

FOUNDERS LODGE EXTENSION

BASELINE TERRESTRIAL ECOLOGY STUDY & BIODIVERSITY VALUE ASSESSMENT



AUGUST 2018

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

Prepared by: ECOREX Consulting Ecologists CC
PO Box 57
White River
1240

Author: Duncan McKenzie

Reviewer: Warren McClelland (Ecorex)



TABLE OF CONTENTS

LIST OF TABLES.....	3
LIST OF FIGURES.....	3
EIA REGULATIONS SPECIALISTS REPORT CHECKLIST.....	4
ABBREVIATIONS.....	5
TERMINOLOGY.....	5
DECLARATION OF INDEPENDENCE.....	6
1. INTRODUCTION.....	7
2. TERMS OF REFERENCE.....	8
3. STUDY AREA.....	9
4. METHODS.....	11
4.1 FLORA.....	11
4.2 FAUNA.....	11
4.3 BIODIVERSITY VALUE ASSESSMENT.....	12
4.4 ASSUMPTIONS, LIMITATIONS AND KNOWLEDGE GAPS.....	15
4.4.1 Seasonality.....	15
4.4.2 Overlooked Species.....	15
5. BIODIVERSITY BASELINE DESCRIPTION.....	16
5.1 FLORA.....	16
5.1.1 National Vegetation Types.....	16
5.1.2 Limpopo Province Biodiversity Conservation Assessment.....	16
5.1.3 Local Vegetation Communities.....	17
5.1.4 Confirmed Conservation-Important Flora.....	19
5.1.5 Potentially Occurring Plant Species of Conservation Concern.....	20
5.2 TERRESTRIAL FAUNA.....	23
5.2.1 Mammals.....	23
5.2.2 Birds.....	26
5.2.3 Reptiles.....	29
5.2.4 Frogs.....	30
6. BIODIVERSITY VALUE ASSESSMENT.....	31
7. KEY POTENTIAL IMPACTS.....	34
8. CONCLUSIONS AND RECOMMENDATIONS.....	35
9. REFERENCES.....	37
10. APPENDICES.....	39
APPENDIX 1. CHECKLIST OF FLORA RECORDED DURING FIELDWORK.....	39
APPENDIX 2. POTENTIALLY OCCURRING PLANT SPECIES OF CONSERVATION CONCERN.....	43
APPENDIX 3. CO-ORDINATES OF PLANTS OF CONSERVATION-IMPORTANCE RECORDED DURING FIELDWORK.....	44
APPENDIX 4. CHECKLIST OF FAUNA CONFIRMED DURING FIELDWORK.....	45
APPENDIX 5. POTENTIALLY OCCURRING FAUNA OF CONSERVATION CONCERN.....	49
APPENDIX 6. BIODIVERSITY VALUES OF VEGETATION COMMUNITIES.....	53
APPENDIX 7. DUNCAN MCKENZIE CV.....	55
APPENDIX 8. SPECIALIST DECLARATION FORM.....	56

List of Tables

Table 1. Method of calculating Biodiversity Value of vegetation communities	14
Table 2. Method of calculating Conservation Importance of vegetation communities	14
Table 3. Method of calculating Functional Importance of vegetation communities	15
Table 4. Conservation-important plant species confirmed during fieldwork.....	21
Table 5. Conservation Importance, Functional Importance and Biodiversity Values for vegetation communities in the Study Area	32
Table 6. Potential Biodiversity / Development Conflict within the identified vegetation communities ...	36

List of Figures

Figure 1. Location of the study area.....	10
Figure 2. Photographs of Closed Rocky Woodland.....	18
Figure 3. Photographs of Plains Woodland	19
Figure 4. Photograph of <i>Elaeodendron transvaalense</i> recorded during fieldwork.....	20
Figure 5. Vegetation communities identified within the Study Area	22
Figure 6. Biodiversity Values of Vegetation Communities in the Study Area	33

EIA REGULATIONS SPECIALISTS REPORT CHECKLIST

(1) A specialist report prepared in terms of the 2014 Environmental Impact Assessment Regulations 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 54
✓	(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	page 55
✓	(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 31
✓	(g) an identification of any areas to be avoided, including buffers;	page 35
✓	(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 33
✓	(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	page 15
✓	(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 31
✓	(k) any mitigation measures for inclusion in the EMPr;	page 35
✓	(l) any conditions for inclusion in the environmental authorisation;	page 35
✓	(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	page 35
	(n) a reasoned opinion-	
✓	(i) as to whether the proposed activity or portions thereof should be authorised; and	page 36
✓	(ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	page 36
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

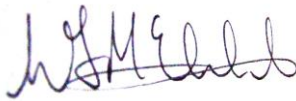
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
LEMA	Limpopo Environmental Management Act (No. 7 of 2003)
LPBCA	Limpopo Province Biodiversity Conservation Assessment
mamsl	Metres Above Mean Sea Level
NEMBA ToPS	National Environmental Management: Biodiversity Act Threatened or Protected Species (No. 10 of 2004)
NFA	National Forest Act (No. 30 of 1998)
PRECIS	National Herbarium Pretoria (PRE) Computerised Information System
QDS	Quarter Degree Square, for example 2328 CD
SABAP2	Southern African Bird Atlas Project 2
SANBI	South African National Biodiversity Institute

TERMINOLOGY

Alien	Introduced from elsewhere: neither endemic nor indigenous.
Biodiversity	The structural, functional and compositional attributes of an area, ranging from genes to landscapes.
Degraded	An ecosystem that is a poor ecological state, usually through impacts such as invasion by alien plants, severe overgrazing, poor burning regimes, etc. These systems still contain a moderate proportion of indigenous flora.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire.
Palearctic	Ecozone consisting of North Africa, Europe and Asia north of the Himalayan foothills.
Transformed	Transformed ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.
Ungulate	Hoofed animal.

Declaration of Independence

We declare that we have been appointed as independent consulting ecologists with no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2010. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. Remuneration for our services by the proponent is not linked to approval by any decision-making authority responsible for authorising this development.



W.L. McClelland

20 August 2018



D.R. McKenzie

20 August 2018

1. INTRODUCTION

ECOREX Consulting Ecologists CC was appointed by Peter Velcich of NuLeaf Planning & Environmental to conduct the terrestrial ecology study for a Basic Assessment Report (BAR) for the proposed extensions to the existing Founders Lodge in the Lapalala Wilderness, Limpopo Province, which would provide a basis for assessing potential impacts of the project on terrestrial ecology and guide the design and location of additional planned infrastructure. The study comprised flora and vertebrate fauna (mammals, birds, reptiles, frogs). The two key deliverables were a baseline terrestrial ecology survey and an integrated Biodiversity Value Assessment. ECOREX performed the original baseline biodiversity study for Founders Lodge in 2016.

The study team was as follows:

Duncan McKenzie – Terrestrial Ecologist. He has been involved in biodiversity assessments for ECOREX for ten 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 Nelspruit and the Kruger National Park. He is currently the Regional Co-ordinator for the South African Bird Atlas Project, a position he has held for eight years, formerly sat on the KZN Bird Rarities Committee and is a co-author on the Wildflowers of the Kruger National Park project. A more detailed CV is presented in Appendix 6.

Linda McKenzie (GIS Specialist). Linda is a GIS Specialist/GIS Analyst with over 13 years' experience in the industry. For the last four years she has operated her own GIS Consultancy called Digital Earth. She has extensive experience in both the private and public sector, as has worked on a wide variety of projects and GIS applications. These include, most recently, vegetation and sensitivity mapping, landcover data capture, municipal roads master planning, hydroelectric scheme and wind farm feasibility mapping and town planning, land surveyor and engineering support services. Linda currently serves as Vice Chairperson and Treasurer for GISSA Mpumalanga and is a registered Professional GISc Practitioner (PGP0170).

2. TERMS OF REFERENCE

The objectives of the Ecology Survey will be to:

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

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

- Biodiversity baseline description;
- Biodiversity Value Assessment;
- Broad-scale Vegetation Map;
- Biodiversity Value Map;
- Recommendations regarding infrastructure layout, where relevant.

3. STUDY AREA

The study area 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, Lephale Local Municipality, Limpopo Province (**Error! Reference source not found.**). The area surveyed covers approximately 2.6 hectares and is located at the base of a small ridge immediately to the west of the existing Founders Lodge. The site is situated within the quarter-degree grid 2328 CD at an elevation of 1060 mamsl. The topography of the general area comprises undulating, rocky hills with level plains situated between them. Lapalala falls within the upper Lephale River catchment which drains into the Limpopo River.

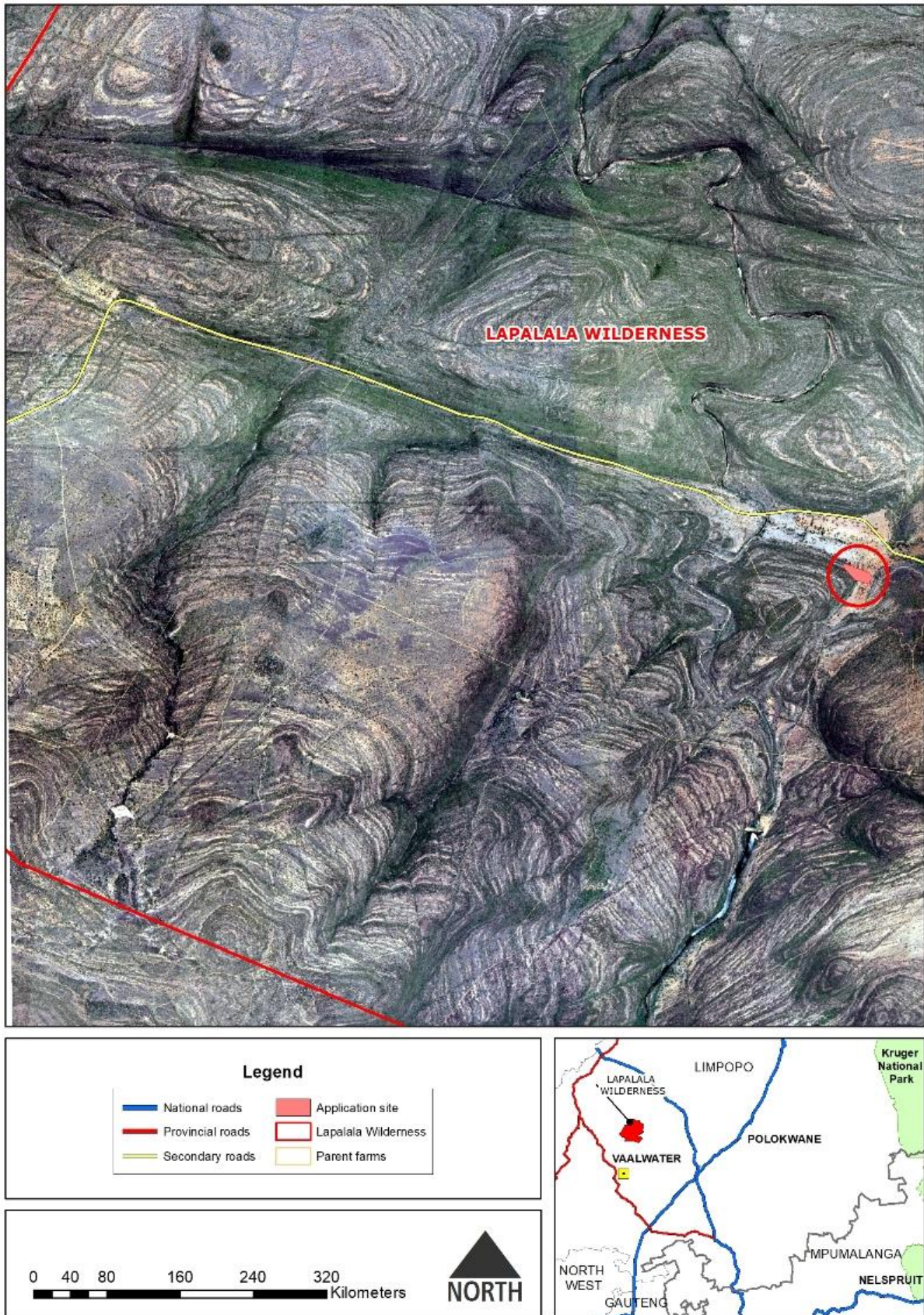


Figure 1. Location of the study area

4. METHODS

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 quarter-degree grid 2328 CD, in which the study area is situated in, and surrounding grids in the PRECIS database from the South African National Biodiversity Institute (SANBI), were used to produce a list of the most likely threatened species, which were searched for during fieldwork.

Fieldwork

Fieldwork was conducted over one day on the 17th July 2018. The boundary of the proposed lodge extension was supplied by NuLeaf and was pre-loaded onto a Samsung S7 phone using LocusMap Pro™ software. Representative meandering transects were surveyed on foot in each vegetation community and species lists compiled for each community. Plants were listed according to each of the vegetation communities identified during the desktop phase. Plants not identified to species level were collected and dried in a plant press for identification at a later stage. Specific attention was paid to search for any conservation-important species of flora and fauna as listed under the various national Red Data Lists as well as the following legislature:

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

The location of any conservation-important species found was recorded using the Samsung S7 GPS.

4.2 Fauna

Desktop

Lists of conservation-important mammals, birds, reptiles and frogs potentially occurring within the project area were prepared using data from 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) and from the Lapalala Management Plan (2016 update). 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). Potential occurrence of fauna in the study area was predicted based on knowledge of known habitat requirements of each species, as well as from former ecological studies performed in Lapalala by Ecorex.

Fieldwork

Birds were identified audially and visually using Bushnell 10x42 binoculars. Observations were made incidentally during the time that the vegetation survey was conducted, and limited to birds seen and heard within the study area and immediate surrounds. Mammals, reptiles and frogs were recorded incidentally as they were encountered during the survey through direct evidence (sightings) and indirect evidence (spoor, dung). The small size of the study area made the use of standard survey methods such as transects or point counts impractical.

4.3 Biodiversity Value Assessment

The biodiversity value of each vegetation community was based on a combination of Conservation Importance and Functional Importance, each of which were rated on a five-point scale, from Very Low to Very High, as indicated in Table 1. This method was based on Biodiversity Action Plan guidelines developed by Anglo American (Coombes, 2004).

Conservation Importance

The method of calculating conservation importance was based on six key parameters, which were each allocated a score that ranged between zero (Not Important) and twenty (Very Important) (Table 2). The overall conservation importance was based on the median value of the six parameters, namely:

1. *Protection Status.* The extent to which the vegetation community is currently formally protected (e.g. World Heritage Site; RAMSAR, National Park; Provincial Game Reserve; Private Conservancy etc.);
2. *Size.* The extent to which the larger vegetation type of which the defined area is a representative sample, still exists; this incorporates the conservation status of threatened vegetation types in that vegetation types with the highest threat status are assumed to have the lowest extent of habitat remaining;

3. *Species Diversity*. The extent to which the vegetation community supports a high diversity of plants or animals;
4. *Threatened Species*. The extent to which the vegetation community supports threatened species and other species of conservation concern;
5. *Unique Habitat or Taxa*. Presence of range-restricted plants or animals or unusual natural feature;
6. *Present Ecological State*. The extent to which the vegetation community is modified from natural conditions.

Functional Importance

The method of calculating functional importance was based on four ecosystem service categories, which were each allocated a score that ranged between zero (Not Important) and twenty (Very Important) (Table 3). The overall functional importance was based on the median value of the four ecosystem service categories, namely:

1. *Provisioning Services*. The extent and frequency that the vegetation community provides consumable goods (e.g. food, freshwater, timber, fibre, medicinal plants, etc.);
2. *Regulating Services*. The extent to which the vegetation community provides regulating services (e.g. flood attenuation, water purification, storage, climate regulation, carbon sequestration, etc.);
3. *Cultural Services*. The extent to which the vegetation community provides cultural services (e.g. tourism attraction, spiritual attraction, aesthetic value, etc.), and;
4. *Supporting Services*. The extent to which the vegetation community provides supporting ecological services, either positive (e.g. migration corridor, refuge area, primary production, pollination, pest control, nutrient cycling, soil formation), or negative (e.g. disease sources, pest outbreaks).

By integrating assessments of the conservation importance and functional importance of the different vegetation communities, an assessment of Biodiversity Value was made. This is indicated spatially in Figure 6.

Table 1. Method of calculating Biodiversity Value of vegetation communities

Conservation Importance	Functional Importance				
	Very High	High	Moderate	Low	Very Low
Very High	Very High	Very High	High	High	Moderate
High	Very High	High	High	Moderate	Moderate
Moderate	High	High	Moderate	Moderate	Low
Low	High	Moderate	Moderate	Low	Low
Very Low	Moderate	Moderate	Low	Low	Very Low

Table 2. Method of calculating Conservation Importance of vegetation communities

Parameter	Very High	High	Moderate	Low	Very Low
Protection Status	International	National	Regional	Local	None
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Size / Length	Very small	Small	Moderate	Large	Very Large
	(<500km ²)	(500 to 1,000km ²)	(1,000 to 20,000km ²)	(20,000 to 50,000km ²)	(> 50,000km ²)
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Species Diversity	Noticeably High		Moderate		Noticeably Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Species of Conservation Concern	Noticeably High		Moderate		Noticeably Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Unique Habitat or Taxa	Noticeably High		Moderate		Noticeably Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Present Ecological State	Natural, largely Unmodified	Slightly modified	Moderately Modified	Considerably Modified	Severely Modified
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

Table 3. Method of calculating Functional Importance of vegetation communities

Parameter	Very High	High	Moderate	Low	Very Low
Provisioning Services	Constant	Regular	Frequent	Occasional	Intermittent
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Regulating Services	Very High	High	Moderate	Low	Very Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Cultural Services	Very High	High	Moderate	Low	Very Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Supporting Services	Very High	High	Moderate	Low	Very Low
	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

4.4 Assumptions, Limitations and Knowledge Gaps

4.4.1 Seasonality

The assessment was based on a single day field visit in the dry season. 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 in the area and has assessed habitat suitability for potentially occurring Threatened plant species. The small size and relative homogeneity of the study area also reduces the likelihood of occurrence of these 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 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.

The study area is not situated in any floristic centres of endemism, which are areas that have an unusually high number of plants unique to that area (Van Wyk & Smith, 2001) and is not within any listed Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

5.1.2 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 most of 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).

5.1.3 Local Vegetation Communities

Two untransformed vegetation communities were identified within the proposed development site 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.). The untransformed vegetation communities are described below (alien plant species are indicated by an asterisk).

5.1.3.1 *Combretum apiculatum* – *Kirkia acuminata* Rocky Woodland

Combretum apiculatum – *Kirkia acuminata* Rocky Woodland is found across the low, sandstone ridge in the western part of the study area (Figure 5). Closed Woodland covers 0.8 ha which equates to approximately 40 % of the area surveyed. Vegetation structure is Low to Tall Closed Woodland (*sensu* Edwards, 1983) (Figure 2). The trees *Combretum apiculatum* and *Kirkia acuminata* dominate the canopy, the latter mostly growing as a taller emergent. Other common canopy species throughout the community include *Combretum zeyheri*, *Schotia brachypetala*, *Pappea capensis*, *Ziziphus mucronata*, *Albizia tanganyicensis* subsp. *tanganyicensis*, *Commiphora marlothii*, *Pseudolachnostylis maprouneifolia*, *Peltophorum africanum* and *Pterocarpus rotundifolius* subsp. *rotundifolius*. The understory is strongly dominated by the shrubs *Grewia bicolor*, *G. flavescens*, *Dichrostachys cinerea* subsp. *africana*, *Croton gratissimus* var. *gratissimus* and *Euclea natalensis* subsp. *angustifolia*. Grasses are relatively scarce but include *Heteropogon contortus* and *Loudetia simplex*. Herbaceous plants were not abundant due to winter dormancy but included *Hypoestes forsskaolii*, *Kyphocarpa angustifolia* and *Barleria saxatilis*.

A total of 53 species (73 % of the entire list) was recorded from Rocky Woodland during fieldwork; the higher of the two communities present (Appendix 1). Species fidelity is very high, with 33 species (62 % of the community list) occurring nowhere else in the study area. Two conservation-important species were recorded, namely *Elaeodendron transvaalense* which is classified as Near Threatened and is protected under the National Forests Act (No.

30 of 1998), as well as *Sclerocarya birrea* subsp. *caffra* which is protected under the same Act (Appendix 2).



Figure 2. Photographs of Closed Rocky Woodland

5.1.3.2 *Acacia nilotica* Plains Woodland

This vegetation community occurs below the sandstone ridge on the flat plains in the central and eastern portion of the study area (Figure 5). Plains Woodland covers 1.9 ha which equates to approximately 60 % of the area surveyed. Vegetation structure is mainly Short Open to Closed Woodland (*sensu* Edwards, 1983) (Figure 3). Soils are generally sandy and the community is heavily overgrazed.

The tree *Acacia nilotica* subsp. *kraussiana* strongly dominates the canopy, with other frequently recorded trees including *Peltophorum africanum*, *Acacia karroo*, *Terminalia sericea* and *Combretum molle*. Dominant shrubs found in this community include *Euclea natalensis* subsp. *angustifolia*, *Grewia bicolor*, *G. flavescens*, *Gymnosporia buxifolia*, *Dichrostachys cinerea* subsp. *africana* and *Euclea crispa* subsp. *crispa*. *Waltheria indica* is the most frequently encountered dwarf shrub. Grasses are quite sparse due to the overgrazed condition of the vegetation but include *Aristida congesta* subsp. *barbicollis*, *Cynodon dactylon* and *Heteropogon contortus*.

A total of 40 species (55 % of the entire list) was recorded from Plains Woodland (Appendix 1) during fieldwork, the lower of the two communities present. Species fidelity is high, with 20 species (50 % of the community list) being restricted to this community.

Three conservation-important species were recorded from *Acacia nilotica* Plains Woodland, namely *Elaeodendron transvaalense* which is classified as Near Threatened and is protected under the National Forests Act (No. 30 of 1998), as well as *Sclerocarya birrea* subsp. *caffra* and *Combretum imberbe* which are both protected under the same Act (Appendix 2).



Figure 3. Photographs of Plains Woodland

5.1.4 Confirmed Conservation-Important Flora

A total of 73 plant species in 30 families was recorded during fieldwork (Appendix 1). Only one of these is regarded as threatened (i.e. Vulnerable, Endangered or Critically Endangered) or as additional species of conservation concern (i.e. Near Threatened, Critically Rare, Rare, Declining or Data Deficient¹), namely *Elaeodendron transvaalense* which is classified as Near Threatened. The trees *Sclerocarya birrea* subsp. *caffra*, *Elaeodendron transvaalense* and *Combretum imberbe* are protected under the National Forests Act (No. 30 of 1998) (Table 4). The Near Threatened species is described below.

Transvaal Saffron *Elaeodendron transvaalense* (Burr Davy) R.H.Archer

Transvaal Saffron 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 bark of this 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 Near Threatened (Williams *et al.*, 2008a). This species is fairly common in the Lapalala Wilderness (*pers.obs.*) and one small tree was located within each of the two vegetation communities (Figure 4).

¹ Raimondo *et al.* (2009)



Figure 4. Photograph of *Elaeodendron transvaalense* recorded during fieldwork

5.1.5 Potentially Occurring Plant Species of Conservation Concern

Ten plant species of conservation concern 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. 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 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 was confirmed to occur within the original Founders Lodge footprint¹.

The co-ordinates of the conservation-important plants located during fieldwork are presenting in Appendix 3. These localities are meant to guide the developers during the planning and construction phases. The points are spatially presented in Figure 5.

¹ McKenzie, 2016

Table 4. Conservation-important plant species confirmed during fieldwork

Taxa	Growth Form	Red data	Protected	Vegetation Communities	
				Rocky Woodland	Plains Woodland
Family Anacardiaceae <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA	u	r
Family Celastraceae <i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	tree	NT	NFA	r	r
Family Combretaceae <i>Combretum imberbe</i> Wawra	tree		NFA		r
TOTAL	3	1	3	2	3

NT = Near Threatened NFA = National Forests Act	d = dominant f = frequent u = uncommon r = rare
--	--



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 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 82 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.

5.2.1.2 Conservation-Important Species

Thirty-one mammal species were recorded during fieldwork within the Lapalala Wilderness during a previous Ecorex survey, including a number of Vulnerable-listed species (McKenzie, 2016). A total of 35 conservation-important mammals potentially occur within the general vicinity of the proposed development footprint (Appendix 4). Of these, 19 species are considered to be of conservation concern⁴. Two of these were confirmed during fieldwork, and are discussed below.

¹ Masterplan for Lapalala Wilderness, 2016

² http://vmus.adu.org.za/vm_sp_list.php Accessed 30/07/2018

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

⁴ 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 with a status of Vulnerable, Endangered and Critically Endangered)

White Rhinoceros (*Ceratotherium simum*)

Although South Africa possesses over 18 000 White Rhinoceros (93 % of the total population)¹, a continued and increased threat from poaching and increasing illegal demand for rhino horn has resulted in this species being assessed as Near Threatened². This species appears to be well protected within Lapalala Wilderness, and fresh tracks and faeces were observed in the Plains Woodland community.

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 Vulnerable³ due to dramatic population declines in most African countries due to poaching for their ivory. This species was recently re-introduced into Lapalala Wilderness⁴ and fresh tracks and faeces were observed from within the study area.

A further four species of conservation concern 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 four are described below:

Black Rhinoceros

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 Vulnerable⁵. This species is resident in Lapalala (*pers. obs.*) and may occasionally forage within the study area but will not remain for long periods of time.

Leopard (*Panthera pardus*)

This large cat is listed as Vulnerable due to hunting and habitat loss⁶ although the local population is probably stable due to the amount of protection afforded. These territorial animals are likely to regularly occur within the study area, but only for short periods of time.

¹ Emslie, 2012

² Child *et al.*, 2016

³ Blanc, 2008

⁴ D. Jacobs *pers.comm.*)

⁵ Child *et al.*, 2016

⁶ Child *et al.*, 2016

Honey Badger (*Mellivora capensis*) is a small carnivore in the Mustelidae family which includes otters, badgers and weasels. It is assessed as Near Threatened due to direct persecution from honey farmers and for the muthi trade, indirect poisoning, poor recruitment and habitat loss¹. Animals could regularly forage anywhere in natural habitat in the study area but are unlikely to be resident.

Brown Hyaena (*Parahyaena brunnea*)

Brown Hyaena is listed as Near Threatened in South Africa mainly due to persecution from stock farmers². It was confirmed during previous Ecorex surveys from Lapalala and probably forages within the study area regularly.

Thirty-three potentially occurring species are protected either under the National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) or the Limpopo Environmental Management Act (No. 7 of 2003) (Appendix 5). Four of these were confirmed during fieldwork (Appendix 4), and it is very likely that a number of other protected species will utilise the study area for brief periods.

Ten mammal species were confirmed to occur during fieldwork (Appendix 4).

¹ Child *et al.*, 2016

² Child *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 216 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 153 bird species from 9 full protocol lists³ have already been recorded from the pentad (mapping unit) in which the study area is situated (2350_2815)⁴.

5.2.2.2 Conservation-Important Species

Sixteen threatened⁵ or Near Threatened bird species potentially occur within the general vicinity of the study area (Appendix 5). None of these were recorded during fieldwork. One of the potentially occurring species with a moderate or high likelihood of occurring in the vicinity of the study area is a threatened species, and is discussed below.

Lanner Falcon (*Falco biarmicus*)

This, the largest falcon in South Africa, is listed as Vulnerable due to habitat loss, reduction of prey, direct persecution and electrocution⁶. It may occasionally forage over the study area although no breeding habitat (cliff ledges) is present for this species.

One species listed as Near Threatened potentially occurs within the study area, and is briefly discussed below.

¹ Hockey *et al.*, 2005

² http://sabap1.adu.org.za/sabap_site_summary.php?autoSite=SABAP&QDGC=2328CD accessed 30/07/2018

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 on 30/07/2018

⁵ Threatened species are those with a status of Critically Endangered, Endangered or Vulnerable

⁶ Taylor *et al.*, 2015

European Roller (*Coracias garrulous*)

This Palearctic migrant prefers open, grassy areas within savanna. It is listed as Near Threatened due to habitat loss over some of its breeding grounds, particularly in Europe¹. Suitable foraging habitat is present in the Plains Woodland portion of the study area.

The remaining potentially occurring species have a Low or Very Low likelihood of occurrence within the study area due to regional scarcity, lack of suitable habitat or are unrecorded from the area and therefore unlikely to occur.

5.2.2.3 Local Avifaunal Assemblages

Thirty-eight bird species were confirmed to occur within or immediately adjacent to the actual habitats represented in the study area during fieldwork and these are listed in Appendix 3. While true species richness is likely to be higher, sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species and to describe broad bird assemblages. Two broad assemblage or species-habitat associations were identified, which are briefly described below.

Plains Woodland Assemblage

This assemblage occurs within the *Acacia*-dominated woodland that covers most of the study area. Common bird species found include Grey Go-away-bird (*Corythaixoides concolor*), White-browed Scrub Robin (*Erythropygia leucophrys*), Golden-breasted Bunting (*Emberiza flaviventris*), Blue Waxbill (*Uraeginthus angolensis*) and White-browed Sparrow-Weaver (*Plocepasser mahali*). Less common species recorded include Bearded Woodpecker (*Dendropicos namaquus*), Burnt-necked Eremomela (*Eremomela usticollis*), Red-billed Oxpecker (*Buphagus erythrorhynchus*) and Bushveld Pipit (*Anthus caffer*). Thirty-one species (82 %) were recorded from the Plains Woodland assemblage, the higher of the two assemblages (Appendix 4).

Rocky Woodland Assemblage

The sandstone ridge and associated broad-leaved woodland supports a distinctive although less diverse assemblage. Typical birds encountered include African Grey Hornbill (*Tockus nasutus*), Yellow-fronted Tinkerbird (*Pogoniulus chrysoconus*), Black-headed Oriole (*Oriolus larvatus*) and Streaky-headed Seedeater (*Crithagra gularis*) while less frequently observed species include Jameson's Firefinch (*Lagonosticta rhodopareia*), Mocking Cliff Chat

¹ Taylor *et. al.*, 2015

(*Thamnolaea cinnamomeiventris*), Lazy Cisticola (*Cisticola aberrans*) and Yellow-bellied Greenbul (*Chlorocichla flaviventris*). Sixteen species (42 %) were recorded from the Rocky Woodland assemblage, the lower of the two assemblages (Appendix 4).

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 QDS) and snakes (13-19 species per QDS) (Bates *et al.*, 2014). Reptile endemism is moderate, with at least five endemic species present in the general area (Bates *et al.*, 2014). Seventy species of reptiles have been recorded from the entire degree grid 2328, as listed on the Reptile Atlas of Southern Africa website (http://vmus.adu.org.za/vm_sp_list.php).

5.2.3.2 Conservation-Important Species

Three of the potentially occurring reptiles are species of conservation concern (Appendix 5). These include Orange-throated Flat Lizard (*Platysaurus monotropis*) which is classified as Endangered, Nile Crocodile (*Crocodylus niloticus*) which is classified as Vulnerable and is protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) and Southern African Python (*Python natalensis*) which is listed as Protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015, Appendix 5). Nile Crocodile has a Very Low likelihood of occurring within the study area due to lack of suitable open water habitat. Orange-throated Flat Lizard has a Low likelihood of occurrence due to the closest known population occurring further to the north of Lapalala and Southern African Python has a High likelihood of occurring anywhere within the study area although due to the small size of the area, it is likely to only occur irregularly. Only one reptile species was recorded during fieldwork, namely Rainbow Skink (*Trachylepis margaritifer*), a common and widespread species² (Appendix 4). A dedicated reptile survey using pitfall traps and drift fences, as well as additional nocturnal surveys, would be needed to adequately sample this fauna group.

¹ Bates *et al.*, 2014

² Bates *et al.*, 2014

5.2.4 Frogs

5.2.4.1 Regional Overview

The Lapalala area supports a moderately high diversity of frog species, with levels of 11-20 species per QDS¹. Frog endemism, however, 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 QDS 2328 CD³, within which the study area is situated.

5.2.4.2 Conservation-Important Species

None of the potentially occurring frog species have a conservation-important status. No frog species were recorded during fieldwork. Dedicated trapping and nocturnal surveys in the wet season would result in confirmation of at least one species although the lack of open water habitat limits the number of species potentially occurring.

¹ Minter *et. al.*, 2004

² http://vmus.adu.org.za/vm_sp_list.php accessed 30/07/2018

³ http://vmus.adu.org.za/vm_sp_list.php accessed 30/07/2018

6. BIODIVERSITY VALUE ASSESSMENT

A qualitative integration of conservation importance and functional importance values for the two vegetation communities represented in the study area provides an indication of the biodiversity values of these communities. The data sheets for conservation importance and functional importance calculations for each community are presented in Appendix 6, and are dealt with in more detail under each vegetation community description. The integrated biodiversity values are summarised in Table 5 and presented spatially Figure 6.

Rocky Woodland was assessed as having **Moderate** Biodiversity Value through integration of Moderate Conservation Importance and Moderate Functional Importance scores (Table 5) (Appendix 6). Only two conservation-important plant species were recorded during fieldwork, namely *Elaeodendron transvaalense*, which is listed as Near Threatened, and *Sclerocarya birrea* subsp. *caffra* and *Elaeodendron transvaalense* which are protected under the National Forests Act (No. 30 of 1998). One species of conservation concern potentially occurs, namely *Drimia sanguinea* (Near Threatened). No Threatened or Near Threatened mammal, bird, reptile or frog species were confirmed, but three Vulnerable-listed mammal species (Elephant, Black Rhinoceros and Leopard) and two Near Threatened species (Honey Badger and Brown Hyaena) potentially occur. Lanner Falcon (Vulnerable) potentially occurs as a foraging species.

Plains Woodland was assessed as having **Moderate** Biodiversity Value through integration of Moderate Conservation Importance and Moderate Functional Importance scores (Table 5) (Appendix 6). Three conservation-important plant species were recorded during fieldwork, namely *Elaeodendron transvaalense*, which is listed as Near Threatened, and *Sclerocarya birrea* subsp. *caffra*, *Combretum imberbe* and *Elaeodendron transvaalense* which are protected under the National Forests Act (No. 30 of 1998). One species of conservation concern potentially occurs, namely *Drimia sanguinea* (Near Threatened). One Threatened mammal was confirmed to occur, namely African Elephant, as well as one Near Threatened species (White Rhinoceros). Two Vulnerable-listed mammal species (Black Rhinoceros and Leopard) and two Near Threatened species (Honey Badger and Brown Hyaena) have a Moderate or higher likelihood of occurrence. Lanner Falcon (Vulnerable) potentially occurs as a foraging species.

Table 5. Conservation Importance, Functional Importance and Biodiversity Values for vegetation communities in the Study Area

Vegetation Communities	Conservation Importance	Functional Importance	Biodiversity Value
Rocky Woodland	Moderate	Moderate	Moderate
Plains Woodland	Moderate	Moderate	Moderate



Figure 6. Biodiversity Values of Vegetation Communities in the Study Area

7. KEY POTENTIAL IMPACTS

This section details the expected environmental impacts of the proposed housing developments on terrestrial ecosystems. Impacts are not arranged in any order of overall significance, and this not a detailed impact assessment as this was not part of the terms of reference for this report. The following are potentially significant impacts on untransformed vegetation communities:

- **Loss of a very small portion of Critical Biodiversity Area 1** – Lapalala Wilderness has been assessed as a Critical Biodiversity Area 1 by the LPBCA;
- **Loss or damage of plant species of conservation importance** – The Near Threatened tree *Elaeodendron transvaalense* and the Nationally protected trees *Sclerocarya birrea* subsp. *caffra*, *Combretum imberbe* and *Elaeodendron transvaalense* are confirmed to occur within the study area;
- **Invasion of natural habitat by alien plants** – although no alien plant species were located during fieldwork, invasion is possible as construction activities expose bare soil providing a base for alien seedlings to establish;
- **Loss of habitat for conservation-important fauna** – One Vulnerable and one Near Threatened-listed mammal species were confirmed to occur, and two Vulnerable and two Near Threatened-listed mammals have a moderate or higher likelihood of regularly occurring within the study area. One Vulnerable and one Near Threatened bird species potentially occur. Development could destroy a small amount of habitat for these species;
- **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.

8. CONCLUSIONS AND RECOMMENDATIONS

Although two vegetation communities are assessed as having Moderate Biodiversity Values, the proposed lodge development occupies a small area adjacent to the existing Founders Lodge. The site potentially supports very few Threatened plant species and none were confirmed during fieldwork. Similarly, Threatened and Near Threatened mammal or bird species are only likely to spend short periods of time within the study area, and then only as foraging species. Although the study area can be considered typical Waterberg Mountain Bushveld, this vegetation type is not threatened. The Limpopo Province Biodiversity Conservation Assessment classifies the study area and general surroundings as a **Critical Biodiversity Area 1 (CBA1)**, an area deemed to be **Irreplaceable**. However, due to the small size of the proposed development and considering that existing infrastructure is already present in an adjacent area, it is deemed that this development will not significantly negatively affect the biodiversity of the Lapalala area in the sub-regional context.

Some preliminary suggestions and mitigation measures regarding the proposed construction activities at Founders Lodge are recommended below. Table 6 summarises the potential Biodiversity / Development Conflict within the identified vegetation communities and makes recommendations for development options.

- The infrastructure layout should be designed to avoid each of the conservation-important trees spatially presented in Figure 4.
- 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. This is especially applicable to the large *Kirkia acuminata* trees present within the Rocky Woodland vegetation community.
- New infrastructure within untransformed areas to be designed to minimize any negative impacts. This could include using wooden decks and walkways, building around taller trees or incorporating them into the design, running electrical, water and sewage piping under wooden decks and walkways, ensuring the design and implementation of an environmentally aware waste treatment system, minimizing waste and encouraging waste recycling.
- All proposed roads to contain adequate stormwater drainage and erosion control measures.
- 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.

Table 6. Potential Biodiversity / Development Conflict within the identified vegetation communities

Vegetation Communities	Biodiversity / Development Conflict	Development Recommendations
Rocky Woodland	Moderate	Develop with mitigation
Plains Woodland	Moderate	Develop with mitigation

Provided the recommendations suggested in this report are followed, there is no objection to the proposed lodge extensions at Founders Lodge in terms of the terrestrial ecosystems of the study area. However, if construction was to proceed without the implementation of the mitigation measures given in Section 8 above and development recommendations in Table 6 then we would object to the development application.

9. REFERENCES

- Animal Demography Unit. n.d. The Southern African Bird Atlas Project <http://sabap2.adu.org.za/index.php> accessed on 30/07/2018.
- 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.
- Blanc, J. 2008. *Loxodonta africana*. The IUCN Red List of Threatened Species 2008: e.T12392A3339343. <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T12392A3339343.en>. Downloaded on 30 July 2018.
- Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Coombes, P. 2004. Anglo American Best Practice Environmental Guideline Series 01: Guideline for preparing Biodiversity Action Plans (BAP) Draft Document 03. Anglo American. Johannesburg.
- 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.
- 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.
- Edwards, D. 1983. A broad-scale structural classification of vegetation for practical purposes. *Bothalia* 14:705-712.
- Emslie, R. 2012. *Ceratotherium simum*. The IUCN Red List of Threatened Species 2012: e.T4185A16980466. <http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T4185A16980466.en>. Downloaded on 30 July 2018.
- Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds) 2005. *Roberts Birds of Southern Africa, VIIIth ed*. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- McKenzie, D. 2016. Lopalala Wilderness Lodge and Road Development, Baseline Terrestrial Ecology Study And Biodiversity Sensitivity Assessment. E COREX.

- 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.
- Mucina, L. and Rutherford, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- 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.
- 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* (Burrtt Davy) R.H.Archer. National Assessment: Red List of South African Plants version 2015.1. Accessed on 2018/07/30.
- 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 2015.1. Accessed on 2018/07/30.

10. APPENDICES

Appendix 1. Checklist of Flora recorded during fieldwork

Taxa	Growth Form	Red data	Protected	Vegetation Communities	
				Rocky Woodland	Plains Woodland
Family Acanthaceae					
<i>Barleria saxatilis</i> Oberm.	herb			r	
<i>Hypoestes forsskaolii</i> (Vahl) R.Br.	herb			u	
Family Anacardiaceae					
<i>Lannea discolor</i> (Sond.) Engl.	tree			r	
<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree		NFA	u	r
<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. & J.Wen forma <i>leptodictya</i>	tree			r	r
Family Annonaceae					
<i>Hexalobus monopetalus</i> (A.Rich.) Engl. & Diels var. <i>monopetalus</i>	tree			u	
Family Amaranthaceae					
<i>Kyphocarpa angustifolia</i> (Moq.) Lopr.	herb			r	
Family Apocynaceae					
<i>Diplorhynchus condylocarpon</i> (Möll.Arg.) Pichon	tree			r	
<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	dwarf shrub				r
Family Asparagaceae					
<i>Asparagus suaveolens</i> Burch.	dwarf shrub			r	r
Family Asteraceae					
<i>Emilia transvaalensis</i> (Bolus) C.Jeffrey	herb				r
<i>Psiadia punctulata</i> (DC.) Vatke	herb			r	
Family Burseraceae					
<i>Commiphora marlothii</i> Engl.	tree			u	

<i>Commiphora mollis</i> (Oliv.) Engl.	tree			u	
Family Celastraceae					
<i>Elaeodendron transvaalense</i> (Burt Davy) R.H.Archer	tree	NT	NFA	r	r
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	shrub			r	u
<i>Gymnosporia maranguensis</i> (Loes.) Loes.	shrub				r
Family Combretaceae					
<i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i>	tree			d	
<i>Combretum hereroense</i> Schinz	tree			r	r
<i>Combretum imberbe</i> Wawra	tree		NFA		r
<i>Combretum molle</i> R.Br. ex G.Don	tree			r	
<i>Combretum zeyheri</i> Sond.	tree			f	
<i>Terminalia sericea</i> Burch. ex DC.	tree				u
Family Ebenaceae					
<i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	tree				u
<i>Euclea divinorum</i> Hiern	shrub				r
<i>Euclea natalensis</i> A.DC. subsp. <i>angustifolia</i> F.White	shrub			f	u
Family Euphorbiaceae					
<i>Croton gratissimus</i> Burch. var. <i>gratissimus</i>	tree			f	
Family Fabaceae					
<i>Acacia karroo</i> Hayne	tree				u
<i>Acacia nigrescens</i> Oliv.	tree				r
<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>kraussiana</i> (Benth.) Brenan	tree				d
<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>heteracantha</i> (Burch.) Brenan	tree				r
<i>Albizia tanganyicensis</i> Baker f. subsp. <i>tanganyicensis</i>	tree			u	
<i>Burkea africana</i> Hook.	tree				r
<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt	tree			r	u
<i>Peltophorum africanum</i> Sond.	tree			u	r
<i>Pterocarpus rotundifolius</i> (Sond.) Druce subsp. <i>rotundifolius</i>	tree			f	
<i>Schotia brachypetala</i> Sond.	tree			r	
Family Kirkiaceae					
<i>Kirkia acuminata</i> Oliv.	tree			d	
Family Loranthaceae					
<i>Plicosepalus kalachariensis</i> (Schinz) Danser	epiphyte			r	
Family Malvaceae					
<i>Abutilon</i> sp.	herb			r	

<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	tree			u	r
<i>Grewia bicolor</i> Juss. var. <i>bicolor</i>	shrub			d	u
<i>Grewia flavescens</i> Juss.	shrub			d	r
<i>Grewia hexamita</i> Burret	tree				r
<i>Hibiscus micranthus</i> L.f. var. <i>micranthus</i>	dwarf shrub			r	
<i>Melhanian acuminata</i> Mast. var. <i>acuminata</i>	dwarf shrub			r	
<i>Sida cordifolia</i> L. subsp. <i>cordifolia</i>	dwarf shrub				r
<i>Waltheria indica</i> L.	dwarf shrub			u	f
Family Olacaceae					
<i>Ximena americana</i> L. var. <i>microphylla</i> Welw. ex Oliv.	shrub			r	
<i>Ximena caffra</i> Sond. var. <i>natalensis</i> Sond.	shrub			r	
Family Phyllanthaceae					
<i>Pseudolachnostylis maprouneifolia</i> Pax	tree			u	
Family Poaceae					
<i>Aristida meridionalis</i> Henrard	grass				r
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	grass			r	u
<i>Cynodon dactylon</i> (L.) Pers.	grass				u
<i>Elionurus muticus</i> (Spreng.) Kuntze	grass				r
<i>Enneapogon cenchroides</i> (Licht. ex Roem. & Schult.) C.E.Hubb.	grass			r	r
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	grass			u	f
<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	r
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	grass				r
Family Rhamnaceae					
<i>Berchemia zeyheri</i> (Sond.) Grubov	tree			r	r
<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
Family Sapindaceae					
<i>Pappea capensis</i> Eckl. & Zeyh.	tree			f	r
Family Selaginellaceae					
<i>Selaginella dregei</i> (C.Presl) Hieron.	fern			r	
Family Sinopteridaceae					
<i>Cheilanthes viridis</i> Sw.				r	

<i>Pellaea calomelanos</i> (Sw.) Link var. <i>calomelanos</i>	fern			r	
Family Sterculiaceae <i>Sterculia rogersii</i> N.E.Br.	tree			r	
Family Strychnaceae <i>Strychnos madagascariensis</i> Poir.	tree			r	
Family Velloziaceae <i>Xerophyta retinervis</i> Baker	dwarf shrub			r	
Family Verbenaceae <i>Vitex rehmannii</i> Gürke	shrub				
Family Viscaceae <i>Viscum combreticola</i> Engl.	parasite			r	
Family Vitaceae <i>Rhoicissus revoilii</i> Planch.	climber			r	
TOTAL	73	1	3	53	40

NT = Near Threatened NFA = National Forests 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
<i>Elaeodendron transvaalensis</i>	Celastraceae	NT	Woodland, often on rocky slopes	Confirmed	
<i>Combretum petrophilum</i>	Combretaceae	Rare	Rocky outcrops in mountain bushveld	Low	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
<i>Ansellia africana</i>	Orchidaceae	VU‡	Savanna	Low	Confirmed at Founders Lodge but no plants are present within the footprint of the proposed Extension
<i>Freylinia tropica</i>	Scrophulariaceae	Rare	Streambanks	Very Low	No suitable habitat present

VU = Vulnerable
 NT = Near Threatened
 ‡ = IUCN assessment

Appendix 3. Co-ordinates of plants of conservation-importance recorded during fieldwork

Species	Red data	Protected Status	No. of Plants	GPS Co-ordinates	
				Lat	Long
<i>Elaeodendron transvaalense</i>	NT	NFA	1	-23.860241	28.279792
<i>Sclerocarya birrea</i>		NFA	1	-23.860241	28.279792
<i>Combretum imberbe</i>		NFA	1	-23.860364	28.279868
<i>Sclerocarya birrea</i>		NFA	1	-23.860229	28.280007
<i>Combretum imberbe</i>		NFA	1	-23.860203	28.280115
<i>Sclerocarya birrea</i>		NFA	1	-23.861021	28.279433
<i>Sclerocarya birrea</i>		NFA	1	-23.860897	28.279359
<i>Sclerocarya birrea</i>		NFA	1	-23.860133	28.278988
<i>Sclerocarya birrea</i>		NFA	1	-23.860265	28.279046
<i>Elaeodendron transvaalense</i>	NT	NFA	1	-23.859949	28.278659
<i>Sclerocarya birrea</i>		NFA	1	-23.859941	28.278424
<i>Sclerocarya birrea</i>		NFA	1	-23.859819	28.278436
<i>Sclerocarya birrea</i>		NFA	1	-23.859486	28.278259
<i>Sclerocarya birrea</i>		NFA	1	-23.859871	28.278830
<i>Combretum imberbe</i>		NFA	1	-23.859557	28.278823
<i>Combretum imberbe</i>		NFA	1	-23.860026	28.279076

NT = Near Threatened
NFA = National Forests Act

Appendix 4. Checklist of fauna confirmed during fieldwork

Common Name	Scientific Name	Red Data	Endemic	Protected: National	Protected: Provincial	Plains Woodland	Rocky Woodland
Mammals							
ORDER: LAGOMORPHA Family Leporidae (rabbits and hares) Scrub Hare	<i>Lepus saxatilis</i>		x			x	
ORDER: RODENTIA Family Hystricidae (Old World porcupines) Cape Porcupine	<i>Hystrix africaeaustralis</i>					x	
ORDER: CARNIVORA 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 (PR)		x	
Family Rhinocerotidae (rhinoceros's) White Rhinoceros	<i>Ceratotherium simum</i>	NT		NEMBA (PR)	LEMA	x	
ORDER: CETARTIODACTYLA Family Suidae (pigs) Common Warthog	<i>Phacochoerus africanus</i>					x	
Family Bovidae (cattle & antilopes) Kudu Blue Wildebeest	<i>Tragelaphus strepsiceros</i> <i>Connochaetes taurinus</i>			NEMBA (PR)		x x	x

Impala	<i>Aepyceros melampus</i>						x	x
Subtotal	10	2	1	4	2	10	2	
Birds								
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: MUSOPHAGIFORMES								
Family Musophagidae (turacos)								
Grey Go-away-bird	<i>Corythaixoides concolor</i>						x	x
ORDER: COLIIFORMES								
Family Coliidae (mousebirds)								
Red-faced Mousebird	<i>Urocolius indicus</i>						x	
ORDER: CORACIIFORMES								
Family Alcedinidae (kingfishers)								
Striped Kingfisher	<i>Halcyon chelicuti</i>						x	
ORDER: BUCEROTIFORMES								
Family Upupidae (hoopoes)								
African Hoopoe	<i>Upupa africana</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
Family Picidae (woodpeckers)								
Bearded Woodpecker	<i>Dendropicus namaquus</i>						x	
ORDER: PASSERIFORMES								
Family Platysteiridae (wattle-eyes and batises)								
Chinspot Batis	<i>Batis molitor</i>						x	
Family Malaconotidae (bushshrikes)								
Black-backed Puffback	<i>Dryoscopus cubla</i>						x	x
Family Oriolidae (figbirds and orioles)								
Black-headed Oriole	<i>Oriolus larvatus</i>						x	x
Family Dicruridae (drongos)								

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	38	0	0	0	0	31	16
Reptiles							
ORDER: SQUAMATA							
Family Scincidae (skinks)							
Rainbow Skink	<i>Trachylepis margaritifer</i>						x
Subtotal	1	0	0	0	0	0	1
TOTAL	49	2	1	4	2	41	19

VU = Vulnerable
 NT = Near-threatened
 PR = Protected
 E = Endemic
 NEMBA = National Environmental Management: Biodiversity Act
 LEMA = Limpopo Environmental Management Act

Appendix 5. Potentially occurring fauna of conservation concern

Common Name	Scientific Name	Red Data	Protected	Habitat	Likelihood	Reason
Mammals						
Cheetah	<i>Acinonyx jubatus</i>	VU	NEMBA (VU)	Wide variety of habitats	Very Low	Very rare in the Waterberg, may occasionally wander through
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	Confirmed	
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	Confirmed	
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	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	Very Low	Confined to small camps within the reserve
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>	NT	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
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	Increasingly rare species
Buffalo	<i>Syncerus caffer</i>		LEMA	Wide variety of habitats	Moderate	Suitable habitat present
<i>Subtotal</i>	35	19	33			
Birds						

Tawny Eagle	<i>Aquila rapax</i>	EN	NEMBA (EN)	Savanna	Low	Very rare in the area
Verreauxs' Eagle	<i>Aquila verreauxii</i>	VU		Mountains and surrounding vegetation	Low	Small size of the footprint, may occasionally forage over
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	Very Low	No suitable habitat present
European Roller	<i>Coracias garrulus</i>	NT		Savanna	Moderate	Suitable habitat present
Lanner Falcon	<i>Falco biarmicus</i>	VU		Wide variety of habitats	Moderate	Suitable foraging habitat present only
Lesser Kestrel	<i>Falco naumanni</i>			Grassland, semi-desert	Low	No suitable habitat present
Red-footed Falcon	<i>Falco tinnunculus</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, disturbance
Cape Vulture	<i>Gyps coprotheres</i>	EN	NEMBA (EN)	Mountains and surrounding vegetation	Low	Low density in the area, disturbance
Marabou Stork	<i>Leptoptilos crumeniferus</i>	NT		Wetlands, savanna	Low	Limited suitable habitat present, disturbance
Denham's Bustard	<i>Neotis denhami</i>	VU	NEMBA (VU)	Grassland	Low	No suitable habitat present
Martial Eagle	<i>Polemaetus bellicosus</i>	EN	NEMBA (EN)	Wide variety of habitats	Low	Suitable habitat present but human disturbance is high
African Finfoot	<i>Podica senegalensis</i>	VU		Rivers with over-hanging vegetation	Very Low	No suitable habitat present
Secretarybird	<i>Sagittarius serpentarius</i>	VU		Open savanna and grassland	Low	Limited suitable habitat present
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN	NEMBA (EN)	Savanna	Low	Low density in the area, disturbance
Subtotal	16	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	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	High	Suitable habitat present
<i>Subtotal</i>	3	2	2			
TOTAL	54	36	41			

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

Appendix 6. Biodiversity Values of Vegetation Communities

Rocky Woodland

Conservation Importance

Parameter	Score	Very High	High	Moderate	Low	Very Low
Protection Status		International	National	Regional	Local	None
	13	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Size / Length		Very small (<500km ²)	Small (500 to 1,000km ²)	Moderate (1,000 to 20,000km ²)	Large (20,000 to 50,000km ²)	Very Large (> 50,000km ²)
	10	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Species Diversity		Noticeably High		Moderate		Noticeably Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Threatened Species		Noticeably High		Moderate		Noticeably Low
	11	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Unique Habitat or Taxa		Noticeably High		Moderate		Noticeably Low
	10	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Present Ecological State		Natural, largely Unmodified	Slightly modified	Moderately Modified	Considerably Modified	Severely Modified
	14	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
MEDIAN Score	11,5	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

EVR Species = Endangered, Vulnerable or Rare

Functional Importance

Parameter	Score	Very High	High	Moderate	Low	Very Low
Provisioning Services		Constant	Regular	Frequent	Occassional	Intermittent
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Regulating Services		Very High	High	Moderate	Low	Very Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Cultural Services		Very High	High	Moderate	Low	Very Low
	13	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Supporting Services		Very High	High	Moderate	Low	Very Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
MEDIAN Score	12,0	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

Plains Woodland

Conservation Importance

Parameter	Score	Very High	High	Moderate	Low	Very Low
Protection Status		International	National	Regional	Local	None
	13	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Size / Length		Very small (<500km ²)	Small (500 to 1,000km ²)	Moderate (1,000 to 20,000km ²)	Large (20,000 to 50,000km ²)	Very Large (> 50,000km ²)
	10	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Species Diversity		Noticeably High		Moderate		Noticeably Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Threatened Species		Noticeably High		Moderate		Noticeably Low
	11	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Unique Habitat or Taxa		Noticeably High		Moderate		Noticeably Low
	10	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Present Ecological State		Natural, largely Unmodified	Slightly modified	Moderately Modified	Considerably Modified	Severely Modified
	14	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
MEDIAN Score	11,5	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

EVR Species = Endangered, Vulnerable or Rare

Functional Importance

Parameter	Score	Very High	High	Moderate	Low	Very Low
Provisioning Services		Constant	Regular	Frequent	Occassional	Intermittent
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Regulating Services		Very High	High	Moderate	Low	Very Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Cultural Services		Very High	High	Moderate	Low	Very Low
	13	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
Supporting Services		Very High	High	Moderate	Low	Very Low
	12	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0
MEDIAN Score	12,0	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1 0

Appendix 7. Duncan McKenzie CV

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: 10
Nationality: South African



Qualifications :

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

Membership in Professional Societies:

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

Languages :

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

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

OVERVIEW OF EXPERIENCE

- 10 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 8. Specialist Declaration Form

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
20/08/2018

Date