, 448 bird species have been recorded within the Waterberg⁵, indicating that species diversity across the region is high but the study area itself is perhaps under-sampled.

The study area falls within the Waterberg System Important Bird & Biodiversity Area (IBA) and qualifies as a Global IBA under criteria A1, A3 and A4ii. This 1.3 million hectare IBA supports six globally threatened species, in addition to seven resident regionally threatened birds. A number of migratory and vagrant threatened species also occur⁶.

5.2.2.2 Local Avifaunal Assemblages

A total of 52 bird species was confirmed from within or immediately adjacent to the actual habitat represented in the study area during fieldwork, and is listed in Appendix 3. Although the habitats present would support a higher species diversity in the rain season, sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species and to describe broad bird assemblages. Two broad assemblages or species-habitat associations were identified, and are briefly described below:

¹ Hockey *et al.*, 2005

² http://sabap1.adu.org.za/sabap_site_summary.php?autoSite=SABAP&QDGC=2328CD accessed 06/10/2019

³ A submitted list is considered full protocol when at least two hours of birding has taken place over a five day period

⁴ Data accessed from http://sabap2.adu.org.za/pentad_info.php?pentad=2350_2815#menu_top and http://sabap2.adu.org.za/pentad_info.php?pentad=2355_2820#menu_top on 06/10/2019

⁵ <http://www.waterberg-bioquest.co.za/index.html>

⁶ Marnewick *et al.*, 2015

Plains Woodland Assemblage

This assemblage occurs within the *Terminalia sericea* – *Combretum zeyheri* dominated woodland that covers most of the level part of the study area. Common bird species found include Golden-breasted Bunting *Emberiza flaviventris*, Blue Waxbill *Uraeginthus angolensis*, Striped Kingfisher *Halcyon chelicuti*, Chinspot Batis *Batis molitor*, Black-headed Oriole *Oriolus larvatus* and Southern Grey-headed Sparrow *Passer diffusus*. Rarer species include Bushveld Pipit *Anthus caffer* and Grey Penduline Tit *Anthoscopus caroli*. Forty-two species (81%) were recorded from the Plains Woodland assemblage, the higher of the two assemblages (Appendix 3).

Rocky Woodland Assemblage

The sandstone ridges and associated dense woodland supports a distinctive although less diverse assemblage. Typical birds encountered include Yellow-bellied Greenbul *Chlorocichla flaviventris*, Grey-backed Camaroptera *Camaroptera brevicaudata*, Black-collared Barbet *Lybius torquatus*, Grey-headed Bushshrike *Malaconotus blanchoti*, White-throated Robin-Chat *Cossypha humeralis* and Cape White-eye *Zosterops virens* while less frequently observed species include Jameson's Firefinch *Lagonosticta rhodopareia* and Bearded Woodpecker *Dendropicos namaquus*. Nineteen species (37%) were recorded from the Rocky Woodland assemblage, the lower of the two assemblages (Appendix 3).

5.2.2.3 Conservation-Important Species

Fifteen bird SCC potentially occur within the general vicinity of the study area (Appendix 4). None of these were recorded during fieldwork and none are expected to regularly occur within the potential development sites due to a lack of suitable habitat, high human disturbance levels or regional rarity.

5.2.3 Reptiles

5.2.3.1 Regional Overview

The Waterberg, including Lapalala Wilderness, supports a very high diversity of reptile species, with diversity levels ranking in the top 10% of all areas in South Africa¹. The two reptile groups showing the highest diversity include the lizards (20-41 species per QDGS) and snakes (13-19 species per QDGS) (Bates *et al.*, 2014). Reptile endemism is moderate, with at least five endemic species present in the Waterberg (Bates *et al.*, 2014). Seventy-six species of reptiles have been recorded from the entire degree grid 2328, and 19 species in 2328 CD, as listed on the Reptile Atlas of Southern Africa website.

5.2.3.2 Confirmed Species

Two reptiles were recorded during fieldwork, namely Variable Skink *Trachylepis varia* and Bushveld Lizard *Heliobolus lugubris*, both of which are common and widespread in South Africa (Bates *et al.*, 2014). Dedicated reptile surveys, including trapping, would no doubt have produced a few additional species but are unlikely to have produced data that would change the recommendations in this report.

5.2.3.3 Conservation-Important Species

None of the potentially occurring reptile SCC are likely to be found within the study area due to a lack of suitable habitat or are unrecorded from Lapalala (Appendix 4). Southern African Python *Python natalensis* is protected under the NEMBA ToPS and is likely to occasionally forage within the study area.

¹ Bates *et al.*, 2014

5.2.4 Frogs

5.2.4.1 Regional Overview

The Waterberg area supports a moderately high diversity of frog species, with levels of 11-20 species per QDGS¹. However, frog endemism is very low with no potentially occurring endemic species present in the area (Minter *et al.*, 2004). Twenty-five frog species have been recorded from the degree grid 2328² and, on a finer scale, 14 have been recorded from the QDGS 2328 CD³, within which the study area is situated.

5.2.4.2 Confirmed Species

No frogs were recorded during the assessment, primarily due to a lack of aquatic habitat present within the study area. Dedicated frog surveys, including trapping, may have produced a few species but are unlikely to have produced data that would change the recommendations in this report.

5.2.4.2 Conservation-Important Species

None of the 25 species of frogs recorded in 2328 have been assessed as SCC.

¹ Minter *et al.*, 2004

² http://vmus.adu.org.za/vm_sp_list.php accessed 06/10/2019

³ http://vmus.adu.org.za/vm_sp_list.php accessed 06/10/2019

5.3 Ecological Importance

5.3.1 Limpopo Province Biodiversity Conservation Assessment

While the Terrestrial Ecosystem Status of the vegetation types in the study area is Not Currently Threatened, the Limpopo Province Biodiversity Conservation Assessment (LPBCA) classifies the study area and general surroundings as a **Critical Biodiversity Area 1 (CBA1)** (Desmet *et al.*, 2013). CBA1's are described as **Irreplaceable** Sites that are required to meet biodiversity pattern and/or ecological processes targets. The primary land management objective for CBA1'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).

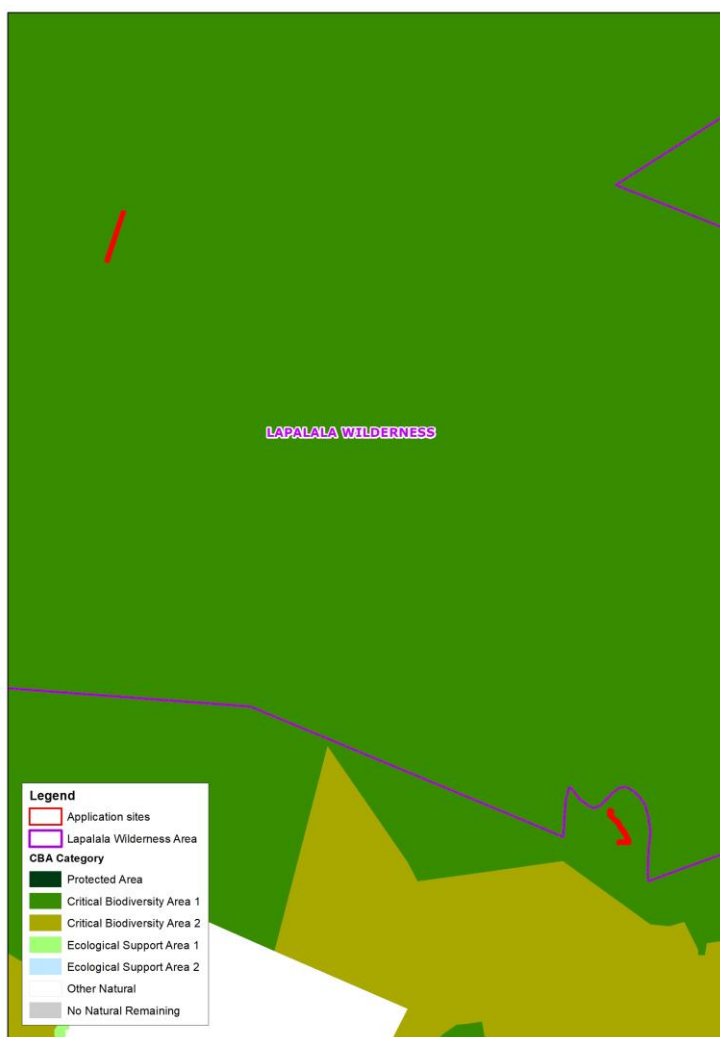


Figure 6. MBSP CBA Map of the Study Area

5.3.2 Environmental Screening Tool

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

1. CBA 1 Area;
2. Located within a Focus Area for the Protected Area Expansion Strategy (PAES).

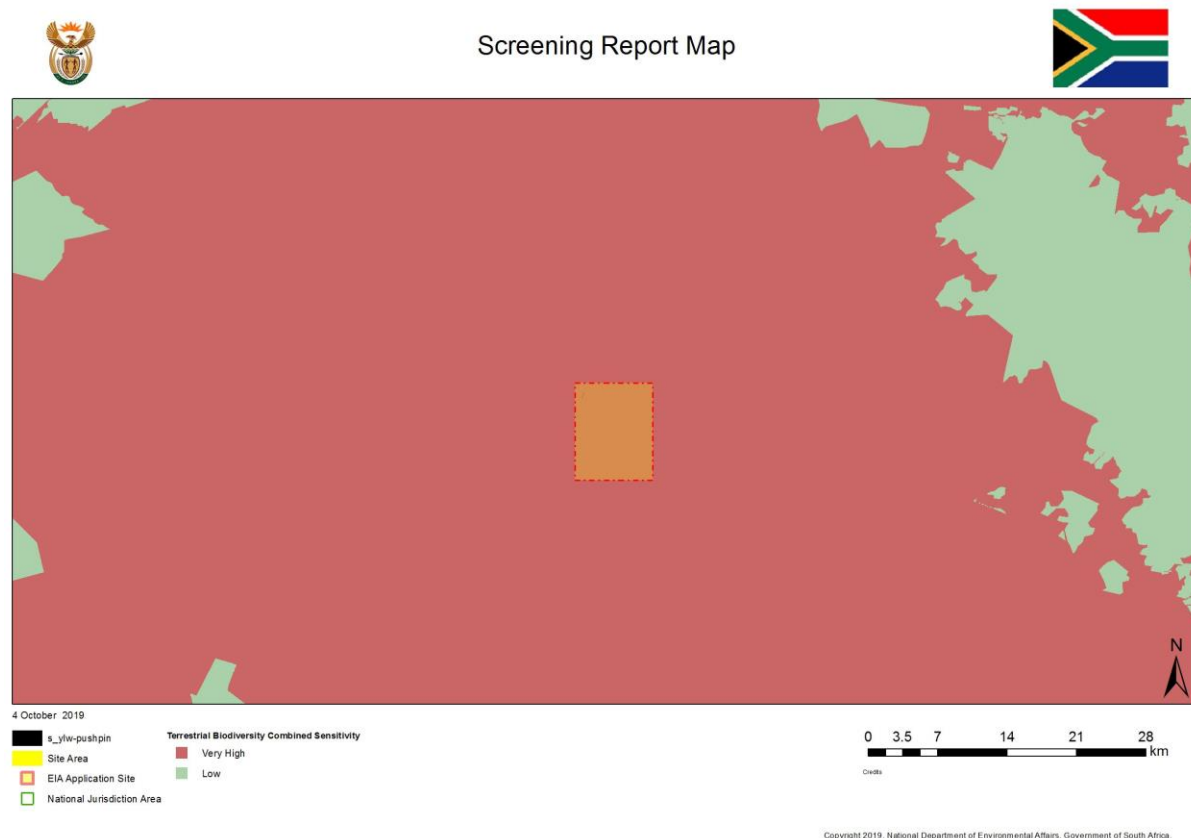


Figure 7. Environmental Screening Tool assessment of Terrestrial Biodiversity Features in the Study Area

5.3.4 Site-specific Ecological Importance Analysis

An Ecological Importance analysis of the two vegetation communities represented in the study area was undertaken using the methodology described in Section 4.3. Table 9 shows the calculation of Ecological Importance of the study area, which is displayed in Figure 8 below. Both communities reflect identical ratings and are therefore discussed under a single paragraph below.

The Rocky Woodland and Plains Woodland vegetation communities have High Conservation Value (CV) as a result of the confirmed occurrence of faunal SCC, such as Elephant and Brown Hyaena, or predicted occurrence of faunal SCC, such as Leopard and Lion. They are also classified as a CBA 1. The Functional Integrity (FI) is also High as both communities are relatively undisturbed. The integration of High CV and High FI results in a Biodiversity Value (BV) of **High**. The Vulnerability (V) of these two communities is assessed as Medium as the area to be impacted is limited in spatial extent and situated within a large, well-protected vegetation type in the savanna biome. Resilience (R) is also assessed as Medium. The Receptor Sensitivity (RS) is thus also **Medium**. When integrated with the High BV the Ecological Importance (EI) of the two vegetation communities is assessed as **Medium**.

Table 9. Overview of the calculation of Ecological Importance of Vegetation Communities in the Project Area

| Assessment Criteria | Vegetation Communities / Habitats | |
|------------------------------|-----------------------------------|-----------------|
| | Rocky Woodland | Plains Woodland |
| Conservation Value | High | High |
| Functional Integrity | High | High |
| Biodiversity Value | High | High |
| Vulnerability | Medium | Medium |
| Resilience | Medium | Medium |
| Receptor Sensitivity | Medium | Medium |
| ECOLOGICAL IMPORTANCE | Medium | Medium |

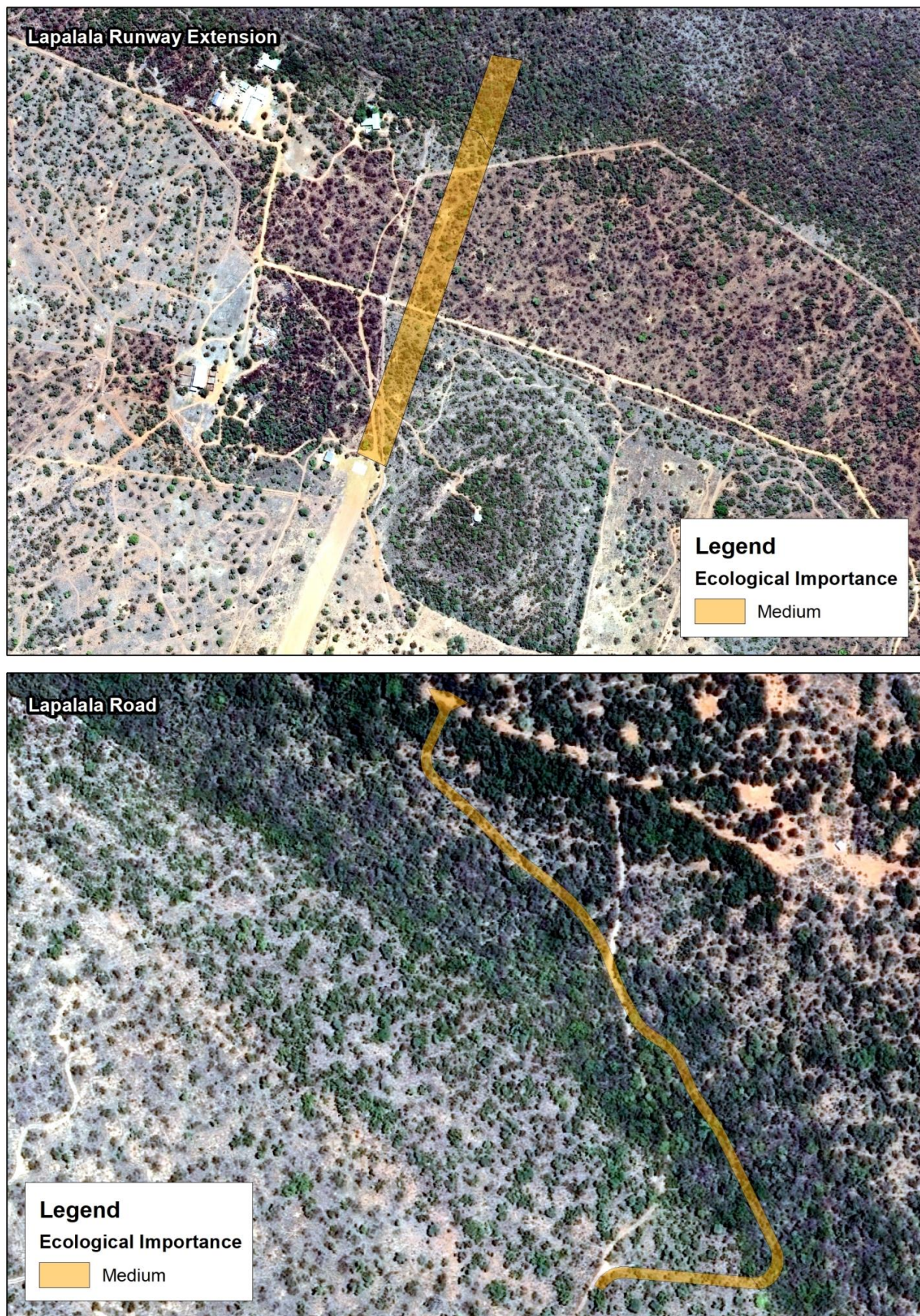


Figure 8. Ecological Importance of the Vegetation Communities in the Study Area

6. KEY POTENTIAL IMPACTS

While a detailed impact assessment was not part of the terms of reference for this report, key potential impacts associated with the development can be described. The following are current or potential impacts in the application site and surrounding area:

- **Loss of a portion of Critical Biodiversity Area 1** – The proposed development sites have been assessed as a CBA 1 by the LPBCA.
- **Loss or damage of plant SCC** – The tree *Elaeodendron transvaalense* is assessed as NT. The trees *Sclerocarya birrea* and *Elaeodendron transvaalense* are protected under the NFA and the tree *Spirostachys africana* is protected under the LEMA;
- **Invasion of natural habitat by alien plants** – although only one alien invasive plant species was located during fieldwork (* *Opuntia stricta*), additional invasion is possible as construction activities expose bare soil providing a base for alien seedlings to establish;
- **Loss of habitat for faunal SCC** – One VU and one NT-listed mammals were confirmed to occur, and two VU-listed mammals have a moderate or higher likelihood of regularly occurring within the study area, and any construction would permanently destroy the available habitat;
- **Potential loss of faunal SCC** – The proposed extension of the runway traverses breeding camps of threatened fauna species, as well as a small section of the reserve that is accessible to a number of free-ranging faunal SCC. Aircraft taking off or landing may collide with these species causing injury or death, or may scare animals into injury through falling or colliding with each other or trees, rocks, etc.
- **Increase in poaching activities** – unsupervised construction workers may participate in small-scale poaching of small mammals. Medicinal plants such as *Elaeodendron transvaalense* may also be harvested for muthi.
- **Increase in soil erosion** – the existing steep track that bisects the proposed road alignment does not contain any storm-water runoff erosion control measures and will most likely continue eroding after rain. This causes a local loss of topsoil, and sediments depositing on the flatter areas below.

7. DISCUSSION AND RECOMMENDATIONS

Two vegetation communities totaling an area of approximately 3.2 ha were surveyed at Lapalala Wilderness and an adjacent area as part of a proposed runway extension and an access road to the pending Lapalala Wilderness School. Plains Woodland occurs along the level, sandier woodland while Rocky Woodland occurs on the steep, rocky sections below the plains. The proposed runway is situated within the large Lapalala Wilderness while the proposed access road is situated in a cattle ranching area immediately adjacent to it.

The LPBCA classifies the study area and general surroundings as a CBA1. CBA1's are described as **Irreplaceable** Sites that are required to meet biodiversity pattern and/or ecological processes targets. The primary land management objective for CBA1'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. The proposed developments are therefore compatible with the recommended land uses.

The EI of both of the vegetation communities is assessed as Medium. Although a moderate number of faunal SCC are confirmed or are likely to do so, the areas are small and do not contain any raptor nesting sites. The runway extension area is also situated near the Lapalala Headquarters and within captive breeding camps, and is therefore experiencing regular human activity. The proposed Lapalala Wilderness School access road is situated outside of a protected area although still immediately adjacent to it. This area does not support larger fauna SCC. The NT-listed tree *Elaeodendron transvaalensis* was confirmed from Rocky Woodland although only one small plant was located. One additional plant SCC is likely to occur, namely the bulb *Drimia sanguinea* which is listed as NT.

Some preliminary suggestions and mitigation measures regarding the proposed construction activities on Lapalala are recommended below.

- Prior to any construction at any of the sites, an experienced botanist should conduct a walk-through of these sites during the wet season (Dec-Apr), marking each plant species of conservation concern to be avoided or that may need to be relocated prior to any site clearance activity taking place.
- All proposed roads to contain adequate stormwater drainage and erosion control measures.

- Wherever possible, trees taller than 5 m or with a diameter at breast height of 30 cm should be left unharmed, whether protected by law or not.
- The existing track leading through the Rocky Woodland at the proposed Lapalala Wilderness School is actively eroding during rain episodes. This track should be completely restored to original habitat by rehabilitation measures promoting sediment trapping, water attenuation and establishment of locally indigenous plant species.
- The proposed runway extension should be adequately fenced off from all larger mammals, including the existing Sable and Roan found in the breeding camps, to prevent loss of both human and animal life through collisions with aircraft.
- In order to comply with the Conservation of Agricultural Resources Act (Act 43 of 1983), all listed invasive exotic plants as indicated in Appendix 1 should be targeted and controlled. This may necessitate the compilation of an alien plant control plan although only the succulent * *Opuntia stricta* was recorded during fieldwork.
- Weeds will inevitably establish around the proposed construction sites and it is important that weed control, if involving herbicides, be managed correctly so as to reduce the impact on the adjacent natural vegetation. Regular inspections should be made to determine if any additional alien plants have established.
- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

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

8. REFERENCES

- Animal Demography Unit. n.d. The Southern African Bird Atlas Project <http://sabap2.adu.org.za/index.php> accessed on 06/10/2019.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M.S. (eds). 2014. *Atlas and Red Data List of the Reptiles of South Africa, Lesotho and Swaziland*. Suricata 1. South African National Biodiversity Institute, Pretoria.
- Bauer, H., Packer, C., Funston, P.F., Henschel, P. & Nowell, K. 2016. *Panthera leo* (errata version published in 2017). *The IUCN Red List of Threatened Species* 2016: e.T15951A115130419. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T15951A107265605.en>. Downloaded on 04 October 2019
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T., editors. 2016. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- DEA. 2014. National Environmental Management: Biodiversity Act 2004 (Act 10 of 2004) Alien and Invasive Species Lists. Government Gazette.
- DEAT. 2011. *National List of Threatened Terrestrial Ecosystems in South Africa*. National Environmental Management: Biodiversity Act (Act 10 of 2004). Government Gazette.
- Department of Agriculture. 2001. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), Regulations: Amendment. Government Gazette, 30 March 2001.
- Desmet, P. G., Holness, S., Skowno, A. & Egan, V.T. (2013). Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS.
- ECOREX. 2016a. Lapalala Wilderness Lodge and Road Development, Baseline Terrestrial Ecology Study And Biodiversity Sensitivity Assessment. Unpublished report submitted to NuLeaf.
- ECOREX. 2016b. Lapalala Wilderness School, Baseline Terrestrial Ecology Study And Biodiversity Sensitivity Assessment. Unpublished report submitted to NuLeaf.
- Edwards, D. 1983. A broad-scale structural classification of vegetation for practical purposes. *Bothalia* 14:705-712.
- Enviro-Insight (2019). Species Protocol Best Practice Guidelines for taxa-specific impact assessments in South Africa. Draft 1. Unpublished report for SANBI and BirdLife SA, Pretoria.
- Marnewick M.D., Retief E.F., Theron N.T., Wright D.R., Anderson T.A. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.

- Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J. & Kloepfer, D. 2004. *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series No.9. Smithsonian Institution, Washington, DC.
- Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (eds) 2009. *Red List of South African Plants 2009*. Strelitzia 25. South African National Biodiversity Institute, Pretoria.
- South African National Biodiversity Institute . 2018 Vegetation Map App [Carry Map] 2018. Available from the Biodiversity GIS website, downloaded on 09 April 2019.
- Taylor, M.R., Peacock, F., Wanless, R.W. (eds). 2015. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. Birdlife South Africa, Johannesburg.
- Van Wyk, A. E. & Smith, G. F. 2001. *Regions of floristic endemism in southern Africa: A review with emphasis on succulents*. Umdaus Press, Pretoria.
- Williams, V.L., Raimondo, D., Crouch, N.R., Cunningham, A.B., Scott-Shaw, C.R., Lötter, M. & Ngwenya, A.M. 2008a. *Elaeodendron transvaalense* (Burt Davy) R.H.Archer. National Assessment: Red List of South African Plants version 2017.1. Accessed on 2019/10/04.
- Williams, V.L., Raimondo, D., Crouch, N.R., Brueton, V.J., Cunningham, A.B., Scott-Shaw, C.R., Lötter, M. & Ngwenya, A.M. 2008b. *Drimia sanguinea* (Schinz) Jessop. National Assessment: Red List of South African Plants version 2017.1. Accessed on 2019/10/10

9. APPENDICES

Appendix 1. Checklist of Flora recorded during fieldwork

| Taxa | Growth Form | Red Data | Protected | CARA Category | Vegetation Communities | |
|---|------------------------|----------|-----------|---------------|------------------------|-----------------|
| | | | | | Rocky Woodland | Plains Woodland |
| Family Acanthaceae <i>Hypoestes forsskaolii</i> (Vahl) R.Br. | herb | | | | r | |
| Family Anacardiaceae <i>Lannea discolor</i> (Sond.) Engl. <i>Ozoroa paniculosa</i> (Sond.) R.Fern. & A.Fern. <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro | tree tree tree | | NFA | | u | u r r |
| Family Annonaceae <i>Hexalobus monopetalus</i> (A.Rich.) Engl. & Diels var. <i>monopetalus</i> | tree | | | | r | |
| Family Amaranthaceae <i>Kyphocarpa angustifolia</i> (Moq.) Lopr. | herb | | | | | r |
| Family Apocynaceae <i>Carissa bispinosa</i> (L.) Desf. ex Brenan <i>Secamone</i> cf. <i>filiformis</i> | shrub climber | | | | u r | r |
| Family Asparagaceae <i>Asparagus</i> sp. <i>Asparagus suaveolens</i> Burch. | climber dwarf shrub | | | | u r | r |
| Family Asteraceae <i>Polydora poskeana</i> (Vatke & Hildebr.) H.Rob. <i>Psiadia punctulata</i> (DC.) Vatke | herb herb | | | | | r u |
| Family Burseraceae <i>Commiphora glandulosa</i> Schinz | tree | | | | r | |
| Family Cactaceae * <i>Opuntia stricta</i> Haw. | succulent | | | 1b | r | |

| | | | | | | |
|---|--|----|------|--|--|---|
| Family Celastraceae <i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer <i>Gymnosporia buxifolia</i> (L.) Szyszyl. <i>Gymnosporia maranguensis</i> (Loes.) Loes. <i>Maytenus albata</i> (N.E.Br.) E.Schmidt bis & Jordaan <i>Mystroxydon aethiopicum</i> (Thunb.) Loes. | tree shrub shrub tree tree | NT | NFA | | r u u d r | u u |
| Family Combretaceae <i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i> <i>Combretum hereroense</i> Schinz <i>Combretum moggii</i> Exell <i>Combretum molle</i> R.Br. ex G.Don <i>Combretum nelsonii</i> Dummer <i>Combretum zeyheri</i> Sond. <i>Terminalia sericea</i> Burch. ex DC. | tree tree shrub tree tree tree tree | | | | r u r u r u | r f u d d |
| Family Dracaenaceae <i>Sansevieria hyacinthoides</i> (L.) Druce <i>Sansevieria pearsonii</i> N.E.Br. | succulent succulent | | | | r r | |
| Family Ebenaceae <i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i> <i>Euclea linearis</i> Zeyh. ex Hiern <i>Euclea natalensis</i> A.DC. subsp. <i>angustifolia</i> F.White | tree shrub shrub | | | | u f | f u f |
| Family Euphorbiaceae <i>Croton gratissimus</i> Burch. var. <i>gratissimus</i> <i>Spirostachys africana</i> Sond. | tree tree | | LEMA | | f d | |
| Family Fabaceae <i>Acacia burkei</i> Benth. <i>Acacia gerrardii</i> Benth. <i>Acacia karroo</i> Hayne <i>Acacia nigrescens</i> Oliv. <i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>kraussiana</i> (Benth.) Brenan <i>Burkea africana</i> Hook. <i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt <i>Elephantorrhiza burkei</i> Benth. <i>Indigofera</i> sp. (no flowers) <i>Peltophorum africanum</i> Sond. <i>Pterocarpus rotundifolius</i> (Sond.) Druce subsp. <i>rotundifolius</i> | tree tree tree tree tree tree tree dwarf shrub dwarf shrub tree tree | | | | r f r r r r r r | r r f u r r u |

| | | | | | | |
|--|-------------|--|--|--|--|---|
| <i>Rhynchosia</i> sp. (no flowers) | climber | | | | | r |
| <i>Schotia brachypetala</i> Sond. | tree | | | | | r |
| Family Heteropxyidaceae | | | | | | |
| <i>Heteropyxis natalensis</i> Harv. | tree | | | | | r |
| Family Kirkiaceae | | | | | | |
| <i>Kirkia acuminata</i> Oliv. | tree | | | | | u |
| Family Malvaceae | | | | | | |
| <i>Abutilon</i> sp. | herb | | | | | r |
| <i>Grewia bicolor</i> Juss. var. <i>bicolor</i> | shrub | | | | | u |
| <i>Grewia flavescens</i> Juss. | shrub | | | | | f |
| <i>Hibiscus micranthus</i> L.f. var. <i>micranthus</i> | dwarf shrub | | | | | r |
| <i>Melhania acuminata</i> Mast. var. <i>acuminata</i> | dwarf shrub | | | | | r |
| <i>Waltheria indica</i> L. | dwarf shrub | | | | | u |
| Family Ochnaceae | | | | | | |
| <i>Ochna inermis</i> (Forssk.) Schweinf. ex Penz. | tree | | | | | r |
| Family Olacaceae | | | | | | |
| <i>Ximenia americana</i> L. var. <i>microphylla</i> Welw. ex Oliv. | shrub | | | | | u |
| <i>Ximenia caffra</i> Sond. var. <i>natalensis</i> Sond. | shrub | | | | | r |
| Family Oleaceae | | | | | | |
| <i>Olea europaea</i> subsp. <i>africana</i> (Mill.) P.S.Green | tree | | | | | f |
| Family Phyllanthaceae | | | | | | |
| <i>Pseudolachnostylis maprouneifolia</i> Pax | tree | | | | | r |
| Family Poaceae | | | | | | |
| <i>Aristida adscensionis</i> L. | grass | | | | | u |
| <i>Aristida meridionalis</i> Henrard | grass | | | | | u |
| <i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter | grass | | | | | d |
| * <i>Cymbopogon pospischilii</i> (K.Schum.) C.E.Hubb. | grass | | | | | f |
| <i>Elionurus muticus</i> (Spreng.) Kuntze | grass | | | | | r |
| <i>Enneapogon cenchroides</i> (Licht. ex Roem. & Schult.) C.E.Hubb. | grass | | | | | f |
| <i>Eragrostis rigidior</i> Pilg. | grass | | | | | u |
| <i>Eragrostis</i> sp. | grass | | | | | u |
| <i>Heteropogon contortus</i> (L.) Roem. & Schult. | grass | | | | | r |
| <i>Loudetia simplex</i> (Nees) C.E.Hubb. | grass | | | | | r |
| <i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i> | grass | | | | | r |
| <i>Panicum maximum</i> Jacq. | grass | | | | | r |
| <i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg. | grass | | | | | u |

| | | | | | | |
|--|-------------|----------|----------|---|-----------|-----------|
| <i>Schizachyrium sanguineum</i> (Retz.) Alston | grass | | | | | u |
| Family Rhamnaceae | | | | | | |
| <i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i> | tree | | | | u | u |
| Family Rubiaceae | | | | | | |
| <i>Gardenia volkensii</i> K.Schum. subsp. <i>volkensii</i> var. <i>volkensii</i> | tree | | | | | r |
| <i>Pyrostria hystrix</i> (Bremek.) Bridson | tree | | | | d | |
| Family Solanaceae | | | | | | |
| <i>Solanum</i> sp. (no flowers) | | | | | | r |
| Family Sapindaceae | | | | | | |
| <i>Pappea capensis</i> Eckl. & Zeyh. | tree | | | | f | r |
| Family Sapotaceae | | | | | | |
| <i>Englerophytum magalismontanum</i> (Sond.) T.D.Penn. | tree | | | | u | r |
| <i>Mimusops zeyheri</i> Sond. | tree | | | f | u | |
| Family Sterculiaceae | | | | | | |
| <i>Sterculia rogersii</i> N.E.Br. | tree | | | | r | |
| Family Strychnaceae | | | | | | |
| <i>Strychnos madagascariensis</i> Poir. | tree | | | | r | r |
| <i>Strychnos pungens</i> Soler. | tree | | | | | r |
| Family Velloziaceae | | | | | | |
| <i>Xerophyta retinervis</i> Baker | dwarf shrub | | | | | u |
| Family Viscaceae | | | | | | |
| <i>Viscum combreticola</i> Engl. | parasite | | | | r | r |
| Family Vitaceae | | | | | | |
| <i>Rhoicissus revouilii</i> Planch. | climber | | | | | r |
| TOTAL | 85 | 1 | 3 | | 55 | 59 |

NT = Near Threatened
NFA = National Forests Act
LEMA = Limpopo Environmental Management Act

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

Appendix 2. Potentially occurring plant species of conservation concern

| Species | Family | Red Data Status | Habitat | Likelihood | Reason |
|------------------------------------|------------------|-----------------|-------------------------------------|------------|--|
| <i>Justicia minima</i> | Acanthaceae | Rare | Rocky riverbeds | Very Low | No suitable habitat present |
| <i>Brachystelma inconspicuum</i> | Apocynaceae | Rare | Open quartzitic grassland | Very Low | No suitable habitat present |
| <i>Brachylaena huillensis</i> | Asteraceae | NT‡ | Various woodland types | Very Low | None located during fieldwork and all suitable habitat searched |
| <i>Elaeodendron transvaalensis</i> | Celastraceae | NT | Woodland, often on rocky slopes | Confirmed | |
| <i>Combretum petrophilum</i> | Combretaceae | Rare | Rocky outcrops in mountain bushveld | Low | None located during fieldwork and all suitable habitat searched |
| <i>Euphorbia louwii</i> | Euphorbiaceae | Rare | Sandstone ridges | Low | Suitable habitat present but plant is conspicuous and none located despite intensive searching |
| <i>Euphorbia waterbergensis</i> | Euphorbiaceae | Rare | Quartzitic ridges in bushveld | Low | No suitable habitat present |
| <i>Drimia sanguinea</i> | Hyacinthaceae | NT | Wide habitat tolerance | Moderate | Suitable habitat present but plants are deciduous and would not have been visible during fieldwork |
| <i>Ansellia africana</i> | Orchidaceae | VU‡ | Savanna | Low | Confirmed on Lapalala but no plants are present within the areas surveyed |
| <i>Freylinia tropica</i> | Scrophulareaceae | Rare | Streambanks | Very Low | No suitable habitat present |

VU = Vulnerable
 NT = Near Threatened
 ‡ = IUCN assessment

Appendix 3. Checklist of fauna recorded during fieldwork

| Common Name | Scientific Name | Red Data | Protected: National | Protected: Provincial | Plains Woodland | Rocky Woodland |
|--|---------------------------------|----------|------------------------|--------------------------|-----------------|----------------|
| Mammals | | | | | | |
| ORDER: PRIMATES | | | | | | |
| Family Cercopithecidae (Old World monkeys) | | | | | | |
| Chacma Baboon | <i>Papio ursinus</i> | | | | x | x |
| Vervet Monkey | <i>Chlorocebus pygerythrus</i> | | | | | x |
| ORDER: LAGOMORPHA | | | | | | |
| Family Leporidae (rabbits and hares) | | | | | | |
| Scrub Hare | <i>Lepus saxatilis</i> | | | | x | |
| ORDER: RODENTIA | | | | | | |
| Family Hystricidae (Old World porcupines) | | | | | | |
| Cape Porcupine | <i>Hystrix africaeaustralis</i> | | | | x | |
| ORDER: CARNIVORA | | | | | | |
| Family Hyaenidae (hyaenas) | | | | | | |
| Brown Hyaena | <i>Parahyaena brunnea</i> | NT | NEMBA (PR) | LEMA | x | |
| Family Herpestidae (mongooses) | | | | | | |
| Banded Mongoose | <i>Mungos mungo</i> | | | | | x |
| Family Canidae (dogs, jackals & allies) | | | | | | |
| Black-backed Jackal | <i>Canis mesomelas</i> | | | | x | |
| ORDER: PROBOSCIDEA | | | | | | |
| Family Elephantidae (elephants) | | | | | | |
| African Elephant | <i>Loxodonta africana</i> | VU† | NEMBA (PR) | LEMA | x | |
| ORDER: PERRISODACTYLA | | | | | | |
| Family Equidae (horses) | | | | | | |
| Burchell's Zebra | <i>Equus quagga burchellii</i> | | NEMBA | | x | |

| | | | (PR) | | | |
|--|---------------------------------|----|------|------|----|---|
| ORDER: CETARTIODACTYLA | | | | | | |
| Family Suidae (pigs) | | | | | | |
| Common Warthog | <i>Phacochoerus africanus</i> | | | | x | |
| Family Bovidae (cattle & antilopes) | | | | | | |
| Buffalo | <i>Syncerus caffer</i> | | | LEMA | x | |
| Roan Antelope | <i>Hippotragus equinus</i> | EN | EN | LEMA | x | |
| Sable Antelope | <i>Hippotragus niger niger</i> | VU | | LEMA | x | |
| Kudu | <i>Tragelaphus strepsiceros</i> | | | | x | x |
| Nyala | <i>Tragelaphus angasii</i> | | | LEMA | | x |
| Impala | <i>Aepyceros melampus</i> | | | | x | x |
| Subtotal | 14 | 5 | 6 | 6 | 12 | 4 |
| Birds | | | | | | |
| ORDER: GALLIFORMES | | | | | | |
| Family Phasianidae (pheasants, fowl and allies) | | | | | | |
| Crested Francolin | <i>Dendroperdix sephaena</i> | | | | | x |
| Natal Spurfowl | <i>Pternistis natalensis</i> | | | | | x |
| ORDER: ACCIPITRIFORMES | | | | | | |
| Family Accipitridae (kites, hawks and eagles) | | | | | | |
| African Hawk-Eagle | <i>Aquila spilogaster</i> | | | | x | |
| ORDER: COLUMBIFORMES | | | | | | |
| Family Columbidae (pigeons and doves) | | | | | | |
| Cape Turtle Dove | <i>Streptopelia capicola</i> | | | | x | |
| Emerald-spotted Wood Dove | <i>Turtur chalcospilos</i> | | | | x | x |
| ORDER: COLIIFORMES | | | | | | |
| Family Coliidae (mousebirds) | | | | | | |
| Red-faced Mousebird | <i>Urocolius indicus</i> | | | | x | |
| ORDER: CORACIIFORMES | | | | | | |
| Family Alcedinidae (kingfishers) | | | | | | |
| Brown-hooded Kingfisher | <i>Halcyon albiventris</i> | | | | x | |
| Striped Kingfisher | <i>Halcyon chelicuti</i> | | | | x | |
| Family Meropidae (bee-eaters) | | | | | | |
| European Bee-eater | <i>Merops apiaster</i> | | | | x | |
| ORDER: BUCEROTIFORMES | | | | | | |
| Family Upupidae (hoopoes) | | | | | | |

| | | | | | | |
|--|-------------------------------------|--|--|--|---|---|
| African Hoopoe | <i>Upupa africana</i> | | | | x | |
| Family Phoeniculidae (wood-hoopoes) | | | | | | |
| Green Wood-hoopoe | <i>Phoeniculus purpureus</i> | | | | | x |
| Common Scimitarbill | <i>Rhinopomastus cyanomelas</i> | | | | x | |
| Family Bucerotidae (hornbills) | | | | | | |
| African Grey Hornbill | <i>Tockus nasutus</i> | | | | x | |
| Southern Yellow-billed Hornbill | <i>Tockus leucomelas</i> | | | | x | |
| ORDER: PICIFORMES | | | | | | |
| Family Lybiidae (African barbets) | | | | | | |
| Yellow-fronted Tinkerbird | <i>Pogoniulus chrysoconus</i> | | | | | x |
| Black-collared Barbet | <i>Lybius torquatus</i> | | | | | x |
| Crested Barbet | <i>Trachyphonus vaillantii</i> | | | | x | |
| Family Picidae (woodpeckers) | | | | | | |
| Cardinal Woodpecker | <i>Dendropicos fuscescens</i> | | | | x | |
| Bearded Woodpecker | <i>Dendropicos namaquus</i> | | | | x | |
| ORDER: PASSERIFORMES | | | | | | |
| Family Platysteiridae (wattle-eyes and batises) | | | | | | |
| Chinspot Batis | <i>Batis molitor</i> | | | | x | |
| Family Prionopidae (helmetshrikes) | | | | | | |
| White-crested Helmetshrike | <i>Prionops plumatus</i> | | | | x | |
| Family Malaconotidae (bushshrikes) | | | | | | |
| Black-backed Puffback | <i>Dryoscopus cubla</i> | | | | x | x |
| Grey-headed Bushshrike | <i>Malaconotus blanchoti</i> | | | | x | |
| Orange-breasted Bushshrike | <i>Chlorophoneus sulfureopectus</i> | | | | x | |
| Black-crowned Tchagra | <i>Tchagra senegalus</i> | | | | x | |
| Southern Boubou | <i>Laniarius ferrugineus</i> | | | | | x |
| Family Oriolidae (figbirds and orioles) | | | | | | |
| Black-headed Oriole | <i>Oriolus larvatus</i> | | | | x | |
| Family Dicruridae (drongos) | | | | | | |
| Fork-tailed Drongo | <i>Dicrurus adsimilis</i> | | | | x | |
| Family Paridae (tits and chickadees) | | | | | | |
| Southern Black Tit | <i>Parus niger</i> | | | | x | 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 |

| | | | | | | |
|--|----------------------------------|--|--|--|------|------|
| Yellow-bellied Greenbul | <i>Chlorocichla flaviventris</i> | | | | | x |
| Family Hirundinidae (swallows and martins) | | | | | | |
| Lesser Striped Swallow | <i>Cecropis abyssinica</i> | | | | over | over |
| Red-breasted Swallow | <i>Cecropis semirufa</i> | | | | over | |
| Family Macrosphenidae (crombecs and African warblers) | | | | | | |
| Long-billed Crombec | <i>Sylvietta rufescens</i> | | | | x | |
| Family Cisticolidae (cisticolas and allies) | | | | | | |
| Tawny-flanked Prinia | <i>Prinia subflava</i> | | | | x | |
| Yellow-breasted Apalis | <i>Apalis flavida</i> | | | | | x |
| Grey-backed Camaroptera | <i>Camaroptera brevicaudata</i> | | | | | x |
| Family Zosteropidae (white-eyes) | | | | | | |
| Cape White-eye | <i>Zosterops virens</i> | | | | x | x |
| Family Sturnidae (starlings) | | | | | | |
| Cape Glossy Starling | <i>Lamprotornis nitens</i> | | | | x | |
| Family Buphagidae (oxpeckers) | | | | | | |
| Red-billed Oxpecker | <i>Buphagus erythrorhynchus</i> | | | | x | |
| Family Turdidae (thrushes) | | | | | | |
| Kurrichane Thrush | <i>Turdus libyanus</i> | | | | x | x |
| Family Muscicapidae (chats and Old World flycatchers) | | | | | | |
| White-browed Scrub Robin | <i>Erythropygia leucophrys</i> | | | | x | x |
| White-throated Robin-Chat | <i>Cossypha humeralis</i> | | | | | x |
| Southern Black Flycatcher | <i>Melaenornis pammelaina</i> | | | | | |
| Family Nectariniidae (sunbirds) | | | | | | |
| White-bellied Sunbird | <i>Cinnyris talatala</i> | | | | x | x |
| Amethyst Sunbird | <i>Chalcomitra amethystina</i> | | | | x | |
| Family Passeridae (Old World sparrows) | | | | | | |
| Southern Grey-headed Sparrow | <i>Passer diffusus</i> | | | | x | |
| Yellow-throated Petronia | <i>Gymnoris supercilialis</i> | | | | x | |
| Family Estrildidae (waxbills, munias and allies) | | | | | | |
| Jameson's Firefinch | <i>Lagonosticta rhodopareia</i> | | | | x | |
| Blue Waxbill | <i>Uraeginthus angolensis</i> | | | | x | |
| Family Motacillidae (wagtails and pipits) | | | | | | |
| Bushveld Pipit | <i>Anthus caffer</i> | | | | x | |
| Family Fringillidae (finches and canaries) | | | | | | |
| Yellow-fronted Canary | <i>Crithagra mozambica</i> | | | | x | x |
| Streaky-headed Seedeater | <i>Crithagra gularis</i> | | | | | x |

| | | | | | | |
|---|------------------------------|---|---|---|----|----|
| Family Emberizidae (buntings and New World sparrows) | | | | | | |
| Golden-breasted Bunting | <i>Emberiza flaviventris</i> | | | | x | |
| Subtotal | 52 | 0 | 0 | 0 | 42 | 19 |
| Reptiles | | | | | | |
| ORDER: SQUAMATA | | | | | | |
| Family Lacertidae (true lizards) | | | | | | |
| Bushveld Lizard | <i>Heliobolus lugubris</i> | | | | x | |
| Family Scincidae (skinks) | | | | | | |
| Variable Skink | <i>Trachylepis varia</i> | | | | | x |
| Subtotal | 2 | 0 | 0 | 0 | 1 | 1 |
| TOTAL | 68 | 5 | 6 | 6 | 55 | 24 |

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

Appendix 4. Potentially occurring fauna of conservation concern

| Common Name | Scientific Name | Red Data | Protected | Habitat | SABAP2 Reporting Rate for 2350_2815 (%) | SABAP2 Reporting Rate for 2355_2820 (%) | Likelihood | Reason |
|---------------------------|-------------------------------|----------|------------|----------------------------|---|---|------------|---|
| Mammals | | | | | | | | |
| Cheetah | <i>Acinonyx jubatus</i> | VU | NEMBA (VU) | Wide variety of habitats | | | Very Low | Very rare in the Waterberg, no resident animals on Lapalala |
| African Clawless Otter | <i>Aonyx capensis</i> | NT | LEMA | Rivers and streams | | | Very Low | No suitable habitat present |
| South African Hedgehog | <i>Atelerix frontalis</i> | NT | LEMA | Arid grassland and savanna | | | Low | Limited suitable habitat present, very rare in the Waterberg |
| White Rhinoceros | <i>Ceratotherium simum</i> | NT | NEMBA (PR) | Wide variety of habitats | | | Low | Limited suitable habitat present, most of the area is fenced off and excludes these animals |
| African Civet | <i>Civettictis civetta</i> | | LEMA | Wide variety of habitats | | | High | Suitable habitat present |
| Blue Wildebeest | <i>Connochaetes taurinus</i> | | NEMBA (PR) | Wide variety of habitats | | | Low | Limited suitable habitat present, most of the area is fenced off and excludes these animals |
| Swamp Musk Shrew | <i>Crocidura mariquensis</i> | NT | | Wetlands | | | Very Low | No suitable habitat present |
| Spotted Hyaena | <i>Crocuta crocuta</i> | NT | NEMBA (PR) | Wide variety of habitats | | | Low | Rare in the Waterberg |
| African Marsh Rat | <i>Dasymys robertsii</i> | VU | | Wetland habitats | | | Very Low | No suitable habitat present |
| Black Rhinoceros | <i>Diceros bicornis minor</i> | VU | NEMBA (VU) | Thickets, savanna | | | Moderate | Some suitable habitat present |
| Burchell's Zebra | <i>Equus quagga burchelli</i> | | NEMBA (PR) | Wide variety of habitats | | | Confirmed | |
| African Wild Cat | <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> | | LEMA | Savanna | | | High | Suitable habitat present |
| Yellow-spotted Rock Hyrax | <i>Heterohyrax brucei</i> | | LEMA | Rocky woodland | | | High | Suitable habitat present |

| | | | | | | | | |
|-----------------------------|--------------------------------|-----|------------|--|--|--|-----------|---|
| Hippopotamus | <i>Hippopotamus amphibius</i> | VU‡ | LEMA | Wetlands | | | Very Low | No suitable habitat present |
| Roan | <i>Hippotragus equinus</i> | EN | NEMBA (EN) | Open tall-grass savanna | | | Confirmed | |
| Serval | <i>Leptailurus serval</i> | NT | NEMBA (PR) | Grassland, wetlands | | | Low | Limited suitable habitat present |
| African Elephant | <i>Loxodonta africana</i> | VU‡ | NEMBA (PR) | Wide variety of habitats | | | Confirmed | |
| African Wild Dog | <i>Lycaon pictus</i> | EN | NEMBA (EN) | Wide variety of habitats | | | Very Low | Very rare in the Waterberg, may occasionally wander through |
| Honey Badger | <i>Mellivora capensis</i> | | LEMA | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Klipspringer | <i>Oreotragus oreotragus</i> | | LEMA | Rocky woodland | | | Moderate | Suitable habitat present |
| Aardvark | <i>Otycteropus afer</i> | | NEMBA (PR) | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Bat-eared Fox | <i>Otocyon megalotis</i> | | LEMA | Semi-desert, arid woodland and grassland | | | Moderate | Suitable habitat present |
| Thick-tailed Greater Galago | <i>Otolemur crassicaudatus</i> | | LEMA | Moist woodland and forest | | | Low | No suitable habitat present |
| Lion | <i>Panthera leo</i> | VU‡ | NEMBA (VU) | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Leopard | <i>Panthera pardus</i> | VU | NEMBA (PR) | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Brown Hyaena | <i>Parahyaena brunnea</i> | NT | NEMBA (PR) | Wide variety of habitats | | | Moderate | Suitable habitat present |
| African Weasel | <i>Poecilogale albinucha</i> | NT | | Wide variety of habitats | | | Low | No recent records from the area |
| Jameson's Red Rock Rabbit | <i>Pronolagus randensis</i> | | LEMA | Rocky slopes in savanna | | | Moderate | Suitable habitat present |
| Aardwolf | <i>Proteles cristatus</i> | | LEMA | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Steenbok | <i>Raphicerus campestris</i> | | LEMA | Wide variety of habitats | | | Moderate | Suitable habitat present |
| Sharpe's Grysbok | <i>Raphicerus sharpei</i> | | NEMBA (PR) | Broad-leaved Woodland | | | Moderate | Suitable habitat present |
| Mountain Reedbuck | <i>Redunca fulvorufula</i> | EN | LEMA | Grassland and open woodland on slopes | | | Low | Limited suitable habitat present |

| | | | | | | | | |
|--------------------------|---------------------------------|----|------------|--|-----|------|-----------|--|
| Ground Pangolin | <i>Smutsia temminckii</i> | VU | NEMBA (VU) | Wide variety of habitats | | | Low | Local scarcity |
| Buffalo | <i>Syncerus caffer</i> | | LEMA | Wide variety of habitats | | | Confirmed | |
| <i>Subtotal</i> | 36 | 19 | 34 | | | | | |
| Birds | | | | | | | | |
| Half-collared Kingfisher | <i>Alcedo semitorquata</i> | NT | | Forested rivers and streams | | 16,7 | Very Low | No suitable habitat present |
| Tawny Eagle | <i>Aquila rapax</i> | EN | NEMBA (EN) | Savanna | | | Low | Very rare in the area |
| Verreaux's Eagle | <i>Aquila verreauxii</i> | VU | | Mountains and surrounding vegetation | | | Low | Small size of the footprint, may occasionally forage over the study area |
| Abdim's Stork | <i>Ciconia abdimii</i> | NT | | Open arid woodland and grassland | | | Low | Human disturbance |
| Black Stork | <i>Ciconia nigra</i> | VU | | Forages in wetlands and breeds on cliffs | 8,3 | 8,3 | Very Low | No suitable habitat present |
| European Roller | <i>Coracias garrulus</i> | NT | | Savanna | | | Low | Some suitable habitat present but very rare in the area |
| Lanner Falcon | <i>Falco biarmicus</i> | VU | | Wide variety of habitats | | | Low | Suitable foraging habitat present only but very rare in the area |
| Red-footed Falcon | <i>Falco vespertinus</i> | NT | | Arid savanna and grasslands | | | Low | No suitable habitat present |
| White-backed Vulture | <i>Gyps africanus</i> | EN | NEMBA (EN) | Savanna | | | Low | Low density in the area, human disturbance |
| Cape Vulture | <i>Gyps coprotheres</i> | EN | NEMBA (EN) | Mountains and surrounding vegetation | | | Low | Low density in the area, human disturbance |
| Marabou Stork | <i>Leptoptilos crumeniferus</i> | NT | | Wetlands, savanna | | | Low | Limited suitable habitat present, human disturbance |
| Denham's Bustard | <i>Neotis denhami</i> | VU | NEMBA (VU) | Grassland | 8,3 | | Low | No suitable habitat present |
| Martial Eagle | <i>Polemaetus bellicosus</i> | EN | NEMBA (EN) | Wide variety of habitats | | 8,3 | Low | Suitable habitat present but human disturbance is high |

| | | | | | | | | |
|-----------------------------|---------------------------------|-----------|------------|--|--|-----|----------|---|
| African Finfoot | <i>Podica senegalensis</i> | VU | | Rivers with over-hanging vegetation | | 8,3 | Very Low | No suitable habitat present |
| Secretarybird | <i>Sagittarius serpentarius</i> | VU | | Open savanna and grassland | | | Low | Limited suitable habitat present, human disturbance |
| Lappet-faced Vulture | <i>Torgos tracheliotos</i> | EN | NEMBA (EN) | Savanna | | | Low | Low density in the area, human disturbance |
| Subtotal | 15 | 15 | 6 | | | | | |
| Reptiles | | | | | | | | |
| Nile Crocodile | <i>Crocodylus niloticus</i> | VU | NEMBA (VU) | Waterbodies | | | Very Low | No suitable habitat present |
| Orange-throated Flat Lizard | <i>Platysaurus monotropis</i> | EN | | Sandstone outcrops | | | Very Low | Only known from a very small area to the NE of the study area |
| Southern African Python | <i>Python natalensis</i> | | NEMBA (PR) | Wide variety of habitats, but usually near water or rocky outcrops | | | Moderate | Suitable habitat present |
| Subtotal | 3 | 2 | 2 | | | | | |
| TOTAL | 54 | 36 | 42 | | | | | |

EN = Endangered

VU = Vulnerable

NT = Near-threatened

‡ = IUCN Assessment

PR = Protected

LEMA = Limpopo Environmental Management Act

NEMBA = National Environmental Management: Biodiversity Act

Appendix 5. 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: 11
Nationality: South African
Qualifications:



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

Membership in Professional Societies:

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

Languages :

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

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

OVERVIEW OF EXPERIENCE

- 11 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 6. 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 |
|---|---|

| | |
|--|--|
| | 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); |
|--|--|

- 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

10/10/2019

Date