



**FLORA AND FAUNA IMPACT  
ASSESSMENT REPORT FOR THE  
PROPOSED PLATREEF  
UNDERGROUND MINE**

**PLATREEF RESOURCES (PTY) LTD**

**OCTOBER 2013**

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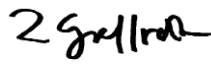



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**Report Title:** **Flora and Fauna Impact Assessment Report for the Proposed Platreef Underground Mine**

**Project Number:** **PLA1677**

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## EXECUTIVE SUMMARY

Digby Wells Environmental (Digby Wells) was appointed by Platreef Resources (Pty) Ltd for Phase 1 and subsequently Phase 2 of the social and environmental documentation required in support of a Mining Right Application for the proposed Platreef Underground Mine. The proposed Platreef Underground Mine is located approximately 8 km from Mokopane, Limpopo Province. It is situated within the Savanna biome. In order to enable characterisation of the environment, as well as of floral and faunal species that may be impacted on by the proposed activities, floral and faunal groups were investigated.

The objectives of this report are to describe the current state of the flora and fauna within the proposed Platreef Platinum Mine Project Area and assess the impact of the proposed mining development. The report will deliver various flora and fauna findings in compliance with existing provincial and national legislation.

An in-depth desktop study was undertaken as well as two field surveys. The first field study comprised of a wet and dry season study, this took place during the dry season (June 2011) and during the wet season (September 2011). A second dry season survey was commissioned during August 2013, during which specific infrastructure placements were investigated. The flora component was completed by surveying sample plots throughout the project area as well as general species listing. Faunal sampling was undertaken concurrently with the flora survey. Visual sightings were conducted with binoculars and identification enabled with recognised South African literature. The presence of species was evaluated using tracks, dung, ecological indicators and non-fatal traps such as Pit-fall traps and Sherman traps. Motion-sensitive cameras were also placed strategically throughout the site. The invertebrate assessment included sweep-netting for insects and active searching.

The affected environment is typical of the region, which lies within the Savanna Biome (Mucina and Rutherford, 2006) which is located in the northern part of South Africa. During the field surveys, the natural vegetation was found to be predominantly bushveld, however residential and farming regions allowed for secondary succession and the growth of pioneer species due to the disturbances exerted.

During the field surveys 140 plant species were identified throughout the project area and six vegetation communities were identified. Within 4 of the vegetation communities, protected species were found. Only Residential and Degraded Ridge Bushveld had all vegetation of value removed. Protected species found include *Combretum imberbe*, *Sclerocarya birrea* and *Boscia albitrunca*.

Four protected fauna species were found including *Pelea capreolus* (Grey Rhebok), *Heterohyrax brucei* (Yellow-spot Dassie), *Mycteria ibis* (Yellowbilled Stork) and *Platalea alba* (African Spoonbill). These species also link with the sensitive areas. The two protected mammal species were found within the ridge areas that form part of the Witvinger Nature Reserve. Many other protected mammal species such as the Leopard have a high probability of occurrence within the ridge range. The level of indigenous vegetation

biodiversity was also found to be of conservation value within these ridges; however they are under threat by the cutting and felling of valued species such as *Combretaceae* for firewood.

A 100m buffer around the ridges is suggested. The two protected bird species were found within the wetland region to the south-west of the site. This wetland forms part of the Nylsvlei floodplain system which is classified as a Ramsar site in its upper reaches. These two species are protected under the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and therefore care must be taken not to impact the habitat of these species. The probability of occurrence of the Bullfrog is rated as high and for this reason a 500m buffer is suggested around its potential habitat. It is suggested that the mining activities remain within the secondary grasslands and agricultural fields.

A follow-up survey on the marking and relocation of protected species within this vegetation community can assist in this process. The wetland and ridge areas should remain protected and an environmental officer should be appointed to assist in the protection of these sites that are protected by various Acts (including NEMA, NWA).

### **Sensitivity of the area**

Owing to the ecological function of the Bushveld habitat on the Platreef site and the presence or likelihood of occurrence of floral and faunal Species of Special Concern (SSC), the overall Sensitivity of the site was regarded as High.

The following areas were regarded as Highly Sensitive:

- Ridge Bushveld, and
- Riparian Areas (Wetland vegetation/Dam).

The following areas were regarded as Moderately to High Sensitive:

- *Impacted Ridge Bushveld.*

The following areas were regarded as Moderately Sensitive

- *Degraded Mixed Bushveld.*

### **Impacts**

Consideration of the impacts of the proposed Platreef Underground Mine development and associated activities on the terrestrial ecology forms a large component of this study. The primary anticipated impacts include a loss of vegetation communities, a loss of biodiversity and a loss of ecosystem services.

### **Mitigation and management**

Methods of mitigation and better management of the negative impacts have been recommended following the hierarchy of; avoidance, mitigation and offsetting. Major recommendations include;

- Avoidance of sensitive habitats (Ridge Bushveld, Riparian vegetation and intact bushveld areas);
- Rescue and Translocation of Flora and Fauna where clearing is unavoidable (especially Species of Special Concern);

- Biodiversity Action Management Plan, and
- Compilation and implementation of a monitoring programme.

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## LIST OF ACRONYMS AND ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act
CITES	Convention on International Trade in Endangered Species
C-Plan	Conservation Plan
CR	Critically Endangered
CSSC	Confirmed Species of Special Concern
DD	Data Deficient
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
DMR	Department of Mineral Rights
DWAF	Department of Water Affairs and Forestry
EBA	Endemic Bird Area
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EN	Endangered
EW	Extinct in the Wild
EX	Extinct
Ha	Hectares
HL	Habitat linkage
HR	Habitat requirements
HS	Habitat status
IBA	Important Birding Area
IUCN	International Union for the Conservation of Nature
IPP	Independent Power Plant
km	Kilometres
km <sup>2</sup>	Square kilometres



LC	Least Concern
LEMA	Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)
m	Metres
mm	Millimetres
MRA	Mining Right Application
NBSAP	National Biodiversity Strategy and Acton Plan
NE	Not Evaluated
NEMBA	National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)
No.	Number
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PRECIS	Pretoria Computerised Information System
PSSC	Possible Species of Special Concern
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SSC	Species of Special Concern
TSF	Tailings Storage Facility
TWINSpan	Two-Way Indicator Species Analysis Programme
VU	Vulnerable

## 1 INTRODUCTION

Platreef Resources (Pty) Ltd (Platreef) has proposed the development of the Platreef Underground Mine. The project lies within the Limpopo Province, approximately 8 km outside of Mokopane. Digby Wells Environmental (Digby Wells) has been requested to submit a Flora and Fauna Assessment for the proposed study area, to form part of the greater Environmental and Social Impact Assessment (ESIA).

Biodiversity is defined, according to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), as “the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems”. The NEMBA legislation upholds the country’s commitment to the protection of South Africa’s biological resources and it is imperative that development takes place in a sustainable way in order to achieve this.

The study area is located within the Savanna Biome, which covers much of the Limpopo Province and has a rich biodiversity due largely to the diverse topography. The Savanna Biome is the largest biome in Southern Africa and covers a large proportion of the northern part of South Africa. Altitude, rainfall and geology play a major role in defining the Biome and as a result it is considered as particularly complex. Bushveld typically consists of a grass sward and a woody component, including woodland, scrubveld and thickets.

### 1.1 Project description

Digby Wells Environmental (Digby Wells) has been appointed by Platreef as the independent Environmental Assessment Practitioner (EAP) to conduct an ESIA and associated specialist studies for the proposed Platreef Underground Mine. Platreef are investigating the construction and operation of an underground platinum mine on the farms of Turfspruit 241 KR; Macalacaskop 243 KR and Rietfontein 2 KS.

Anticipated infrastructure relating to the proposed mine will include (but is not limited to):

- Workshops;
- Temporary offices;
- Pollution control facilities;
- Sewage treatment plant;
- Parking area;
- Hard park;
- Roads;
- Drainage systems;
- Bulk and potable water supply and storage infrastructure, and;
- Fencing.

## 1.2 Study Area

The Project is located approximately 8 km from Mokopane, Limpopo Province. It is situated within the Savanna biome, which is the largest biome in Southern Africa. The environmental factors for this biome include altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and virtually every major geological and soil type. Factors that delimit this biome include sufficient rainfall, fires and grazing of animals (SANBI, 2011). The project is located within the Waterberg District Municipality (DM) as represented in Figure 1-1.

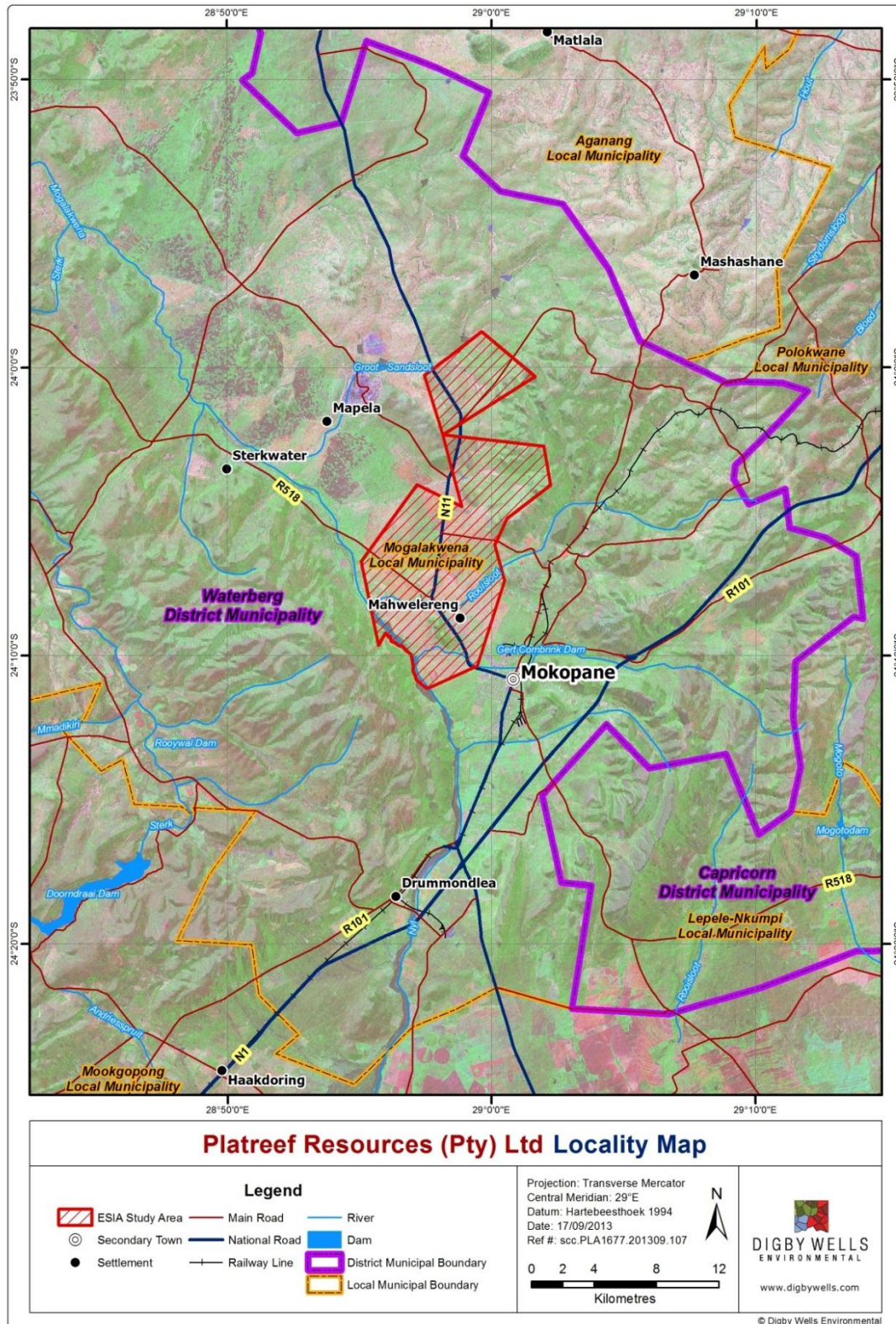


Figure 1-1: Locality of the Platreef project area.



### **1.3 Terms of Reference**

The agreed Terms of Reference (ToR) include a desktop review, field investigation and report compilation. The precise methodologies employed are elaborated on in Section 2.

#### **1.3.1 Desktop Review**

The desktop review required compiling relevant information for the greater study area from reliable and recognised resources. This included the consulting of relevant national and international legislation and best practice approaches as well as the most recent aerial imagery.

#### **1.3.2 Field Investigation**

Field investigations took place during the dry season (June 2011) and during the wet season (September 2011). A second dry season survey was commissioned during August 2013, during which specific infrastructure placements were investigated. The agreed upon ToR for the field work component of the study were to include:

- Characterisation of vegetation in the study area in conjunction with an in-depth study including plant species lists, Species of Special Concern (SSC) and their locations, declared alien or invasive species present and areas of sensitivity. In addition, all species of ethnobotanical (medicinal or cultural use) importance were recorded;
- A thorough faunal investigation, including the identification of habitats, recording of evidence of faunal activity, live-trapping, opportunistic observations, setting of motion-sensitive cameras and random transects. Any SSC were recorded, and
- Identification of Areas of Sensitivity based on ecological function and SSC.

#### **1.3.3 Report Compilation**

- Review of relevant legislation applicable to the study;
- Explanation of the methodologies used;
- Results of the study include:
  - Delineation of vegetation habitats on site and a description of the structure and condition of these habitats;
  - A description of faunal diversity on site as well as their connection to the vegetation habitats identified; and
  - Listing of all SSC and their applicable national and international statuses.
- A sensitivity assessment of habitats identified;
- Maps throughout the report showing significant features of the study area;
- An Impact Assessment (IA) where all impacts of the construction and operation of the proposed mine on the flora and fauna on site are discussed. This includes the impacts on the presence of certain important species as well as the impacts on

habitat diversity. The influence on the ecosystems in the area and their interactions are assessed and discussed.

#### **1.4 Expertise of the Specialist**

The Biophysical Team at Digby Wells is made up of a group of equipped and experienced professionals that have had ample experience with similar mining projects in the Waterberg Coalfield District. Relevant details of the specialists involved in this study are described below:

- Louise Van Wyk (involved with the 2011 studies but not longer employed by Digby Wells), the fauna and flora specialist achieved an honours degree in Biodiversity at the University of Johannesburg; and is an environmental consultant specialising in both terrestrial ecology and environmental management. The specialist holds an M.Sc in Environmental Management from the University of Johannesburg and did a thesis on the ecology of the Kruger National Park. Project experience includes various countries such as Botswana, Sierra Leone, Mozambique, Ghana and throughout South Africa;
- Caitlin O'Connor (involved with the 2011 studies but not longer employed by Digby Wells), a flora specialist achieved an M.Sc of Landscape Architecture at the University of Cape Town and is an environmental consultant specialising in vegetation assessments and biodiversity planning. Experience includes ecological impact assessments, baseline vegetation assessments, monitoring plans, Biodiversity Action Plans and rehabilitation plans. Project experience includes various countries such as Sierra Leone, Mali, and extensively within South Africa; and
- Rudi Greffrath, the flora and fauna specialist achieved a National Diploma in Nature Conservation, followed by a Bachelor of technology degree in Biodiversity Conservation at the Nelson Mandela Metropolitan University; and is an environmental consultant specialising in both terrestrial ecology and environmental management. Experience includes ecology field work such as flora and fauna surveys, biodiversity assessments, Biodiversity Action Plans, species relocation and environmental rehabilitation. Furthermore, experience has been acquired in environmental Rehabilitation Monitoring, Rehabilitation Action Plans, Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP). Project experience includes various countries such as Botswana, Sierra Leone, Mali, Mozambique, Ghana, Democratic Republic of the Congo, Namibia and throughout South Africa

#### **1.5 Aims and objectives**

Information generated from this survey was used to identify the potential impacts that the construction and operational activities will have on the environment. In order to achieve this aim the following objectives were considered for this specialist study:

- To delineate the various vegetation/habitat types and describe their sensitivity, present within the study area;



- To determine if any flora and fauna species or assemblages will be directly impacted upon by the proposed mining activities and its associated infrastructure, this includes flora and fauna communities present, the ecological state of these communities, identification of possible Red Data species (according to the International Union for the Conservation of Nature (IUCN) as well as considering National and Provincial criteria, and
- To determine mitigation measures for the identified impacts in order to reduce the severity of these impacts. In cases where impacts cannot be mitigated, areas may be regarded as ‘no-go’ owing to the presence of SSC or critical habitat. Legislation and frameworks

The legislation applicable to this project is listed in Table 1-1.

**Table 1-1: Legislation referenced and consulted in the development of this assessment.**

Legislation	Description
<b>International frameworks and best practice guidelines</b>	Convention on Biological Diversity (Rio de Janeiro, 1992).
	United Nations Convention to Combat Desertification.
	The Bonn Convention on the Conservation of Migratory Species of Wild Animals.
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
<b>National legislation and frameworks</b>	The National Environmental Management Biodiversity Act (NEMBA) (Act No. 10 of 2004) affords threatened or protected species a legal status and protection.
	National Spatial Biodiversity Assessment: site specific findings.
	Additionally wetlands are protected under various Acts including the National Environmental Management Act (Act No. 107 of 1998), National Water Act (Act No. 36 of 1998), and the Conservation of Agricultural Resources Act (Act No. 43 of 1983).
<b>Provincial and municipal legislation and frameworks</b>	Limpopo Environmental Management Act 7, 2003 (LEMA)
	Limpopo State of the Environment Report Overview, 2003.

## 2 METHODOLOGY

For flora and fauna, the following methodologies were used:

### 2.1 Flora

The floral assessment included a desktop and a field survey component as discussed below.

#### 2.1.1 Desktop Study

##### 2.1.1.1 Regional Species List

A desktop study was undertaken, aiming to produce a checklist of all species identified on site. The following literature was consulted for this purpose:

- PRECIS (National Herbarium Pretoria Computerised Information System) (Appendix A);
- SIBIS: SABIF – South African Biodiversity Information Facility; and
- Mucina and Rutherford, 2006.

##### 2.1.1.2 Species of Special Concern (SSC)

From the overall species list, a list of *Species of Special Concern* can be drawn up. In order to be fully comprehensive, this list includes plants on each of the following lists:

- The SANBI Red List of South African plants version 2012;
- National Environmental Management Biodiversity Act (NEMBA 10 of 2004) listed species;
- National Forests Act, 1998 (Act No. 84 of 1998) (NFA) Protected Trees; and
- Limpopo Protected Plants (Limpopo Environmental Management Act, 2003).

An initial list of SSC expected to be found within the study area comprises of Possible Species of Special Concern (PSSC). If any of these (and any additional species on the above lists) are recorded on site, they are ascribed the status Confirmed Species of Special Concern (CSSC).

The South African Red Data list uses the same criteria as that defined by the International Union for the Conservation of Nature (IUCN). According to the IUCN all species are classified in nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation (IUCN, 2010). The categories are described in Table 2-1 below.

**Table 2-1: Red Data Categories (IUCN, 2010).**

Category		Description
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.

Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
Endangered	(EN)	High risk of extinction in the wild
Vulnerable	(VU)	High risk of endangerment in the wild.
Near Threatened	(NT)	Likely to become endangered in the near future.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
Data Deficient	(DD)	Not enough data to make an assessment of its risk of extinction.
Not Evaluated	(NE)	Has not yet been evaluated against the criteria.

The online IUCN database was referenced in order to identify Red Data species and their various threat status categorisations.

### 2.1.2 Field Survey

Field investigations took place during the dry season (June 2011) and during the wet season (September 2011). A second dry season survey was commissioned during August 2013, during which specific infrastructure placements were.

After broad habitats were delineated on aerial imagery, sample plots were used to determine vegetation distribution in the field. The Braun-Blanquet methodology was employed and a total of 64 relevés were sampled (Figure 2-1), each covering an approximate area of 100 m<sup>2</sup>. The Braun-Blanquet floristic-sociological approach recognizes units by the floristic composition and abundance. This methodology is easier and quicker to use than the alternative point-survey or wheel-point methodology, results in a reliable estimate of cover abundance and it is the most widely used approach for vegetation studies. The Braun-Blanquet method incorporates seven cover-abundance categories as listed in Table 2-2. A general species list was also compiled from random traversing through the site.

**Table 2-2: Braun-Blanquet analysis cover abundance.**

Cover Abundance	Category
One or few individuals.	r
Occasional and less than 5% of total plot area.	+
Abundant and with very low cover, or less abundant but higher cover; in any case less than 5% cover of total plot area.	1
Very abundant and less than 5%, or 5-25% cover, of a total plot area:	2



Cover Abundance	Category
<ul style="list-style-type: none"> <li>• 2m – Very abundant</li> <li>• 2a – 5-12.5 % cover, irrespective of number of individuals</li> <li>• 2b – 12.5-25% cover, irrespective of number of individuals</li> </ul>	
25-50% cover of total plot area, irrespective of number of individuals.	3
50-75% cover of total plot area, irrespective of number of individuals	4
75-100% cover of total plot area, irrespective of number of individuals	5



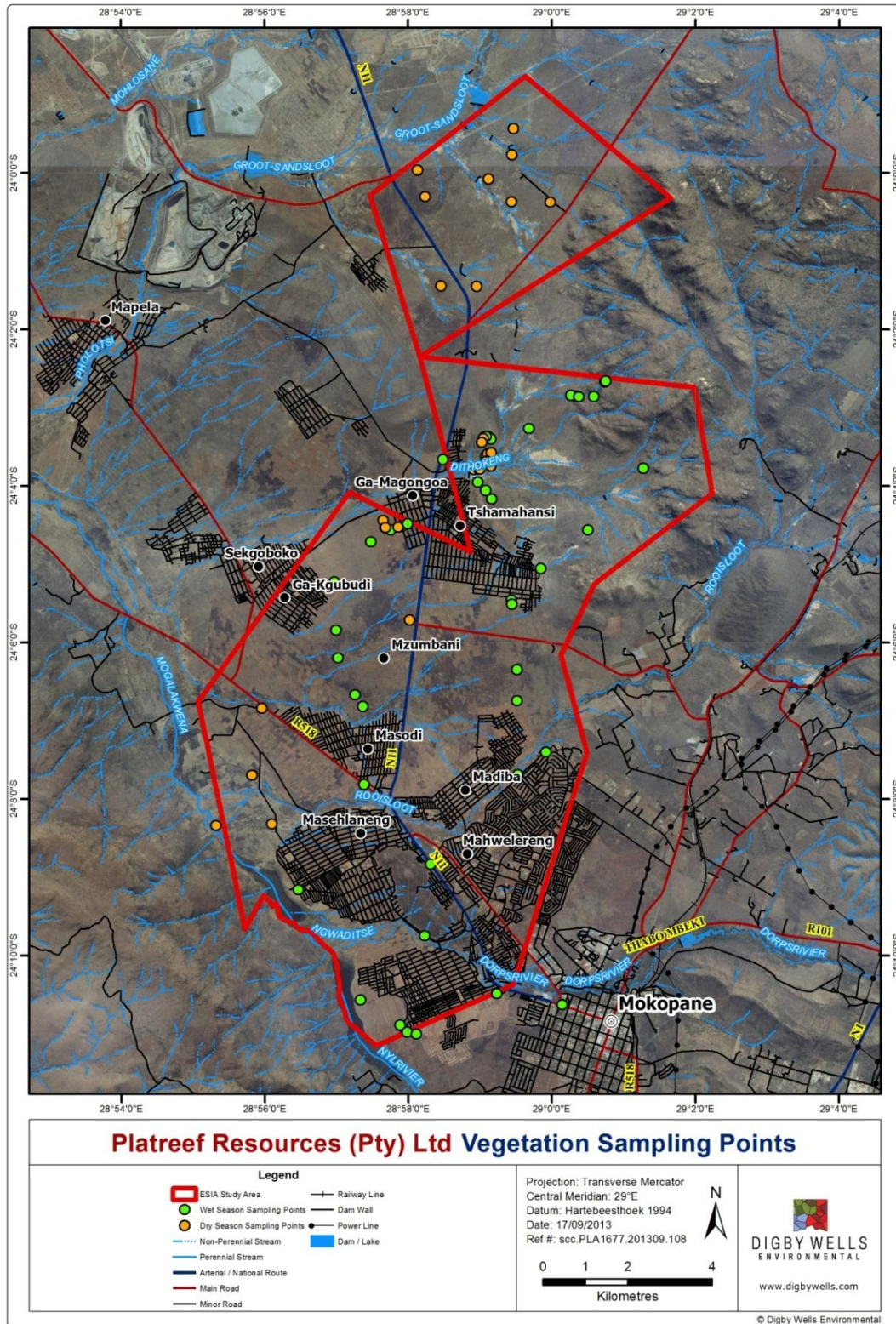


Figure 2-1: Vegetation sampling points completed for the summer and winter survey.

## **2.2 Fauna**

The faunal study, like the vegetation assessment was comprised of both a desktop and a field survey component:

### **2.2.1 Desktop Study**

#### **2.2.1.1 Regional Species List**

The following resources were used for the desktop component of the faunal investigation.

- The SIBIS online interactive species distribution map was used to obtain data for the distribution of mammals, reptiles, amphibians and terrestrial invertebrates within the greater study area. Data was acquired for the Quarter Degree Squares (QDS) in which the study is located;
- The potential occurrence of mammals was supplemented by the species distribution maps in Friedman and Daly (2004), and
- Lists of birds found in the QDS for the study area were determined using online data from the South African Bird Atlas Project (SABAP 2) for 2011.

#### **2.2.1.2 Species of Species Concern**

The conservation statuses of fauna identified on site was determined using the following resources:

- The Convention on International Trade of Endangered Species (CITES) species database;
- The IUCN Red-Data List for South African fauna;
- The International IUCN Red-Data List, and
- NEMBA listed species.

### **2.2.2 Field Investigation**

Pertinent notes were made during the survey and desktop studies were also conducted for birds, mammals, reptile and frogs. All fauna species encountered on site were identified and recorded. The following methods were used during the survey:

#### **2.2.2.1 Mammals**

Visual sightings and ecological indications were used to identify the mammal inhabitants of the study area; this includes scats, tracks and habitat such as burrows and dens. Scats found were collected (if required), photographed on scale along with any tracks found and identified. For identification purposes a field guide Mammals of Southern Africa (Smithers, 2000) was used.

The following was recorded:

- All mammals encountered, noted or captured during the survey;
- Animals listed by landowners;
- A list of the most prominent mammal species; and
- A list of rare and endangered species encountered during the survey.

Small mammal trapping was also applied by using Sherman traps. Sherman traps are collapsible traps (23 cm x 9 cm x 7.5 cm) which were baited and laid along transects in the representative vegetation of the study areas. Areas where clear small mammal activity could be seen such as the presence of burrows were also used as sites for trapping. The traps were checked every morning due to the fact that the small mammals are predominantly active at night. Trapping was undertaken for three consecutive days for the wet and dry season survey independently. Captured animals were photographed and identified. Species of conservation concern and listed by the IUCN or by the Limpopo Environmental Management Act as protected and endemic within the study area, took priority and the Red Data status identified and recorded.

#### **2.2.2.2 Birds**

The principal ornithological field survey technique used was transect counts. Transect counts were planned based on sites representative of different avifauna habitat, such as bushveld, open areas and wetlands. A transect line was selected at each site to reflect its general habitat conditions. Footpaths, trails and other access ways within each site were used as the transect line. The sampling period stretched over the survey period of six days for the wet and dry season collectively and counts were focused on early in the morning and in the evenings when bird activity was at its highest. Transect count procedures involve slow attentive walks along transects during which any bird seen or heard is identified and recorded.

The following was recorded:

- All birds encountered or noted during the survey including night surveys;
- A list of the birds encountered; and
- A list of rare and endangered species encountered.

Because the primary purpose of this work was to establish the presence of species, no distance or time limit was set, and hence any species seen or heard anywhere within each of the sampling sites was recorded for the site. If the project were to go ahead, set transects to be surveyed in specific timeframes are to be undertaken. Where possible, visual identification was used to confirm calls. Bird species were confirmed using Sinclair *et al*, 1997.

Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN 2004) and birds listed by the Limpopo Environmental Management Act (2003). Robert's' Multimedia of Birds of Southern Africa



(2006) was used to compile a list of possible species that might occur in the project area which falls within the quarter degree square 2429AA and 2428BB.

### 2.2.2.3 Reptiles and Frogs

Herpetofauna include reptile and amphibian species. Direct / opportunistic observation was done along trails or paths within the project area. Any herpetofauna species seen or heard along such paths or trails within the project area was identified and recorded. Another method used was refuge examinations using visual scanning of terrains to record smaller herpetofaunal species which often conceal themselves under rocks and in fallen logs, rotten tree stumps, under rocks, in leaf litter, rodent burrows, ponds, old termite mounds, etc. Branch (1996) and Carruthers (2001) was used to confirm identification where necessary.

### 2.2.2.4 Red Data faunal assessment

The following parameters were used to assess the Probability of Occurrence of each Red Data species:

- Habitat requirements (HR) – Most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics in the study area was evaluated;
- Habitat status (HS) – The status or ecological condition of available habitats in the area is assessed. Often a high level of habitat degradation prevalent in a specific habitat will negate the potential presence of Red Data species (this is especially evident in wetland habitats); and
- Habitat linkage (HL) – Movement between areas for breeding and feeding forms an essential part of the existence of many species. Connectivity of the study area to surrounding habitat and the adequacy of these linkages are evaluated for the ecological functioning of Red Data species habitat within the study area.

Probability of occurrence is presented in four categories, namely:

- Low (will not occur);
- Medium (could possibly occur);
- High (most likely could occur); or
- Recorded (does occur on site).

The IUCN Red Data categories are defined as follows and it is used for the status identification of mammals, birds, reptiles and amphibians globally:

- **CRITICALLY ENDANGERED (CR):** A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild (IUCN, 2010);
- **ENDANGERED (EN):** A taxon is Endangered when it is considered to be facing a very high risk of extinction in the wild (IUCN, 2010);
- **VULNERABLE (VU):** A taxon is Vulnerable when the best available evidence indicates it to be facing a high risk of extinction in the wild (IUCN, 2010); and



- **NEAR THREATENED (NT):** A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN, 2010).

### 2.2.2.5 Assessment of sensitive landscapes and conservation importance/significance

Subsequently all flora and fauna data were collectively assessed to determine areas that is of conservation importance. This was then collaborated with a desktop study and mapping which aimed at describing the proposed mining area and assessing the sensitive landscapes and conservation importance/significance of the proposed mining area. Sensitive areas will include areas with a unique or sensitive ecological system such as wetlands, ridges and Red Data species habitat. Nature reserves or proximity to nature reserves are also taken into account

**Table 2-3: Reference Sources for Species of Special Concern**

Reference Document	Description
<b>Red List, South Africa</b>	Listed species of flora and fauna are regarded as species whose representation in the wild, has declined to such an extent that drastic action is needed to ensure their survival.
<b>PRECIS</b>	The PRECIS list was obtained from the SANBI which lists all the Red Data plant species officially recorded by SANBI. This list represents only those species that may occur in the grid in which the sites fall, thus it is regarded as a guideline as to what is likely to occur. The sites sampled are only a very small portion of the whole grid and habitats suitable for certain species in these PRECIS lists may not be present at the sites sampled. It is therefore not unusual for species in the PRECIS list to be absent from the sampling sites
<b>IUCN</b>	The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable).  Plants and animals that have been evaluated to have a low risk of extinction are classified as Least Concern. (IUCN.org).
<b>CITES</b>	Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival (CITES.org).  CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction



Reference Document	Description
	from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species (CITES.org). Specimens are divided into the following appendices according to the restriction on trade.
<b>National Legislation</b>	Of special concern during the field investigations were all protected trees listed by the South African National Forest Act (Act 84 of 1998).  All flora and fauna species, listed by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004).
<b>Provincial Legislation</b>	All specially protected (Schedule 2) and protected species (Schedule 3) as listed by Limpopo Environmental Management Act (Act No. 7 of 2003).

### 2.3 Study limitations

The following limitations were encountered during this study:

- The time of the winter study did not coincide with the flowering time of most plant species; and
- Faunal activity is generally low during winter when the detailed study took place.

### 2.4 Sensitivity Assessment

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as meeting biodiversity targets for the country's variety of ecosystems. These guides are essential to consult for development projects, and will form an important part of the sensitivity analysis. Areas earmarked for conservation in the future, or that are essential to meet biodiversity and conservation targets should not be developed, and have a high sensitivity as they are necessary for overall functioning. In addition, sensitivity analysis in the field based in much finer scale data can be used to ground-truth the larger scale assessments and put it into a more localised context. The following assessments and assignments were taken into account in determining sensitivity:

- The occurrence of the site within an Internationally recognised Important Bird Area (IBA);
- The National List of Ecosystems that are Threatened and in need of Protection;
- The National Protected Areas Expansion Strategy;
- The National Spatial Biodiversity Assessment, and

- The National Vegetation Map (Mucina and Rutherford, 2006).

The Sensitivity Assessment was conducted based on desktop studies as well as information obtained during the field investigations. Ecological sensitivity was quantified by subjectively assessing two factors, namely ecological function and conservation importance. These were defined as follows:

### **Ecological function**

Ecological function is rated as described below:

- High ecological function: Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystem integrity (e.g. pristine grasslands, pristine wetlands and pristine ridges);
- Medium ecological function: Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem; and
- Low ecological function: Degraded and highly disturbed systems with little or no ecological function.

Functional Status refers to an indication of the services provided by an area and includes both ecological and human related services. Functional Status depends on the degree to which the area or system still provides a noticeable service.

### **Conservation importance**

Conservation importance is rated as described below:

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

Ecological health is an indication of carrying capacity of an ecosystem and therefore its ability to perform ecological services. In order to adequately gauge the ecological health of the study site it was important to give a qualitative definition of the 'perceived biodiversity value' of the land. This is done at a broad level, to simply categorise the total area of land owned based on potential biodiversity value. Biodiversity Value is understood as being a combination of the conservation status and the functional status of the area.

Conservation Status depends on:

- The amount of the area or system remaining (the extent);
- The diversity in terms of :

- Proportional species composition of the area of system; and
  - The presence of ecosystems/habitat and species which are endemic, threatened, vulnerable or have particularly high religious/cultural value.
- The degree to which the area or system reflects/represents its original state.

In addition, the data gathered from the field assessment allows for more fine-scale and accurate view of the vegetation in the study area. This data is pivotal for the determination of sensitivity of the area. Based on this approach the total land surface within the project area is categorised into the following biodiversity classes as listed in Table 2-4 below.

**Table 2-4: Score table describing the Biodiversity value (Sensitivity) scores.**

Score	Biodiversity Value	Percentage Score
1	Very High Biodiversity Value	75 – 100%
2	High Biodiversity Value	50 – 75%
3	Moderate Biodiversity Value	25-50%
4	Low Biodiversity Value	0 - 25%

### 2.4.1 Threatened Ecosystems

The list of national Threatened Ecosystems has been gazetted (NEM:BA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion, and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the Department of Water Affairs (DWA);
- Priority areas identified in a provincial systematic biodiversity plan, and
- High irreplaceability forest patches or clusters identified by DWAF (Department of Water Affairs and Forestry).

The criteria for identifying threatened terrestrial ecosystems include six criteria overall, two of which are dormant due to lack of data (criteria B and E). The criteria are presented in Table 2-5 below.

**Table 2-5: Criteria for the listing of National Threatened Ecosystems.**

Criterion	Details
<b>A1</b>	Irreversible loss of natural habitat
<b>A2</b>	Ecosystem degradation and loss of integrity
<b>B</b>	Rate of loss of natural habitat
<b>C</b>	Limited extent and imminent threat
<b>D1</b>	Threatened plant species associations
<b>D2</b>	Threatened animal species associations
<b>E</b>	Fragmentation
<b>F</b>	Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

These areas are essential for conservation of the country’s ecosystems as well as meeting conservation targets.

## 2.5 Impact Assessment

The following tables (Table 2-6 and Table 2-7) describe the Impact Rating Methodology which was applied for the proposed Project area and proposed activities.

**Table 2-6: Impact Assessment Categories: Severity, Spatial Scale, Duration and Probability Rating.**

Rating	Severity	Spatial scale	Duration	Probability
<b>7</b>	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage.	<u>International</u> The effect will occur across international borders	<u>Permanent: No Mitigation</u> No mitigation measures of natural process will reduce the impact after implementation.	<u>Certain/ Definite.</u> The impact will occur regardless of the implementation of any preventative or corrective actions.
<b>6</b>	Significant impact on highly valued species, habitat or ecosystem.	<u>National</u> Will affect the entire country	<u>Permanent: Mitigation</u> Mitigation measures of natural process will reduce the	<u>Almost certain/Highly probable</u> It is most likely that the impact will occur.



Rating	Severity	Spatial scale	Duration	Probability
			impact.	
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	<u>Province/Region</u> Will affect the entire province or region	<u>Project Life</u> The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year	<u>Municipal Area</u> Will affect the whole municipal area	<u>Long term</u> 6-15 years	<u>Probable</u> Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem functions. Rehabilitation requires intervention of external specialists and can be done in less than a month.	<u>Local</u> Local extending only as far as the development site area	<u>Medium term</u> 1-5 years	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	<u>Limited</u> Limited to the site and its immediate surroundings	<u>Short term</u> Less than 1 year	<u>Rare/ improbable</u> Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area).	<u>Very limited</u> Limited to specific	<u>Immediate</u> Less than 1 month	<u>Highly unlikely/None</u> Expected never to happen.

Rating	Severity	Spatial scale	Duration	Probability
	Will have no impact on the environment.	isolated parts of the site.		

**Table 2-7: Significance Categories.**

<u>Significance</u>										
Consequence (severity + scale + duration)										
		1	3	5	7	9	11	15	18	21
<u>Probability / Likelihood</u>	1	1	3	5	7	9	11	15	18	21
	2	2	6	10	14	18	22	30	36	42
	3	3	9	15	21	27	33	45	54	63
	4	4	12	20	28	36	44	60	72	84
	5	5	15	25	35	45	55	75	90	105
	6	6	18	30	42	54	66	90	108	126
	7	7	21	35	49	63	77	105	126	147
<u>Significance</u>										
<b>High (Major)</b>							<b>108 - 147</b>			
<b>Medium-High (Moderate)</b>							<b>73 - 107</b>			
<b>Medium-Low (Minor)</b>							<b>36 - 72</b>			
<b>Low (Negligible)</b>							<b>0 - 35</b>			

## 2.6 Ecosystem Services

Ecosystem system services are the benefits people obtain from ecosystems. This definition is derived from two other commonly referenced and representative definitions:

- Ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors (Daily 1997); and
- Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions (Costanza et al.).

The primary focus of the Ecosystem Services assessment in this report is to address the impact of biodiversity loss to the communities within or adjacent to the proposed project boundary. The process adopted was essentially a system based on social-ecological principles developed for the study area through collating information from different specialist studies such as Cultural and Heritage as well as the Flora and Fauna specialist studies. The model considers the supply of ecosystem services (i.e. the ecological component).

An ecosystem services assessment was conducted to establish the supply and demand of ecosystem services within the context of the proposed Platreef Underground Mine. This was essentially an exploratory process to better understand the following:

- The key ecosystem services generated by the natural assets or land cover types within the study;
- The demand for these services based on numbers of users and their dependence on the supply of these services; and
- The potential changes in the supply of services with development of the Platreef Project and the implications for the users in terms of service level changes.

The demand for ecosystem services within the study area was established through consultation with local community members during Cultural and Heritage as well as the Flora and Fauna field studies. Discussions involved identifying provisioning services such as the supply of water, energy/fuel, building materials and food amongst others and establishing the supply of and dependence on regulatory and cultural services.



### 3 DESCRIPTION OF THE STUDY AREA

#### 3.1 Climate

The environmental factors for this biome include altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and virtually every major geological and soil type. Factors that delimit this biome include sufficient rainfall, fires and grazing of animals (SANBI, 2011).

#### 3.2 Regional Vegetation

The Platreef study area is situated within the Savanna biome, which is the largest biome in Southern Africa. It consists of a grassy ground layer and a woody plant upper layer. It is known as Shrubveld when the woody layer is close the grass layer and as Bushveld in any intermediate phases.

The Project is located approximately 8 km from Mokopane, Limpopo Province (Figure 1-1). It is situated within the Savanna biome, which is the largest biome in Southern Africa. It consists of a grassy ground layer and a woody plant upper layer. It is known as Shrubveld when the woody layer is close the grass layer and as Bushveld in any intermediate phases. The environmental factors for this biome include altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and virtually every major geological and soil type. Factors that delimit this biome include sufficient rainfall, fires and grazing of animals (SANBI, 2011).

The project area was identified to occur within four vegetation types that can be seen in (Figure 3-1). This includes:

- Makhado Sweet Bushveld (Vulnerable) (Mucina&Rutherford, 2006);
- Mamabolo Mountain Bushveld (Least Threatened, because statutorily conserved in Witvinger Nature Reserve) (Mucina&Rutherford, 2006);
- Polokwane Plateau Bushveldn (Least Threatened) (Mucina&Rutherford, 2006); and
- Waterberg Mountain Bushveld (Least Threatened) (Mucina&Rutherford, 2006).

Plant species expected to occur within the study area are listed in Appendix B, the PRECIS list obtained from SIBIS can be found in Appendix A.

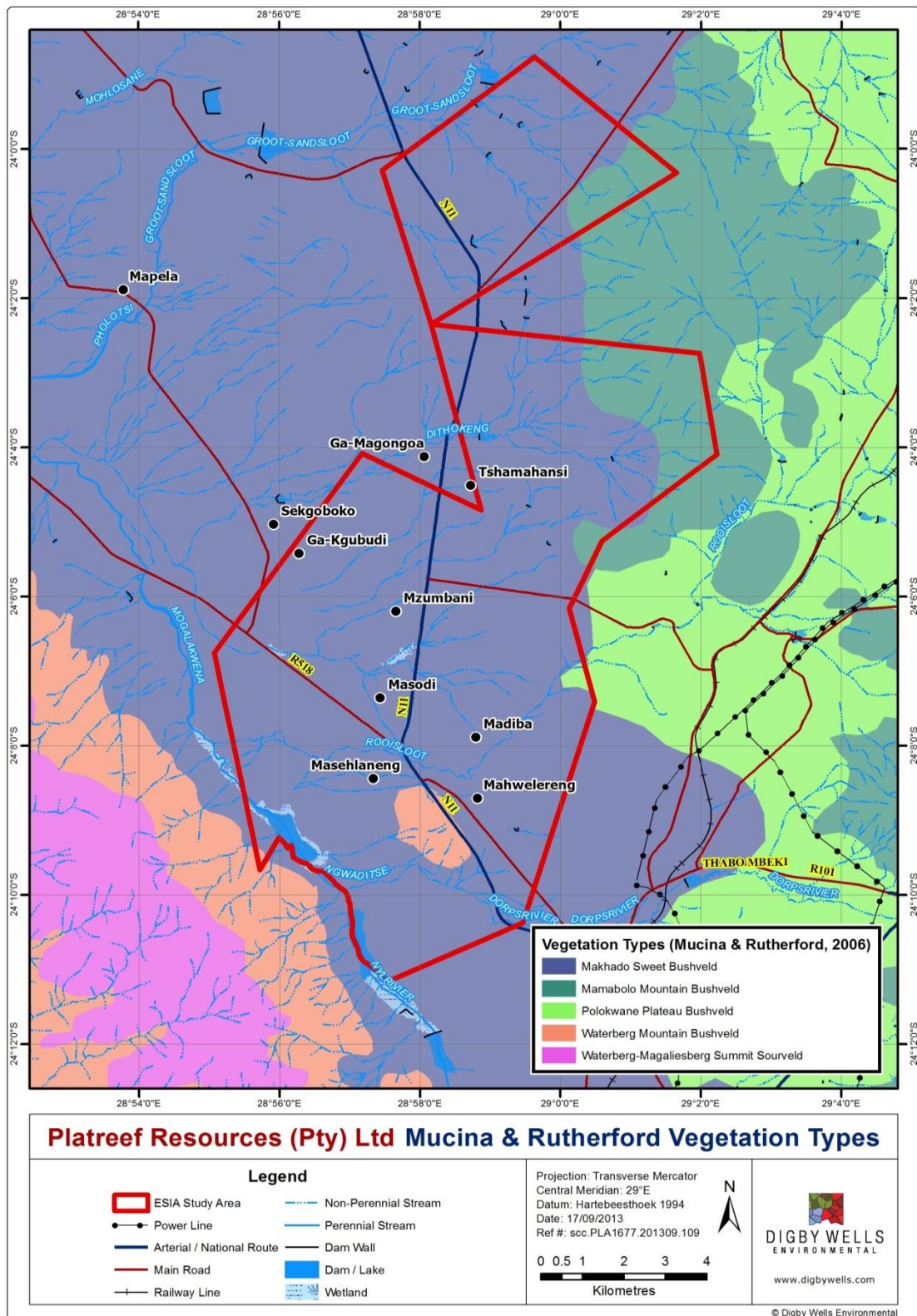


Figure 3-1: Regional Vegetation (Mucina and Rutherford, 2006).

## 4 RESULTS

### 4.1 Flora

As aforementioned, the vegetation in the study area is part of the Limpopo Bushveld, which is a component of the Savanna Biome. This vegetation is comprised of a grassy ground layer and an upper layer of woody species.

#### 4.1.1 Vegetation Communities

During the field survey the vegetation was found to be predominantly bushveld, however residential and farming regions allowed for secondary succession and the growth of pioneer species due to the disturbances exerted. A complete species list can be seen in Appendix B; 140 species were identified throughout the project area. Six vegetation communities (Figure 4-1) were identified including the Degraded Bushveld community which is sub divided into the Un-impacted Bushveld, found exclusively within the Witvinger Nature Reserve:

- Ridge Bushveld;
- Impacted Ridge Bushveld;
- Degraded Mixed Bushvel/Un-impacted Bushveld;
- Secondary Grassland and Agricultural fields;
- Wetland vegetation; and
- Residential areas.



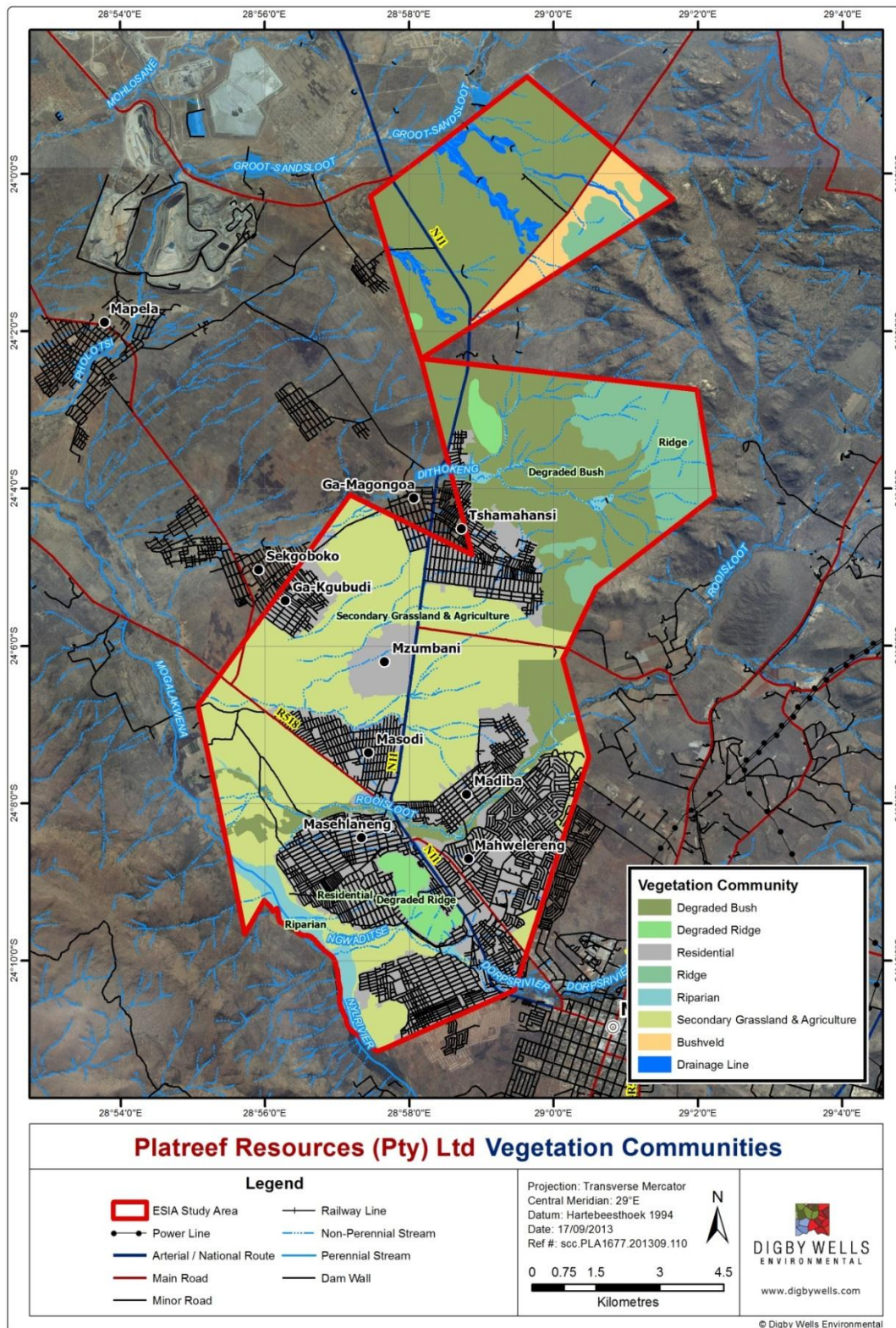


Figure 4-1: Vegetation communities



#### 4.1.1.1 Ridge Bushveld

This vegetation type was defined as vegetation unique to the ecological system of a ridge and was found to be different in comparison to the environment that directly surrounds it. It consisted of a grassy layer and a tree/shrub layer which is characteristic of the Bushveld. The grass layer included species such as *Panicum natalense*, *Eragrostis rigidior*, *Brachiaria serrate* and *Schizachyrium sanguineum* along the channels within the ridge area. On the mid and higher slopes, the grassy layer diminishes. The tree/shrub layer consists of *Acacia caffra*, *Combretum heroerense*, *Commiphora neglecta*, *Diospyrus villosa*, *Dombeya rotundifolia*, *Ficus sycamorus*, *Ficus glumosa* and *Cussonia paniculata*. A high level of indigenous, well established bushveld species were abundant and prominent (Figure 4-2). This can also be due to the fact that these ridges form part of the Witvinger Nature Reserve ridge range.



**Figure 4-2: The Ridge Bushveld vegetation community identified.**

#### 4.1.1.2 Impacted Ridge Bushveld

The Impacted Ridge Bushveld vegetation community forms part of the ridges that are close to settlements. For this reason the ridges are constantly exposed to the cutting down of trees for firewood and the grazing of cattle. If compared to the Ridge Bushveld vegetation community, the impacts are apparent as the amount of indigenous trees is significantly reduced (Figure 4-3). The reason for this is that indigenous species such as *Dombeya rotundifolia* are targeted first for the purpose of firewood and species such as *Dichrostachys cinerea* remain. The grassy layer consisted of species such as *Themeda triandra*, *Hyparrhenia hirta*, *Aristida congesta*, *Eragrostis curvula*, *Eragrostis rigidior*, *Melinis repens* and *Sporobolus centrifugus*. The tree/shrub layer comprised of *Aloe cryptopoda*, *Grewia*



*bicolor*, *Grewia flava*, *Ruellia cordata*, *Gymnosporia buxifolia*, *Kirkia wilmsii* and *Dichrostachys cinerea*.



**Figure 4-3: The Impacted Ridge Bushveld identified**

#### **4.1.1.3 Degraded Mixed Bushveld**

This vegetation community was found in between the base of ridges and residential areas/settlements, which was interrupted in certain sections by agricultural/secondary grasslands. This was also significantly impacted by removal of vegetation for firewood, grazing and dumping of domestic waste, bush encroachment have occurred extensively through *Dichrostachys cinerea*, most probably due to overgrazing through many years. Mining activities for sand mining were also found within this community with informal gravel roads that are used for this purpose. The grassy layer was dominated by *Melinis repens*, *Eragrostis plana* and *Eragrostis rigidior*. The tree/shrub layer includes *Acacia karroo*, *Acacia garrardii*, *Ziziphus mucronata*, *Aloe greatheadii*, *Aloe marlothii*, *Euphorbia ingens* and *Dichrostachys cinerea* (Figure 4-4). An un-impacted version of this vegetation type found within the boundaries of the Witvinger Nature Reserve did not have any of the anthropogenic disturbances





**Figure 4-4: Degraded Mixed Bushveld identified in the project area.**

#### **4.1.1.4 Secondary grasslands/Agricultural fields**

Secondary grasslands and agricultural fields have been placed together, due to the fact the secondary grasslands persists were previous agricultural activities ceased. Where agricultural activities are still current, *Zea mays* (maize/mielies) is found. The secondary grasslands consist predominantly of secondary/pioneer grasses such as *Eragrostis curvula*, *Melinis repens*, *Urochloa panicoides*, *Cynodon dactylon*, *Hyparrhenia hirta*, *Aristida congesta*, *Pogonarthria squarrosa*, *Dactyloctenium aegyptium* and exotic species such as *Tagetes minuta*, *Senecio latifolius*, *Xanthium strumarium*\*, *Bidens pillosa*, *Solanum panduriform* and *Ricinus communis*\* (Figure 4-5). Secondary grassland and agricultural fields are also intermixed in-between each other, there is no distinct pattern as secondary growth is determined by activity or non-activity. Legally protected large Leadwood trees (*Combretum imberbe*) were found in large amounts in the secondary grassland vegetation type as remnant vegetation of the previous dominating bushveld of this region.



**Figure 4-5: Secondary grassland identified in the project area.**

#### **4.1.1.5 Wetland vegetation**

The wetland regions are indicated by wetland indicator and aquatic plant species. Wetland regions are usually seen as sensitive areas due to its unique ecological cycles and the species that are dependent on it or inhabit it for both fauna and flora (Figure 4-6). Wetland vegetation species include *Ammania baccifera*, *Imperata cylindrica*, *Phragmites australis*, *Centella asiatica*, *Kyllinga erecta* and other Cyperaceae species.





**Figure 4-6: A wetland region with Wetland Vegetation identified within the project area.**

#### 4.1.1.6 Residential areas

Although not identified as an official vegetation community, Residential areas form part of a large section of the project area. Although developed, this area still has vegetation species within it and due to the large extent of the Residential area within the project area; it is mentioned as a community. Species found within developed areas include *Mangifera indica*, *Carica papaya*, *Bougainvillea spinosa*, *Persea americana*, *Ceiba pentandra*, *Bauhinia variegata*, *Euphorbia milii*, *Senna pendula var. glabrata* and *Melia azedarach*.

A complete list of all plant species identified on site is found in Appendix B. Figure 4-1 graphically represents the distribution of the different vegetation units identified on site. A number of SSC were identified within the different vegetation habitats and these are described in Section 5.1.1.

**Table 4-1: Broad communities identified in the study area.**

Plant Community	Area (ha)	Percentage of total (%)
Community 1: Ridge Bushveld	981.4	9.44
Community 2: Impacted Ridge Bushveld	269.75	2.43
Community 3: Degraded Mixed Bushveld	3705.7	19.79
Community 4: Secondary Grassland and Agricultural fields	3516.3	32.91



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<b>Plant Community</b>	<b>Area (ha)</b>	<b>Percentage of total (%)</b>
Community 5: Wetland vegetation/Dam	338.5	3.17
Community 6: Residential areas.	3767.9	35.26

#### 4.1.2 Alien and Invasive Species

Alien invasion for the Platreef study area was not regarded as severe and is not regarded as a major hindrance to biodiversity.

Alien species in South Africa are categorised according to the Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983) (CARA) and the NEMBA.

Declared alien and invasive species have been divided according to CARA into three categories:

- Category 1: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled, or eradicated where possible;
- Category 2: Declared invader species that are only allowed in demarcated areas under controlled conditions and prohibited within 30m of the 1:50 year flood line of any watercourse or wetland; and
- Category 3: Declared invader species that may remain, but must be prevented from spreading. No further planting of these species are allowed.

In addition, draft NEMBA Regulations (Government Gazette Vol. 526, No. 32090) were issued on the 3<sup>rd</sup> of April 2009. Although these regulations are yet to be promulgated as law, they are useful and relevant for categorising alien plant species found on site in this study. The draft NEMBA categories for invasive species according to Section 21 are as follows:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

Certain species have different alien invasive categories for different provinces in South Africa. Table 4-2 lists the alien species identified on site as well as their respective alien categories.

**Table 4-2 Alien species identified on site**

Family	Species Name	Common Name	Category
Agavaceae	<i>Agave americana</i>	Century plant	-
Apocynaceae	<i>Catharanthus roseus</i>	Periwinkle	-
Asparagaceae	<i>Asparagus larycinus</i>	Wild asparagus	-
Asteraceae	<i>Bidens pilosa</i>	Black Jack	-
Asteraceae	<i>Mantisaalca salmantica</i>	Mantisaalca	-
Asteraceae	<i>Schkuhria pinnata</i>	Dwarf marigold	-



Family	Species Name	Common Name	Category
Asteraceae	<i>Senecio latifolius</i>	Ragwort	-
Asteraceae	<i>Tagetes minuta</i>	Tall khakhi weed	-
Asteraceae	<i>Xanthium strumarium</i>	Spiny cocklebur	1
Asteraceae	<i>Zinnia peruviana</i>	Redstar zinnia	-
Cactaceae	<i>Opuntia ficus-indica</i>	Prickley pear	1
Caesalpiniaceae	<i>Senna pendula var. glabrata</i>	Easter Cassia	3
Euphorbiaceae	<i>Ricinus communis</i>	Castor oil plant	2
Fabaceae	<i>Bauhinia variegata</i>	Orchid tree	3
Fabaceae	<i>Indigofera heterotricha</i>	Hairy indigo	-
Meliaceae	<i>Melia azedarach</i>	Chinaberry	3
Papaveraceae	<i>Argemone ochrolauca</i>	Mexican poppy	1
Poacea	<i>Melinis repens</i>	Natal red top	-
Solanaceae	<i>Solanum incanum</i>	Thorn Apple	-
Solanaceae	<i>Solanum panduriform</i>	Bitterappel	-

#### 4.1.3 Grazing Intensity/ Landuse

The proposed Platreef Plainum Mine study area is broadly managed, either privately and fenced or community and not fenced; the majority of the site is currently not fenced and communally utilised for grazing. Large agricultural fields also exist but are discussed separately. The communal grazing areas are severely overgrazed with the subsequent bush encroachment the result.

A



B



**Figure 4-7 Examples of the impacts of overgrazing on the Platreef study site (A: Bush encroachment; B: Overgrazed and burnt bushveld).**

## 4.1 Fauna

Fauna expected to occur on site include assemblages within terrestrial and wetland ecosystems: mammals, birds, reptiles, amphibians and invertebrates. Each of these assemblages occur within unique habitats, the ecological state of these habitats directly relates to the number of species found within them. The main habitats occurring in the project area are bushveld plains and pans with little altitudinal variation.

### 4.1.1 Mammals

For a desktop review of mammals that could possibly occur within the project area, SIBIS was used. SIBIS is part of SANBI’s Integrated Biodiversity Information System. Animal species that were previously recorded within the Limpopo Province and the project area can be seen in Appendix C. The list also indicated the global and national IUCN status, as well as the NEMBA status. By making a comparison between the previously recorded species list and the currently occurring species found during the field survey, the magnitude of impacts resulting in species reduction or loss can be estimated

The Red Data species considered for this survey can be seen in Table 4-3. The probability of occurrence was estimated based on habitat requirement and distribution. Protected species of Limpopo Province under Schedule 3 were also considered. Amongst these listed; the Leopard, Honey Badger, Hedgehog, Bat-eared fox and Civet were identified to have a high probability of occurrence within the project area.

**Table 4-3: Red Data species of the Limpopo Province.**

Category	Scientific Name	Common Name	Probability
Critically Endangered	<i>Diceros bicornis</i>	Black rhinoceros	Low
	<i>Amblysomus julianae</i>	Juliana’s golden mole	Medium



Category	Scientific Name	Common Name	Probability
Endangered	<i>Loxodonta africana</i>	African elephant	Low
	<i>Lycan pictus</i>	African wild dog	Low
Vulnerable	<i>Amblysomus gunningi</i>	Gunning's golden mole	Low
	<i>Lutra maculicollis</i>	Spotted-necked otter	Medium -High
	<i>Acinonyx jubatis</i>	Cheetah	Low
	<i>Felis lybica</i>	African wild cat	Medium
Near Threatened	<i>Ceratotherium simum</i>	White rhinoceros	Low

**4.1.1.1 Mammals found during the field survey**

Burrows and holes of small mammals, which can possibly belong to mice, rats, suricates, etc. were found during the field survey. Sherman traps were set up to capture small mammals that are nocturnal. Species captured included *Aethomys namaquensis* (Figure 4-8).



**Figure 4-8: *Aethomys namaquensis* captured during the field survey.**

A full species list of mammals recorded can be seen in Table 4-4. Two of the species found are protected under Schedule 3 of the Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA). Both of these species were found to the north-east of the project area, which is a ridge range that forms part of the Witvinger Nature Reserve.

**Table 4-4: Mammal species identified during the field survey.**

Family	Species Name	Common Name
Bovidae	<i>Sylvicapra grimmia</i>	Common duiker
Bovidae	<i>Pelea capreolus</i>	Grey rhebok*
Cercopithecidae	<i>Papio cynocephalus</i>	Chacma baboon
Hystricidae	<i>Hystrix africaeaustralis</i>	Porcupine
Leporidae	<i>Lepus saxatilis</i>	Scub hare
Muridae	<i>Aethomys namaquensis</i>	Namaqua rock mouse
Procaviidae	<i>Procavia capensis</i>	Rock dassie
Procaviidae	<i>Heterohyrax brucei</i>	Yellow-spot dassie*
Sciuridae	<i>Paraxerus cepapi</i>	Tree squirrel
Sciuridae	<i>Xerus inauris</i>	Ground squirrel
Viverridae	<i>Galerella sanguinea</i>	Slender mongoose

**Note:** \* denotes species protected by the Limpopo Environmental Management Act (2003) Schedule 3\*

#### 4.1.2 Avifauna

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the area; the majority of these birds are comprised of bushveld species. All birds that could be present within QDS 2429AA and 2428BB are listed in Appendix D.

The Yellow-Billed Stork and African Spoonbill are protected by the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns and even the African Penguin. This conservation agreement includes issues such as species and habitat

conservation, management of human activities, research and monitoring, education and information, and implementation.

Red Data bird species protected within the Limpopo Province were also considered during the field survey (Table 4-5). The possibility of occurrence was based on the distribution and habitat requirements of these Red Data species. The Yellow-Billed Stork is also included in this list and has a Near Threatened status (Barnes, 2000). The probability of occurrence is high for aquatic birds, due to the fact that the wetland to the south-west of the site forms part of the Nylsvlei Ramsar system and fulfils the habitat requirements of these species.

**Table 4-5: Red Data species considered during the field survey.**

Status	Scientific name	Common name	Probability
Vulnerable	<i>Aquila rapax</i>	Tawny Eagle	High
Vulnerable	<i>Ardeotis kori</i>	Kori Bustard	Low
Near threatened	<i>Buphagus erythrorhynchus</i>	Red Billed Oxpecker	Medium
Near threatened	<i>Ciconia nigra</i>	Black Stork	High
Near threatened	<i>Glareola nordmanni</i>	Black Winged Pratincole	High
Vulnerable	<i>Gyps africanus</i>	White Backed Vulture	Medium
Vulnerable	<i>Gyps coprotheres</i>	Cape Vulture	Medium
Near threatened	<i>Leptoptilos crumeniferus</i>	Marabou Stork	High
Near threatened	<i>Mycteria ibis</i>	Yellow Billed Stork*	Recorded
Vulnerable	<i>Polemaetus bellicosus</i>	Martial Eagle	Medium
Near threatened	<i>Sagittarius serpentarius</i>	Secretary Bird	High
Vulnerable	<i>Terathopius ecaudatus</i>	Bateleur	High
Vulnerable	<i>Torgos tracheliotos</i>	Lappet Faced Vulture	Medium

Key: \* denotes species identified during field surveys

#### 4.1.2.1 Bird species found during the field survey

During the field survey 49 species were observed. Table 4-6 summarises all species of birds recorded. This list cannot be considered as a complete list as many other birds can be present within any given season or day of the year. During the dry season survey, bird activity was greatly reduced.

**Table 4-6: Bird species identified during the field survey.**

Family	Species Name	Common Name
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Accipitridae	<i>Haliaeetus vocifer</i>	African Fish Eagle
Accipitridae	<i>Polyboroides typus</i>	Gymnogone
Alaudidae	<i>Mirafraba sabota</i>	Sabota Lark
Alcedinidae	<i>Ceryle rudis</i>	Pied Kingfisher
Anatidae	<i>Dendrocygna viduata</i>	Whitefaced Duck
Anatidae	<i>Anas sparsa</i>	Black Duck
Anatidae	<i>Anas erythrorhyncha</i>	Redbilled Teal
Anatidae	<i>Alopochen aegyptiacus</i>	Egyptian Goose
Ardeidae	<i>Ardea cinerea</i>	Grey Heron
Ardeidae	<i>Ardea melanocephala</i>	Blackheaded Heron
Ardeidae	<i>Ardea purpurea</i>	Purple Heron
Ardeidae	<i>Egretta intermedia</i>	Yellowbilled Egret
Ardeidae	<i>Casmerodius albus</i>	Great White Egret
Bucerotidae	<i>Tockus nasutus</i>	Grey Hornbill
Charadriidae	<i>Vanellus coronatus</i>	Crowned Plover
Charadriidae	<i>Vanellus armatus</i>	Blacksmith Plover
Ciconiidae	<i>Mycteria ibis</i> *	Yellowbilled Stork
Coliidae	<i>Urocolius indicus</i>	Redfaced Mousebird
Columbidae	<i>Streptopelia capicola</i>	Cape Turtle Dove
Columbidae	<i>Streptopelia senegalensis</i>	Palm Dove
Columbidae	<i>Oena capensis</i>	Namaqua Dove
Estrildidae	<i>Estrilda astrild</i>	Common Waxbill
Estrildidae	<i>Uraeginthus angolensis</i>	Blue Waxbill
Hirundinidae	<i>Delichon urbica</i>	House Martin
Jacaniidae	<i>Actophilornis africanus</i>	African Jacana
Laniidae	<i>Lanius collaris</i>	Fiscal shrike
Lybiidae	<i>Trachyphonus vaillantii</i>	Crested Barbet



Malaconotidae	<i>Malaconotus blanchoti</i>	Greyheaded Bush Shrike
Malaconotidae	<i>Laniarius ferrugineus</i>	Southern Boubou
Malaconotidae.	<i>Laniarius atrococcineus</i>	Crimsonbreasted Shrike
Meropidae	<i>Merops pusillus</i>	Little Bee-eater
Nectariniidae	<i>Nectarinia afra</i>	Greater Doublecollared Sunbird
Passeridae	<i>Vidua macroura</i>	Pintaled Whydah
Passeridae	<i>Passer melanurus</i>	Cape Sparrow
Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Great Comorant
Picidae	<i>Dendropicos fuscescens</i>	Cardinal Woodpecker
Ploceidae	<i>Ploceus velatus</i>	Southern Masked Weaver
Pycnonotidae	<i>Pycnonotus barbatus</i>	Common Bulbul
Rallidae	<i>Fulica cristata</i>	Redknobbed Coot
Rallidae	<i>Gallinula chloropus</i>	Common Moorhen
Rallidae	<i>Porphyrio porphyrio</i>	Purple Gallinule
Rallidae	<i>Amauornis flavirostris</i>	Black Crake
Recurvirostridae	<i>Himantopus himantopus</i>	Blackwinged Stilt
Scolopacidae	<i>Gallinago nigripennis</i>	African Snipe
Sturnidae	<i>Lamprotornis nitens</i>	Glossy Starling
Threskiornithidae	<i>Platalea alba</i> *	African Spoonbill
Threskiornithidae	<i>Bostrychia hagedash</i>	Hadedda Ibis
Threskiornithidae	<i>Threskiornis aethiopicus</i>	Sacred Ibis

\* Indicated birds protected under AEWA.

### 4.1.3 Herpetofauna

No Red Data status reptiles were found during the surveys. The probability of occurrence was determined based on the distribution and habitat requirements. The Red Data species can be seen in Table 4-7. The complete list of reptiles expected to occur on site can be viewed in Appendix E. The complete list of amphibians expected to occur on site can be view in Appendix F.

**Table 4-7: Red Data herpetofauna for the Limpopo Province.**



Status	Scientific Name	Common Name	Probability
Extinct	<i>Tetradactylus eastwoodi</i>	Eastwood's Longtailed Seps	Low
Rare	<i>Lamprophis swazicus</i>	Swazi Rock Snake	Low
	<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	Low
	<i>Xenocalamus transvaalensis</i>	Transvaal Quill-snout Snake	High
Vulnerable	<i>Python sebae natalensis</i>	Python	High
	<i>Lygodactylus methueni</i>	Methuen's Dwarf Gecko	Low
	<i>Crocodylus niloticus</i>	Nile Crocodile	Medium
	<i>Breviceps sylvestris</i>	Transvaal Forest Rainfrog	Low
Near Threatened	<i>Pyxicephalus adspersus</i>	Gaint Bulfrog	High
Peripheral	<i>Lycophidion variegatum</i>	Variegated Wolf Snake	Medium
	<i>Psammophis jallae</i>	Jalla's Sand Snake	Medium
Restricted	<i>Platysaurus relictus</i>	Relic Flat Lizard	Low
	<i>Lacerta rupicola</i>	Soutpandberg Rock Lizard	Low
	<i>Afroedura pondolia langi</i>	Woodbush/Pondo Flat Gecko	Low
	<i>Homopholis mulleri</i>	Muller's Velvet Gecko	Low
	<i>Chirindia langi occidentalis</i>	Lang's Pink Roundheaded Worm Lizard	Low
	<i>A. microphthalmia nigra</i>	Black Whitelipped Snake	Medium
	<i>Acontophiops lineatus</i>	Woodbush Legless Skink	Medium
	<i>Scelotes limpopoensis</i>	Limpopo Burrowing Skink	Medium
	<i>Typhlosaurus lineatus subtaeniatus</i>	Stripe-bellied Blind Legless Skink	Medium
	<i>Typhlosaurus lineatus richardi</i>	Richard's Blind Legless Skink	Medium

## 5 BIODIVERSITY VALUE ASSESSMENT

### 5.1 Species of Special Concern

#### 5.1.1 Flora

Red Data species identified by the PRECIS data for the grid squares can be seen in Table 5-1. None of these species were identified during the field survey, however the LEMA and the National Forests Act, 1998 (Act No. 84 of 1998) was also taken into consideration. Under the National Forest Act, 1998 (Act No. 84 of 1998), three protected species were found on site, including:

- *Combretum imberbe* (Leadwood) (Figure 5-1);
- *Boscia albitrunca* (Sheperds tree)(Figure 5-1); and
- *Sclerocarya birrea* (Marula) (Figure 5-2).

**Table 5-1: Red Data species listed by PRECIS considered during the field survey**

Family	Species Name	Status
Amaryllidaceae	<i>Boophone disticha</i>	Declining
Apocynaceae	<i>Brachystelma hirtellum</i>	NT
Aquifoliaceae	<i>Ilex mitis</i>	Declining
Asteraceae	<i>Callilepis leptophylla</i>	Declining
Celastraceae	<i>Elaeodendron transvaalense</i>	NT
Cornaceae	<i>Curtisia dentata</i>	NT
Euphorbiaceae	<i>Euphorbia clivicola</i>	CR
Fabaceae	<i>Acacia erioloba</i>	Declining
Hyacinthaceae	<i>Drimia altissima</i>	Declining
Hyacinthaceae	<i>Drimia elata</i>	Data deficient
Hypoxidaceae	<i>Hypoxis hemerocallidea</i>	Declining
Iridaceae	<i>Gladiolus dolomiticus</i>	Rare
Myrsinaceae	<i>Rapanea melanophloeos</i>	Declining
Orchidaceae	<i>Eulophia speciosa</i>	Declining
Passifloraceae	<i>Adenia fruticosa</i>	NT
Passifloraceae	<i>Adenia gummifera</i>	Declining

Family	Species Name	Status
Rosaceae	<i>Prunus africana</i>	VU

The protected tree species *Combretum imberbe* (Figure 5-1 and Figure 5-2), was encountered on the lower lying flat areas with regular intervals as this tree species is not removed when agricultural fields are made.



**Figure 5-1: *Combretum imberbe* (left) and *Boscia albitrunca* (right).**





**Figure 5-2: Leadwood (*Combretum imberbe*)**

#### 5.1.1.1 Plant Species with ethnobotanical uses

Ethnobotany is a branch of botany that places focus on the use of plants for medicines and other practical purposes. The use of native plants for ethnobotanical uses can be detrimental to populations that are overexploited.

South Africa has a rich diversity of medicinal plants that not only have a global significance, but also have a cultural and historical role (van Wyk *et al.* 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors.

From the list of plant species identified during the field surveys there are 53 species (Table 5-2) that have cultural uses. Medicinal plants are important to many people and have been used traditionally for centuries to cure many ailments. Plants have also been used traditionally for other cultural uses, such as building material, and for spiritual uses such as charms.

**Table 5-2: Species with cultural used identified within the project area**

Species Name	Common Name	Uses
<i>Acacia caffra</i>	Common Hook Thorn	Dyes and tanning
<i>Acacia karroo</i>	Sweet Thorn	Dyes and tanning
<i>Albizia versicolor</i>	False Thorn	Utility timber
<i>Aloe cryptopoda</i>	Geelaalwyn	Dyes



Species Name	Common Name	Uses
<i>Aloe marlothii</i>	Mountain Aloe	Dyes
<i>Asparagus larycinus</i>	Wild Asparagus	Vegetable
<i>Berchemia zeyheri</i>	Red Ivory	Fruits, utility timbers,
<i>Bidens pilosa</i>	Black Jack	Herbs
<i>Boscia albitrunca</i>	Witgat Boom	Witgat coffee, remedy for epilepsy
<i>Boscia foetida</i>	Stink Sheperds Tree	Womens health
<i>Carica papaya</i>	Pawpaw Tree	Fruits
<i>Carissa bispinosa</i>	Forest Num num	Fruits, treats toothache
<i>Catharanthus roseus</i>	Periwinkle	Medical uses
<i>Centella asiatica</i>	Pennywort	Vegetable, medical uses
<i>Combretum hereroense</i>	Russet Bushwillow	Firewood
<i>Combretum imberbe</i>	Leadwood	Firewood
<i>Commiphora neglecta</i>	Sweet-root Corkwood	Edible roots
<i>Croton gratissimus</i>	Lavender Feverberry	Dental care, perfumes
<i>Cussonia paniculata</i>	Highveld Cabage Tree	Edible roots
<i>Dichrostachys cinerea</i>	Sickle Bush	Medicinal uses, dental care, firewood
<i>Diospyros lycioides</i>	Star Apple	Dental care, dyes and tans
<i>Dodonaea angustifolia</i>	Sand Olive	Medicinal uses
<i>Englerophytum magaliesmontanum</i>	Stemfruit	Fruits
<i>Euclea crispa</i>	Blue Guarri	Mind and mood plant
<i>Euclea divinorum</i>	Magic Guarri	Dental care, mind and mood plant
<i>Euclea natalensis</i>	Natal Guarri	Dental care, mind and mood plant
<i>Euphorbia ingens</i>	Candelabra Tree	Poison
<i>Ficus glumosa</i>	Hairy Rock Fig	Dyes and tanning
<i>Ficus sycamorus</i>	Sycamore Fig	Dyes, tanning, fruits and drinks



Species Name	Common Name	Uses
<i>Gossypium herbaceum</i>	Wild Cotton	Traditional cotton
<i>Grewia flava</i>	Velvet Raisin	Fruits, fire making and waving
<i>Gymnosporia senegalensis</i>	Red Spike Thorn	Medicinal uses
<i>Heteropyxis natalensis</i>	Lavendar Tree	Dental care and perfumes
<i>Hyparrhenia hirta</i>	Common thatching Grass	Thatching
<i>Lannea discolor</i>	Live Long Lannea	Fruits, womens health, mind and mood plants
<i>Mangifera indica</i>	Mango Tree	Fruits
<i>Olea europaea subsp.africana</i>	Wild Olive	Medicinal uses and utility timber
<i>Opuntia ficus-indica</i>	Prickley Pear	Fruits
<i>Pappea capensis</i>	Jacket Plum	Fruits
<i>Persea americana</i>	Avocado Tree	Fruits
<i>Phaseolus vulgaris</i>	Common Green Bean	Vegetables
<i>Phragmites australis</i>	Common Reed	Weaving and edible roots
<i>Rhoicissus tridentata</i>	Bushmans Grape	Fruits and womens health
<i>Ricinus communis</i>	Castor Oil Plant	Seed oil
<i>Sarcostemma viminalis</i>	Rapunzel Plant	Womens health
<i>Sclerocarya birrea</i>	Marula	Fruits, beverages and utility timber
<i>Sesamum triphyllum</i>	Wild Sesame	Seed oil
<i>Sterculia rogersii</i>	Star Chestnut	Nuts
<i>Syzigium cordatum</i>	Water Berry	Fruits, medicinal uses and dyes
<i>Tagetes minuta</i>	Tall Khakhi Weed	Repellant
<i>Tarconanthus camphoratus</i>	Camphor Bush	Mind and mood plant
<i>Xanthium strumarium</i>	Spiny Cocklebur	Wound healing, tonic plant and fruits
<i>Zea mays</i>	Mielies	Maize



## 5.2 Ecological Sensitivity Assessment

### 5.2.1 Protected Areas

#### Witvinger National Reserve

The Witvinger National Reserve has an IUCN status listed as Category IV Protected Area. This means that management of the area is performed to ensure the maintenance of habitats and meet the requirements of certain species. The Nature reserve supports high levels of biodiversity which is endemic to the area and therefore extremely important to conserve. Ridges link the study area to this reserve. The current mine plan indicates that the boundary of Tailings Storage Facility (TSF) option 3 crosses into this reserve, the mine plans will have to be adapted because this reserve is a No Go area, as far as fauna and flora is concerned.

#### Nylsvlei Nature Reserve

The wetland area on site is part of the Nylsvlei floodplain which is one of South Africa's least impacted floodplain systems. Part of the system is conserved and is recognised as a Provincial Reserve; the Nylsvlei Nature Reserve. The reserve has statutory protection and is also recognised as a Ramsar Site. Ramsar recognition indicates the wetland to be of international importance for waterfowl.

The wetland area forms the western boundary of the proposed Platreef Underground Mine site. A steep ridge area lies on the other side of the wetland; another area of high sensitivity which falls in the Waterberg Wilderness Reserve.

#### Waterberg Wilderness Reserve

The private reserve has national conservation protection status as a result of it supporting high levels of biodiversity. It is not indicated on the map as it does not appear on the SANBI database. This reserve is important for populations of tree species such as Protea, Acacia, Combretum and Searsia that readily occur here. It also includes many protected mammal species such as Leopard (*Panthera pardus*), Serval (*Leptailurus serval*), African Wild cat (*Felis silvestris*), Brown Hyaena (*Parahyaena brunnea*), Aardwolf (*Proteles cristatus*), Honey badger (*Mellivora capensis*) and African Civet (*Civettictis civetta*)

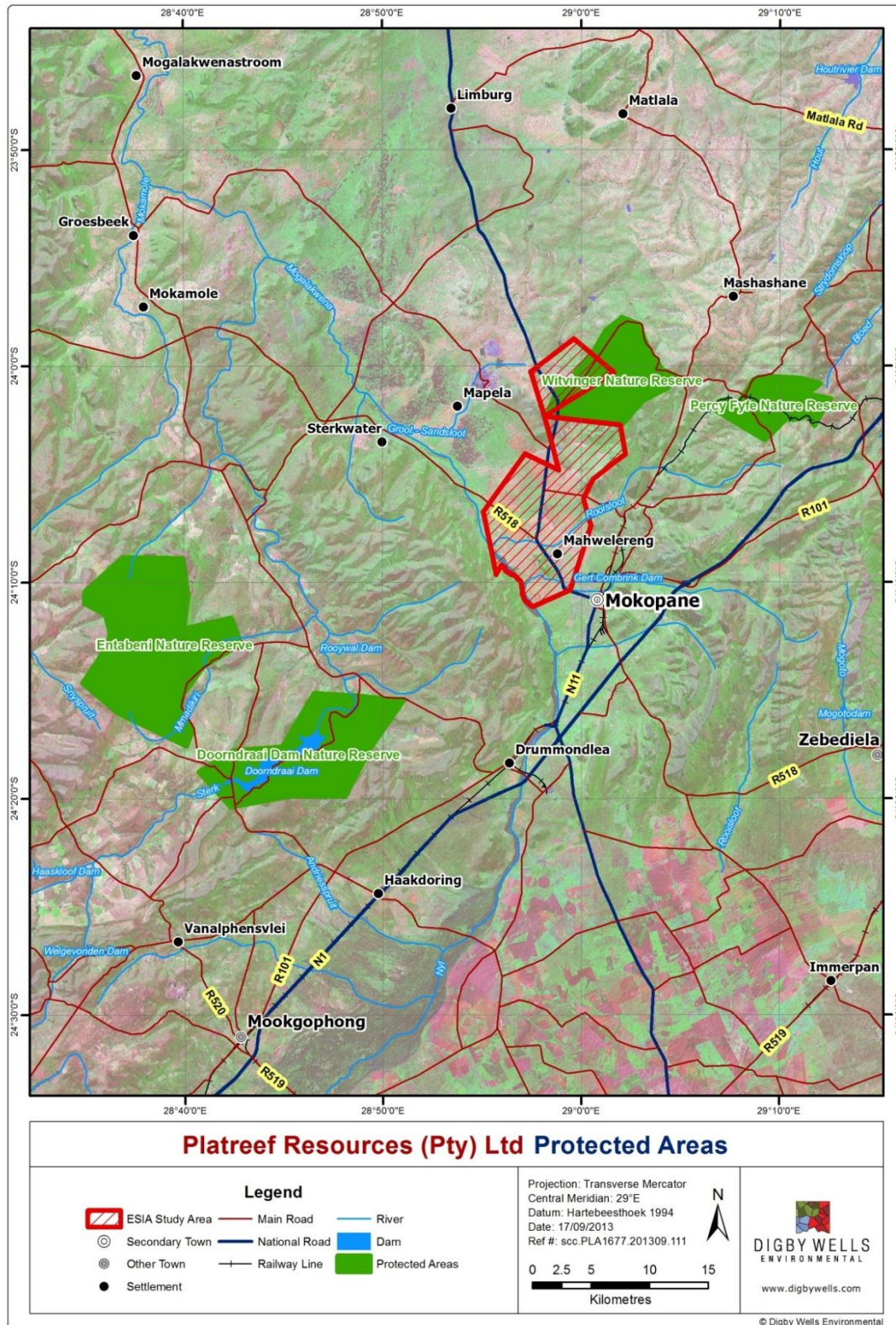


Figure 5-3: Protected Areas in proximity to the Platreef study site

## 5.2.2 Important Bird Areas

The Platreef project area does not fall within any important bird areas; the different categories of IBA's are depicted in Table 5-3.

**Table 5-3 IBA Criteria according to Birdlife International**

	Species Type	Criterion	Notes
A1.	<b>Globally threatened species</b>	The site is known or thought regularly to hold significant numbers of a globally threatened species, or other species of global conservation concern.	The site qualifies if it is known, estimated or thought to hold a population of a species categorised by the IUCN Red List as Critically Endangered, Endangered or Vulnerable. In general, the regular presence of a Critical or Endangered species, irrespective of population size, at a site may be sufficient for a site to qualify as an IBA. For Vulnerable species, the presence of more than threshold numbers at a site is necessary to trigger selection. Thresholds are set regionally, often on a species by species basis. The site may also qualify if holds more than threshold numbers of other species of global conservation concern in the Near Threatened, Data Deficient and, formerly, in the no-longer recognized Conservation Dependent categories. Again, thresholds are set regionally.
A2.	<b>Restricted-range species</b>	The site is known or thought to hold a significant component of a group of species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area (SA).	<b>Notes:</b> This category is for species of EBAs. EBAs are defined as places where two or more species of restricted range, i.e. with world distributions of less than 50,000 km <sup>2</sup> , occur together. More than 70% of such species are also globally threatened. Also included here are species of SAs. An SA supports one or more restricted-range species, but does not qualify as an EBA because less than two species are entirely confined to it. Typical SAs include single restricted-range species which do not overlap in distribution with any other such species, and places where there are widely disjunct records of one or more restricted-range species, which are clearly geographically separate from any of the EBAs.
A3.	<b>Biome-</b>	The site is known or	This category applies to groups of species





	<b>Species Type</b>	<b>Criterion</b>	<b>Notes</b>
	<b>restricted species</b>	thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.	with largely shared distributions of greater than 50,000 km <sup>2</sup> , which occur mostly or wholly within all or part of a particular biome and are, therefore, of global importance. As with EBAs, it is necessary that a network of sites be chosen to protect adequately all species confined to each biome and, as necessary, in each range state in which the biome occurs. The 'significant component' term in the Criterion is intended to avoid selecting sites solely on the presence of one or more biome-restricted species that are common and adaptable within the EBA and, therefore, occur at other chosen sites. Additional sites may, however, be chosen for the presence of one or a few species which would, e.g. for reasons of particular habitat requirements, be otherwise under-represented.
<b>A4.</b>	<b>Congregations</b>	<p>A site may qualify on any one or more of the four criteria listed below). Site known or thought to hold, on a regular basis, <math>\geq 1\%</math> of a biogeographic population of a congregatory waterbird species.</p> <p>ii). Site known or thought to hold, on a regular basis, <math>\geq 1\%</math> of the global population of a congregatory seabird or terrestrial species.</p> <p>iii). Site known or thought to hold, on a regular basis, <math>\geq 20,000</math> waterbirds or <math>\geq 10,000</math> pairs of seabirds of one or more species.</p> <p>iv). Site known or thought to exceed thresholds set for migratory species at</p>	<p>i) This applies to 'waterbird' species as defined by Delaney and Scott (2006) Waterbird Population Estimates, Fourth Edition, Wetlands International, Wageningen, The Netherlands, and is modelled on Criterion 6 of the Ramsar Convention for identifying wetlands of international importance. Depending upon how species are distributed, the 1% thresholds for the biogeographic populations may be taken directly from Delaney &amp; Scott, they may be generated by combining flyway populations within a biogeographic region or, for those for which no quantitative thresholds are given, they are determined regionally or inter-regionally, as appropriate, using the best available information.</p> <p>ii) This includes those seabird species not covered by Delaney and Scott (2002). Quantitative data are taken from a variety of published and unpublished sources.</p> <p>iii) This is modelled on Criterion 5 of the Ramsar Convention for identifying wetlands of international importance.</p> <p>iv) Thresholds are set regionally or inter-regionally, as appropriate.</p>



	<b>Species Type</b>	<b>Criterion</b>	<b>Notes</b>
		bottleneck sites.	

The Platreef project site is within 15 to 20 kilometers from 3 IBA's, these areas are the Waterberg system the Nyl River floodplain and the Wolkberg forest belt. It is not envisaged that the project will have any effect on the above mentioned IBA areas.

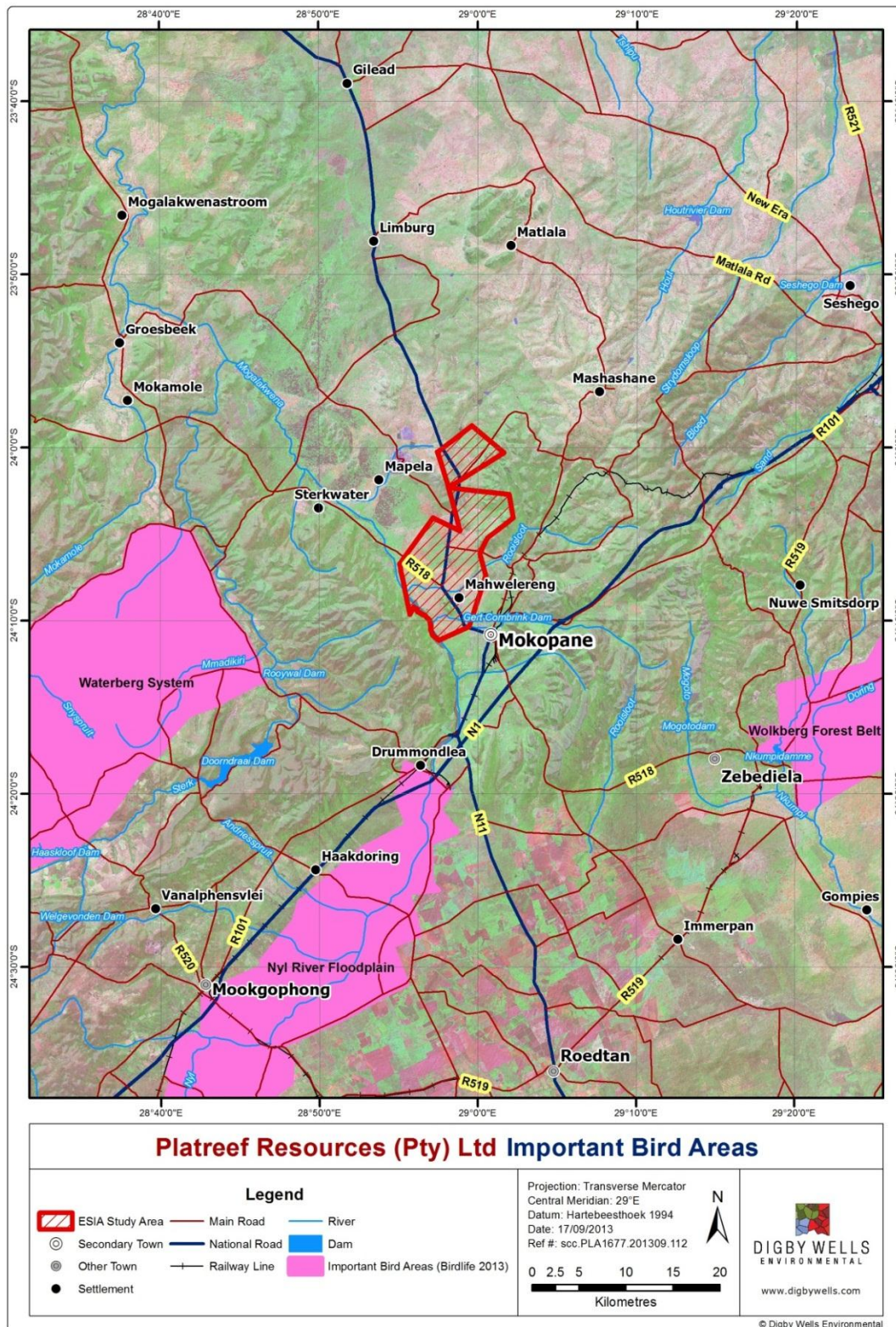


Figure 5-4: The Platreef project area’s proximity to IBA’s.

### 5.2.3 Nationally Threatened Ecosystems

The National threatened ecosystems list (NEMBA) was referenced in order to ascertain the level of ecosystem threat of the ecosystems present within the study area.

The list of national Threatened Ecosystems has been gazetted (NEMBA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion; and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the DWAF;
- Priority areas identified in a provincial systematic biodiversity plan; and
- High irreplaceability forest patches or clusters identified by DWAF.

The study site does not fall within any demarcated National Threatened Ecosystems and is located approximately 20 km north of the Springbokvlakte Thornveld Nationally Threatened Ecosystems (Figure 5-5).



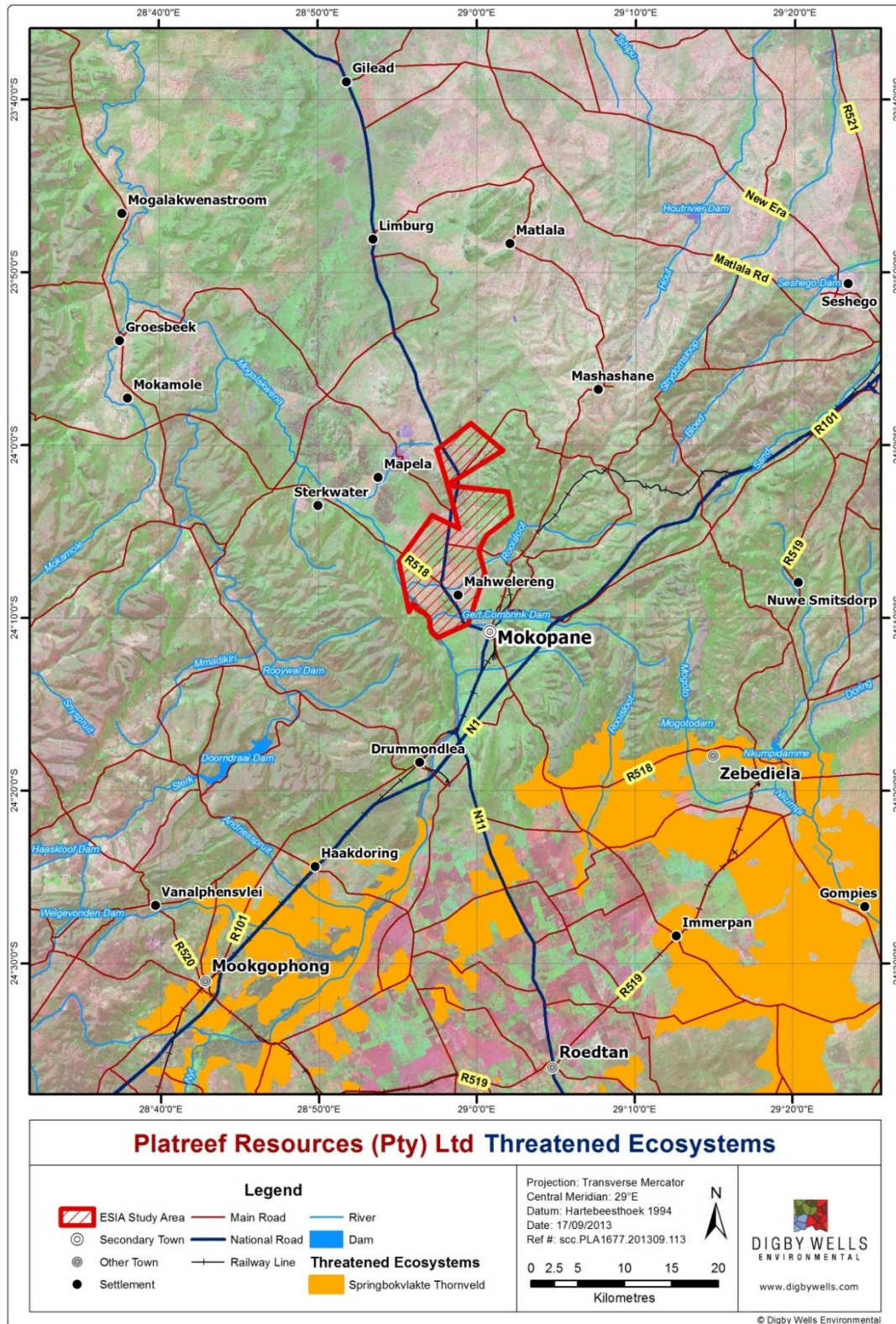


Figure 5-5 Ecosystems in need of protection in relation to the Platreef study area.

#### **5.2.4 National Protected Areas Expansion Strategy (NPAES)**

The NPAES are areas designated for future incorporation into existing protected areas (both National and Informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning. Figure 5-6 indicates the proximity of the Platreef project site to existing expansion focus areas specifically the Limpopo Central Bushveld.



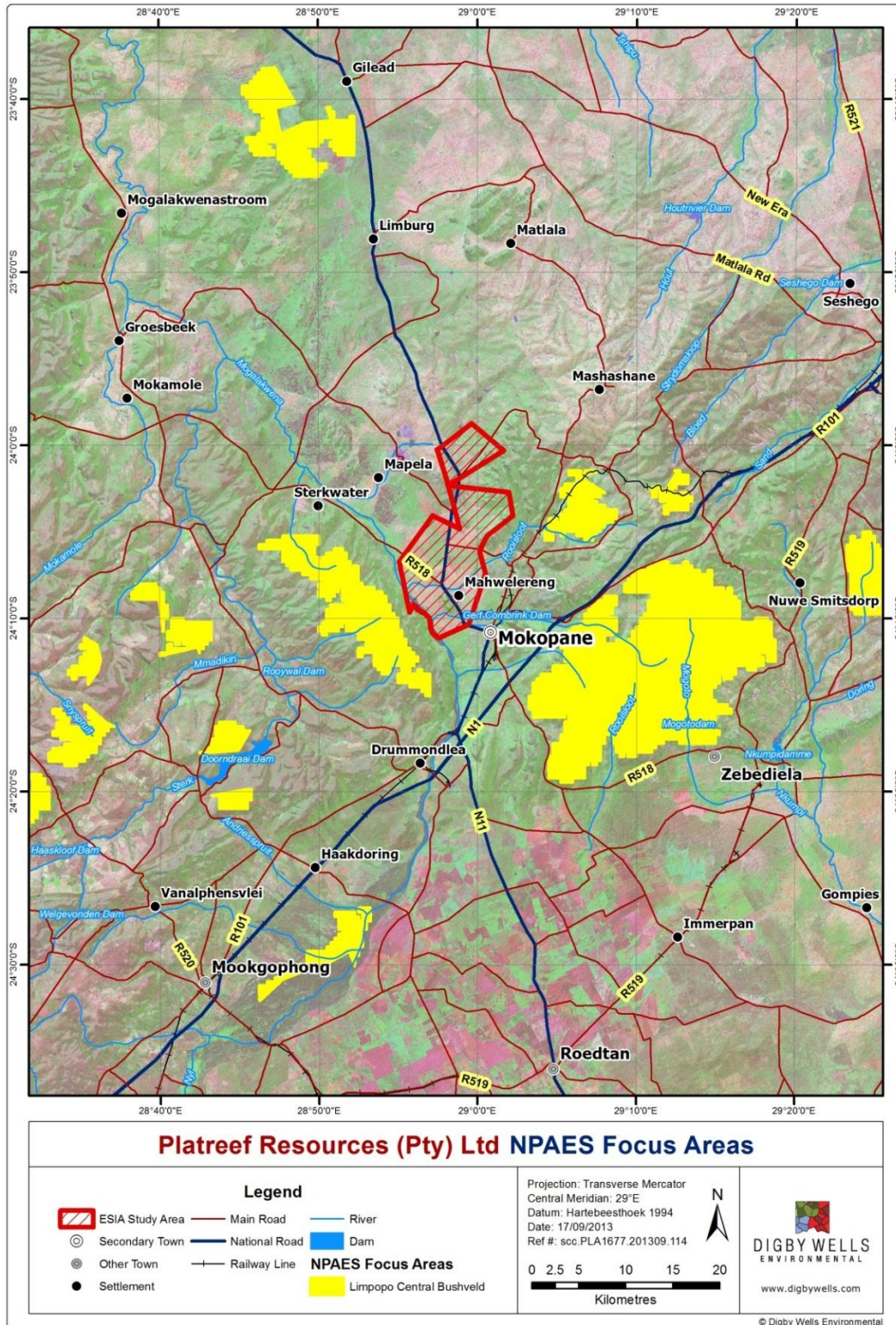


Figure 5-6: National Protected Area Expansion Strategy focus areas proximity to the Platreef study area.

## 5.2.5 Biodiversity Value Assessment

The biodiversity value or sensitivity assessment takes into account all of the plans mentioned above (Threatened Ecosystems and NPAES), as well as the field data gathered during the site visits. The outcome of these assessments is one sensitivity map, incorporating vegetation and flora and fauna. These are presented in Figure 5-7. A Very High Sensitivity was assigned to the Riparian Areas and Ridges owing to the ecosystem services provided by these, as well as their irreplaceability as unique biodiversity features. The mixed bushveld vegetation on site is in good ecological condition and was mostly allocated a Moderately to High Sensitivity. The vegetation occurring on flat lower lying areas was severely overgrazed or cultivated and was in poor condition. These lower lying areas, identified as Secondary Grassland and Agricultural fields, were scored as moderately low sensitivity and contain the majority of the infrastructure planned. The three TSF options, as of the time of this report, are as follows and discussed separately.

TSF Site 1: This area is in a low sensitivity rating from a fauna and flora point of view, but occurs within the buffer zone of the wetlands, and is therefore unsuitable.

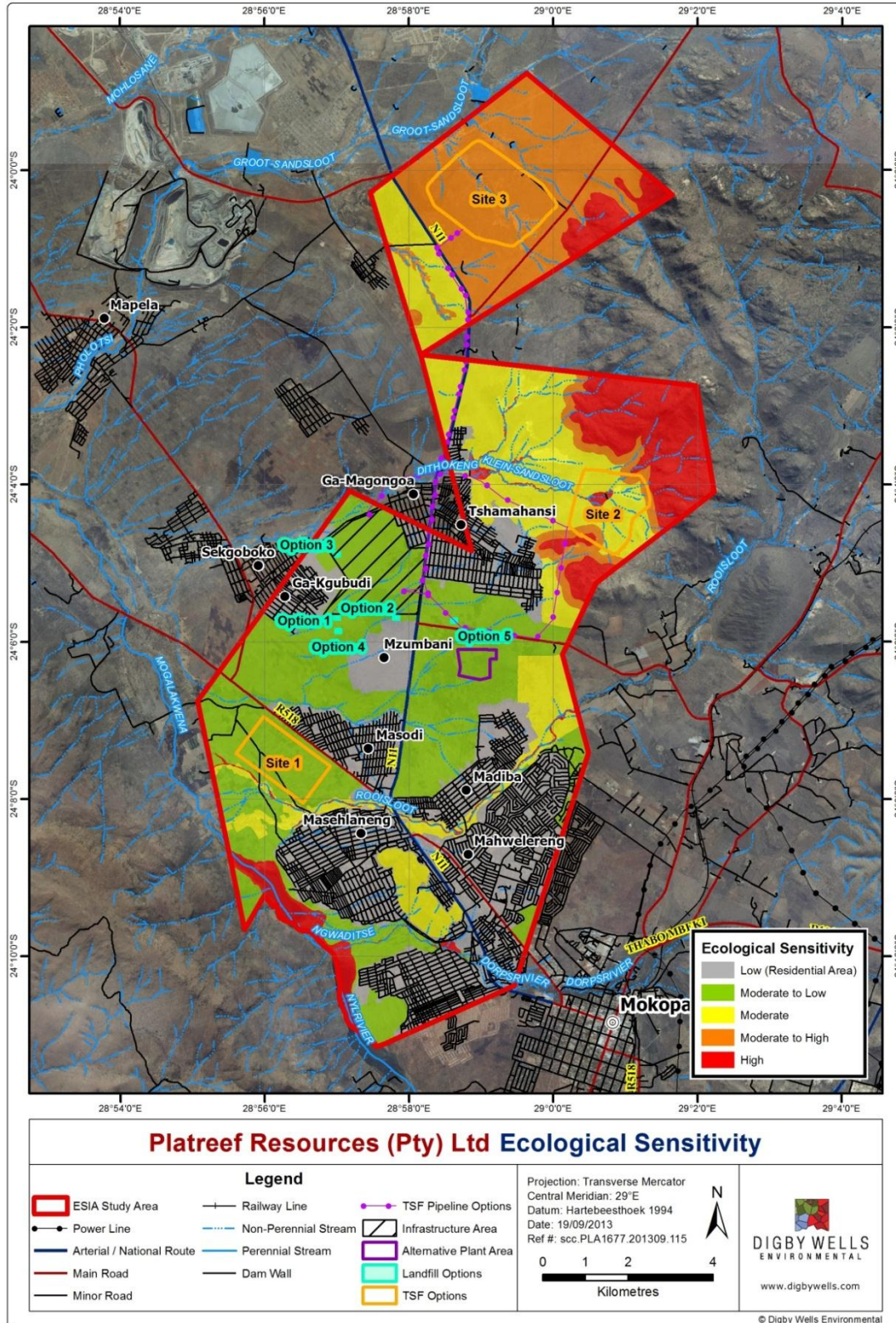
TSF Site 2: This area is situated in the Ridge Bushveld (high), Impacted Ridge bushveld (Moderately High) and the Degraded Mixed Bushveld (Moderate), and is not a viable option from a fauna and flora point of view in its current locality. TSF 2 is predominantly in a moderate Biodiversity Value (BV) (including drainage lines) delineated area, the moderate BV area is described as Degraded Mixed Bushveld vegetation type; this vegetation community was found in between the base of ridges and residential areas/settlements, which was interrupted in certain sections by agricultural/secondary grasslands. If the TSF does not encroach within the moderately-high to high BV areas of the Ridge bushveld boundaries as indicated in the Figure 5-7, then Option 2 becomes the more attractive option, as it will then fall completely within degraded bushveld, with no protected species encountered during field work in this particular area.

TSF Site 3: This area is situated in the Bultongfontein farm, with a small portion in the Witvinger Nature Reserve. The location of this area means that this site is a No-go option due to the sensitivity of the Witvinger Nature Reserve. TSF 3 occurs within a Moderately-High BV area of the Degraded Mixed Bushveld vegetation type, due to the protected species encountered here, namely *Combretum imberbe* (Leadwood), *Boscia albitrunca* (Shepherd's tree) and *Sclerocarya birrea* (Marula), this increases the BV of this site to Moderately-High. This area is sensitive because of the semi-natural landscape that is important for ecosystems functioning and it contains protected plant species, is used for grazing and was found to be overgrazed. It must be stressed that this option encroaches on the Witvinger Nature Reserve and could have a negative effect if TSF dust gets blown on the reserve or spills of any sort occur. Option 3 is least preferred from a F&F point of view.

All moderately low BV areas are altered landscape with little ecosystems functioning, apart from foraging for certain animal species, and therefore the preferred options from a F&F point of view is Plant option 1, and the alternative and all the Landfill sites can be defined as preferred sites for development. Please note that these areas could contain protected tree species, such as Marula's, left by farmers for shade while working their land. In the case of



these species being found, relocation permits and strategies must be adhered to as per Provincial legislation.





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**Figure 5-7: Vegetation sensitivity and planned infrastructure for the Platreef study area.**

## 6 IMPACT ASSESSMENT

### 6.1 Proposed Activities

The following activities apply to the proposed Platreef Underground Mine construction, operation and decommissioning.

**Table 6-1: Proposed Activities for the Different Phases of the Proposed Platreef Underground Mine**

Activity No.	Activity
<b>Construction Phase</b>	
1	Site Clearing: removal of topsoil and vegetation.
2	Construction of any surface infrastructure e.g. access roads, pipes, storm water diversion berms, change houses, admin blocks etc. (including transportation of materials and stockpiling).
3	Drilling, blasting and development of infrastructure and adits for mining.
4	Temporary storage of hazardous products (fuel, explosives), and waste (e.g. sewage).
5	Monitoring: Environmental monitoring of construction activities' potential impacts.
<b>Operational Phase</b>	
6	Use and maintenance of roads and infrastructure.
7	Removal of overburden and ore (underground mining process) and backfilling when possible (including drilling/blasting of hard overburden and stockpiling it).
8	Water use and storage onsite (storm water, Pollution Control Dam, domestic waste water, and abstraction).
9	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste (waste, sewage, PC Dam).
10	Concurrent rehabilitation by replacement of, subsoil, topsoil and re-vegetation as mining progresses.
11	Monitoring: Environmental monitoring of operational activities' potential impact.
<b>Decommissioning Phase</b>	
12	Demolition and Removal of all infrastructure (incl. transportation off site).

Activity No.	Activity
13	Rehabilitation (spreading of soil, re-vegetation and profiling/contouring).
14	Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste (waste, sewage, PC Dam).
15	Monitoring: Environmental monitoring of decommissioning activities' potential impact.
<b>Post – Closure</b>	
16	Post-closure monitoring and rehabilitation.

## 6.2 Issues and Impacts

The following section describes the flora and fauna issues and impacts for;

- Current land use (the no-go option); and
- Proposed Platreef Mining Development

### 6.2.1 Impacts of current land use (the no-go option)

The current land use in the project area is mostly subsistence farming and also cattle farming. The more natural areas have been overgrazed and signs of bush encroachment and erosion (due to vegetation removal) has occurred in the study area. The overstocking that has occurred has resulted in degradation of the vegetation, resulting in a loss of plant abundance (habitat) and diversity.

#### 6.2.1.1 Issue 1: Loss of Plant Communities

The impacts associated with the loss of plant communities are the following:

- Impact 1: Loss of Ridges;
- Impact 2: Loss of Degraded Bushveld; and
- Impact 3: Loss of Riparian Vegetation.

**Table 6-2: Loss of Plant Communities Significance Ratings**

Issue 1	Loss of Plant Communities				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Impact 1	Loss of Ridges				
Pre- Mitigation	Minor Effects	Local (3)	Short-term	Likely (5)	Low (35)

	(2)		(3)		
Post- Mitigation	N/A				
<b>Impact 2</b>	<b>Loss of Degraded Bushveld</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				
<b>Impact 3</b>	<b>Loss of Riparian Vegetation</b>				
Pre- Mitigation	Moderate (3)	Local (3)	Short-term (3)	Likely (5)	Low (40)
Post -Mitigation	N/A				

### 6.2.1.2 Issue 2: Loss of Biodiversity

The impacts associated with the loss of biodiversity are the following:

- Impact 3: Loss General Biodiversity;
- Impact 5: Loss of floral SSC; and
- Impact 6: Loss of faunal SSC.

**Table 6-3: Loss of Biodiversity Significance Ratings**

<b>Issue 2</b>	<b>Loss of Biodiversity</b>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Impact 4</b>	<b>Loss of General Biodiversity</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				
<b>Impact 5</b>	<b>Loss of floral SSC</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				
<b>Impact 6</b>	<b>Loss of faunal SSC</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				

### 6.2.1.3 Issue 3: Loss of Ecosystem Function

The impacts associated with the loss of ecosystem function are the following:

- Impact 7: Fragmentation and Edge Effect; and
- Impact 8: Alien Vegetation Colonisation

**Table 6-4: Loss of Ecosystem Function Significance Ratings**

Issue 3	Loss of Ecosystem Function				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
<b>Impact 7</b>	<b>Fragmentation and edge effect</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				
<b>Impact 8</b>	<b>Colonisation by aliens</b>				
Pre- Mitigation	Minor Effects (2)	Local (3)	Short-term (3)	Likely (5)	Low (35)
Post- Mitigation	N/A				

## 6.2.2 Impacts of Proposed Mining Activities

### Construction Phase

#### 6.2.2.1 Issue 1: Loss of Plant Communities

Construction of the mining infrastructure will lead to the direct loss of the vegetation on site the selected sites (Figure 5-7). There are five different broad vegetation units found on site, which include three main types of habitat (Figure 4-1): Loss of Ridges, Degraded Bushveld and Riparian Vegetation, with Ridges and Riparian areas rated as Highly Sensitive for the majority of the site owing to a lack of major disturbance and a predominantly natural state. Vegetation is considered as a whole, and individual plant species (and SSC) are not taken into account for this impact. Anticipated impacts include:

- Impact 1: Loss of Ridge Bushveld Impacted Ridge Bushveld vegetation High and Moderately high sensitivity);
- Impact 2: Loss of Degraded Mixed Bushveld vegetation type (Moderate sensitivity); and
- Impact 3: Loss of Secondary Grassland and Agricultural fields (Moderately low sensitivity).

### Mitigation and Management



The proposed Platreef Underground Mine Mine Plan indicates that mining infrastructure is concentrated in a single area (rather than being spread out), with the exception of the TSF options, occupying a little footprint area and coincides with areas of low sensitivity, such as the Secondary Grassland and Agricultural fields (according to Figure 5-7). Provided that the Mine Plan does not change, the areas of Very High Sensitivity (wetlands and riparian edges) will be avoided, with the exception of the Ridge Bushveld that will be impacted on by the TSF Site 2. All Highly Sensitive Areas should be avoided and these include all Ridge Bushveld, Impacted Ridge Bushveld and Wetland and Dam habitat on site.

Areas that are not directly affected by mining activities should be conserved. This entails restricting access, and controlling any alien invasives as well as keeping site clearing to a minimum. Rehabilitation of small areas disturbed during construction, and not needed for operation, should occur concurrently to mining activities. A nursery is recommended which will serve to propagate indigenous species in order that they can restore disturbed areas, immediately after activity has ceased.

**Table 6-5: Loss of Plant Communities Post-mitigation Significance Ratings**

<b>Issue 1</b>	<b>Loss of Plant Communities</b>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Impact 1</b>	<b>Loss of Ridge Bushveld Impacted Ridge Bushveld vegetation</b>				
Pre- Mitigation	Significant (6)	Local (3)	Permanent (5)	Almost certain (6)	Medium-High (84)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (5)	Likely (6)	Medium-Low (66)
<b>Impact 2</b>	<b>Loss of Degraded Mixed Bushveld</b>				
Pre- Mitigation	Serious (5)	Local (3)	Permanent (6)	Improbable (6)	Medium – High (84)
Post- Mitigation	Minor Effects (2)	Local (3)	Permanent (6)	Unlikely (3)	Low (33)
<b>Impact 3</b>	<b>Loss of Secondary Grassland and Agricultural fields</b>				
Pre- Mitigation	Moderate(3)	Local (3)	Permanent (6)	Improbable (4)	Medium – Low (48)
Post- Mitigation	Minor Effects (2)	Local (3)	Permanent (6)	Improbable (2)	Low (6)

**6.2.2.2 Issue 2: Loss of Biodiversity**

The construction of the mining infrastructure will result in the loss of certain biodiversity aspects. General biodiversity will be affected (this includes individual species associated

with vegetation). The areas rated as having Very High and High Sensitivity are in a good ecological condition. For these reasons, destruction of these habitats which occupy the small areas of the site, are regarded as severely detrimental to biodiversity in the area. SSC (both flora and fauna) will be destroyed where the Site 2 of the TSF is proposed to take place, and thus are assessed separately. The field investigations thus far indicate the presence of approximately four plant SSC (Nationally Protected Trees), and a few faunal species of special concern (primarily amphibians and birds). In addition, at least nine medicinal plant species are confirmed for the site. Anticipated impacts include:

- Impact 4: Loss general biodiversity;
- Impact 5: Loss of floral SSC, and
- Impact 6: Loss of faunal SSC.

**Mitigation and Management**

Provided that the Mine Plan does not change, the areas of Very High Sensitivity (wetlands and riparian edges) will be avoided, with the exception of the Ridge Bushveld that will be impacted on by the TSF Site 2. All SSC, as well as the immediate habitat surrounding them, should be preserved and mining should be restricted to areas outside of their immediate habitat. In the case where this is not possible, and all efforts to avoid these areas have been exhausted, permits may be applied for from the provincial authorities to translocate these species. It is imperative however, that the habitat in which these species are translocated to is as similar to the donor habitat as possible and is also within close proximity to the site. It must be noted, regardless of the potential relocation of SSC, if the original natural habitat in which these species occur is destroyed, the negative impact still exists.

**Table 6-6: Loss of Biodiversity Post-mitigation Significance Ratings**

<b>Issue 2</b>	<b>Loss of Biodiversity</b>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Impact 4</b>	<b>Loss of general biodiversity</b>				
<b>Construction Phase</b>					
Pre- Mitigation	Very Serious (5)	Local (3)	Permanent (5)	Certain (7)	Medium-High (77)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (5)	Certain (7)	Medium-High (70)
<b>Operational Phase</b>					
Pre- Mitigation	Very Serious (4)	Local (3)	Permanent (5)	Almost Certain (6)	Medium-High (70)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (5)	Almost Certain (6)	Medium-Low (66)
<b>Impact 5</b>	<b>Loss of floral SSC</b>				
<b>Construction Phase</b>					

Pre- Mitigation	Significant Impact (6)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-High (90)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-Low (66)
<b>Operational Phase</b>					
Pre- Mitigation	Moderate (3)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-High (90)
Post- Mitigation	Minor (2)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-Low (66)
<b>Impact 6</b>	<b>Loss of faunal SSC</b>				
<b>Construction Phase</b>					
Pre- Mitigation	Significant Impact (6)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-High (90)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-Low (66)
<b>Operational Phase</b>					
Pre- Mitigation	Significant Impact (6)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-High (90)
Post- Mitigation	Moderate (3)	Local (3)	Permanent (6)	Highly Probable (6)	Medium-Low (66)

### 6.2.2.3 Issue 3: Loss of Ecosystem Function

Ecosystem function is the measure of the combined functioning of the vegetation and associated species, faunal habitats and wetlands, all of which result in the ecosystem health. The construction of the mining infrastructure will affect the ecosystem function in two main ways. The first is the fragmentation of the ecosystem, which will occur with large land surface changes. Fragmentation occurs conjointly with edge-effects, which change the composition of the ecosystem on the edge of structures such as buildings and roads. The consequence of this is a loss of cohesiveness between larger fragments of habitat which limits the exchange of genes and resources across them.

An additional contributor to loss of ecosystem function is the introduction of alien and invasive species. Disturbance to the soil after vegetation clearing results in the establishment of alien species, that may form dense monospecific stands. Anticipated impacts include:

- Impact 7: Fragmentation and edge effect, and;
- Impact 8: Alien vegetation colonisation.

#### **Mitigation and Management**

It is highly recommended that areas of contiguous natural bushveld be managed on site and in adjacent sites where mining is proposed, as part of a Biodiversity Action Management Plan.

Cleared areas should be monitored for colonisation by alien species and a proactive approach should be undertaken to control alien species as soon as they are established. Monitoring and eradication of alien species is part of the mine’s responsibility and failure to do so in the early stages will result in greater investments of resources to remove them at a later stage.

Provided the decommissioning phase includes the dismantling of the entire infrastructure there will be a comparative gain in biodiversity (from the operational phase). This will in turn create faunal habitat with the potential to increase fauna diversity. There will still be an overall loss of biodiversity however.

**Table 6-7: Loss of Ecosystem Function Post-mitigation Significance Ratings**

<b>Issue 3</b>	<b>Loss of Ecosystem Function</b>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Impact 7</b>	<b>Fragmentation and edge effects</b>				
<b>Construction Phase</b>					
Pre-Mitigation	Very Serious (5)	National (6)	Medium (3)	Probable (4)	Medium- Low (60)
Post- Mitigation	Moderate (3)	National (6)	Medium (3)	Probable (4)	Medium-Low (44)
<b>Operational Phase</b>					
Pre-Mitigation	Serious (4)	National (6)	Medium (3)	Probable (4)	Medium- Low (48)
Post- Mitigation	Moderate (3)	National (6)	Medium (3)	Probable (4)	Medium-Low (44)
<b>Decommissioning Phase</b>					
Pre- Mitigation	Moderate (3)	National (6)	Medium (3)	Probable (4)	Medium-Low (44)
Post-Mitigation	Minor (2)	National (6)	Medium (3)	Probable (4)	Medium-Low (40)
<b>Impact 8</b>	<b>Influx of alien invasives</b>				

<b>Construction Phase</b>					
Pre-Mitigation	Serious (4)	National (6)	Permanent (6)	Likely (5)	Medium- High (75)
Post- Mitigation	Moderate (3)	Local (3)	Medium-term (3)	Probable (4)	Medium-Low (36)
<b>Operational Phase</b>					
Pre-Mitigation	Very Serious (5)	National (6)	Permanent (6)	Likely (5)	Medium- High (90)
Post- Mitigation	Minor (2)	Local (3)	Medium-term (3)	Probable (4)	Low (28)
<b>Decommissioning Phase</b>					
Pre-Mitigation	Moderate (3)	Local (3)	Permanent (6)	Likely (5)	Medium- High (75)
Post- Mitigation	Moderate (3)	Limited (2)	Short-term (2)	Probable (4)	Low (28)

### 6.3 Ecosystem services adapted from (Haines-Young and Potschin 2009).

According to the Millennium Ecosystems Assessment definition, both natural and human-modified ecosystems are defined as sources of ecosystem services, and using the term “services” to encompass both the tangible and the intangible benefits humans obtain from ecosystems, which are sometimes separated into “goods” and “services” respectively. It is common practice in economics both to refer to goods and services separately and to include the two concepts under the term services.

Furthermore, when one refers to “ecosystem goods and services,” cultural values and other intangible benefits are sometimes not included. Ecosystem services have been categorised in a number of different ways, including by:

- Functional groupings, such as regulation, carrier, habitat, production, and information services (Lobo 2001; de Groot *et al.* 2002);
- Organisational groupings, such as services that are associated with certain species, that regulate some exogenous input, or that are related to the organisation of biotic entities (Norberg 1999); and



- Descriptive groupings, such as renewable resource goods, nonrenewable resource goods, physical structure services, biotic services, biogeochemical services, information services, and social and cultural services (Moberg and Folke 1999).

For this report's purposes, classification of ecosystem services will be completed along functional lines, using categories of provisioning, regulating, cultural, and supporting services.

### 6.3.1 Provisioning Services

The provisional services products obtained from ecosystems are displayed in Table 6-8. The approximation of the percentage that the Project will remove these services is rated by means of a percentage in the table below. These percentages indicate the negative effect of the mine.

**Table 6-8: Provisioning services**

Product	Description	Present at Platreef
<i>Food and fiber</i> 15%	This includes the vast range of food products derived from plants, animals, and microbes, as well as materials such as wood, hemp, and many other products derived from ecosystems	Certain plant species are used for food and fiber specifically the larger trees, as indicated in the ethnobotanical assessment.
<i>Fuel</i> 15%	Wood, dung, and other biological materials serve as sources of energy.	Yes
<i>Biochemicals, natural medicines</i> 10%	Many medicines, biocides, food additives such as alginates, and biological materials are derived from ecosystems.	Yes, certain plant species are used for for this, as indicated in the ethnobotanical assessment.
<i>Ornamental resources</i> 15%	Animal products, such as skins and shells, and flowers are used as ornaments, although the value of these resources is often culturally determined. This is an example of linkages between the categories of ecosystem services.	Yes, as indicated in the ethnobotanical assessment.
<i>Ornamental resources: Fresh Water</i> 10%	Fresh water is another example of linkages between categories— in this case, between provisioning and regulating services	Yes, the dam to the west of the project site does provide this service.

### 6.3.2 Regulating Services

The benefits obtained from the regulation of ecosystem processes are displayed in Table 6-9.

**Table 6-9: Regulating Services**

<b>Product</b>	<b>Description</b>	<b>Present at Platreef</b>
<i>Air quality maintenance</i> 15%	Ecosystems both contribute chemicals to and extract chemicals from the atmosphere, influencing many aspects of air quality	Yes
<i>Climate regulation</i> 1%	Ecosystems influence climate both locally and globally. At a local scale, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases.	Yes
<i>Water regulation</i> 5%	The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of woodlands with croplands or croplands with urban areas.	Yes
<i>Erosion control</i> 10%	Animal products, such as skins and shells, and flowers are used as ornaments, although the value of these resources is often culturally determined. This is an example of linkages between the categories of ecosystem services.	Yes, but large areas have been overgrazed and this service is lacking in these areas.
<i>Water purification and waste treatment</i> 10%	Ecosystems can be a source of impurities in fresh water but also can help to filter out and decompose organic wastes introduced into rivers, dams and streams.	Yes, but the area is suffering from rubble.

<b>Product</b>	<b>Description</b>	<b>Present at Platreef</b>
<i>Regulation of human diseases</i> 5%	Changes in ecosystems can directly change the abundance of human pathogens, such as cholera, and can alter the abundance of disease vectors, such as mosquitoes	Yes, to an extent.
<i>Biological control</i> 5%	Ecosystem changes affect the prevalence of crop and livestock pests and diseases	Yes
<i>Pollination</i> 15%	Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators	Yes

### 6.3.3 Cultural Services

These are the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences, these are displayed in Table 6-10.

**Table 6-10: Cultural Services**

<b>Product</b>	<b>Description</b>	<b>Present at Platreef</b>
<i>Cultural diversity</i> 5%	The diversity of ecosystems is one factor influencing the diversity of cultures	Yes
<i>Spiritual and religious values</i> 10%	Many religions attach spiritual and religious values to ecosystems or their components.	Yes
<i>Knowledge systems (traditional and formal).</i> 15%	Ecosystems influence the types of knowledge systems developed by different cultures.	Yes

<b>Product</b>	<b>Description</b>	<b>Present at Platreef</b>
<i>Educational values</i> 1%	Ecosystems and their components and processes provide the basis for both formal and informal education in many societies.	Yes, to a lesser extent as westernized schooling is dominant.
<i>Inspiration</i> 1%	Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising	Yes
<i>Aesthetic values</i> 24%	Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, “scenic drives,” and the selection of housing locations.	Yes
<i>Social relations</i> 5%	Ecosystems influence the types of social relations that are established in particular cultures. Fishing and agrarian societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies	Yes
<i>Sense of place</i> 25%	Many people value the “sense of place” that is associated with recognized features of their environment, including aspects of the ecosystem.	Yes
<i>Cultural heritage values</i> 35%	Many societies place high value on the maintenance of either historically important landscapes (“cultural landscapes”) or culturally significant species	Yes
<i>Recreation and ecotourism.</i> 10%	People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular	Yes to an extent.

Product	Description	Present at Platreef
	area	

Cultural services are tightly bound to human values and behavior, as well as to human institutions and patterns of social, economic, and political organisation. Thus, perceptions of cultural services are more likely to differ among individuals and communities than perceptions of the importance of food production.

### 6.3.4 Supporting Services

Supporting services are those that are necessary for the production of all other ecosystem services. They differ from provisioning, regulating, and cultural services in that their impacts on people are either indirect or occur over a very long time, whereas changes in the other categories have relatively direct and short-term impacts on people. (Some services, like erosion control, can be categorised as both a supporting and a regulating service, depending on the time scale of their impact on people. Similarly, climate regulation is categorised as a regulating service since ecosystem changes can have an impact on local or global climate over time scales relevant to human decision-making (decades or centuries), whereas the production of oxygen gas (through photosynthesis) is categorised as a supporting service since any impacts on the concentration of oxygen in the atmosphere would only occur over an extremely long time. Some other examples of supporting services are primary production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat. (Haines-Young and Potschin 2009).

## 6.4 Cumulative Impacts

It is necessary to consider the impacts that the development will have from a broad area perspective by considering land-use and transformation of natural habitat in areas surrounding the site. Cumulative impacts are assessed by considering past, present and anticipated changes to biodiversity.

Albeit the vegetation types present are assigned a Least Concern status apart from Makhado Sweet Bushveld (Vulnerable), large portions of these vegetation types are under threat due to expanding anthropogenic activities. The cumulative loss of this vegetation type as well as the SSC found within it should be considered proactively.

The impacts on the ecology of the area will be significant, if highly sensitive areas are disturbed. It is expected that there will be losses of vegetation and flora along with associated faunal habitat. The primary impacts will be fragmentation and edge effects with a reduction in the movement of remaining naturally occurring, and isolation of pockets, of



vegetation. Secondary cumulative impacts will include increased accessibility to the site and the resulting increase in development and resource dependence. Ideally, a strategic environmental plan for the area should be developed and adhered to. This should include the conservation of important areas as well as the provision of corridors for faunal movement.

## 7 CONCLUSIONS

The Platreef site offers a high Biodiversity Value owing to the presence of intact Ridges, bushveld habitat as well as Riparian areas. Loss of these components will result in significant loss of biodiversity for the area. The delineations of sensitive areas include the Witvinger Nature reserve which is a no-go option and cannot be considered for any infrastructure placement. Furthermore the delineation of sensitive landscapes such as ridges also form areas where infrastructure placement must be avoided. The protected tree species encountered on site must also be managed according to relevant legislation.

## 8 RECOMMENDATIONS

As illustrated in this report the study area consists of different levels of sensitivity from a biodiversity standpoint. These areas have been delineated and described. It is therefore important that the placement of the mining infrastructure is done with these sensitive areas in mind. The placement of particularly the Bultongfontein TSF option 3 must be re-considered as this area contains protected tree species and is in close proximity to the Witvinger Nature Reserve. This Nature Reserve is of importance for both faunal and floral populations and cannot be considered an option. The Rietfontein TSF site covers moderate, moderate-high and high sensitivity areas, and should also not be considered for final placement in its current layout. If the layout of Rietfontein TSF takes cognisance of the sensitivity delineated for the vegetation types and is moved to completely avoid these high biodiversity areas, it will be the preferred option for the TSF placement. The opportunity exists however, for the proposed Platreef Underground Mine to contribute significantly to conservation of biodiversity within the region. Conservation of as much of the natural land in the area within the site as possible, and the creation of corridors linking other natural areas would aid in conservation of ecosystems, flora and fauna. If efforts are made to initiate conservation of this habitat, and conservation is maintained after the decommissioning of the mine, the net impacts on biodiversity will be positive.

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## Appendix A: PRECIS data for the 2429AA and 2428BB

Family	Species	Family	Species
ACANTHACEAE	<i>Barleria mackenii</i>	FABACEAE	<i>Argyrolobium wilmsii</i>
ACANTHACEAE	<i>Blepharis breyeri</i>	FABACEAE	<i>Astragalus atropilosulus subsp. Burkeanus</i>
ACANTHACEAE	<i>Blepharis diversispina</i>	FABACEAE	<i>Bauhinia petersiana subsp. Macrantha</i>
ACANTHACEAE	<i>Justicia flava</i>	FABACEAE	<i>Burkea africana</i>
ACANTHACEAE	<i>Monechma divaricatum</i>	FABACEAE	<i>Calpurnia aurea</i>
ACANTHACEAE	<i>Petalidium oblongifolium</i>	FABACEAE	<i>Chamaecrista biensis</i>
ACANTHACEAE	<i>Ruellia patula</i>	FABACEAE	<i>Chamaecrista stricta</i>
ACANTHACEAE	<i>Thunbergia neglecta</i>	FABACEAE	<i>Crotalaria brachycarpa</i>
AIZOACEAE	<i>Zaleya pentandra</i>	FABACEAE	<i>Crotalaria burkeana</i>
AMARYLLIDACEAE	<i>Crinum lugardiae</i>	FABACEAE	<i>Crotalaria damarensis</i>
ANACARDIACEAE	<i>Ozoroa albicans</i>	FABACEAE	<i>Crotalaria doidgeae</i>
ANACARDIACEAE	<i>Ozoroa paniculosa</i>	FABACEAE	<i>Crotalaria laburnifolia subsp. Australis</i>
ANACARDIACEAE	<i>Searsia discolor</i>	FABACEAE	<i>Crotalaria lotoides</i>
ANNONACEAE	<i>Hexalobus monopetalus</i>	FABACEAE	<i>Crotalaria recta</i>
APOCYNACEAE	<i>Huernia zebrina subsp. magniflora</i>	FABACEAE	<i>Decorsea galpinii</i>
ASPLENIACEAE	<i>Asplenium aethiopicum</i>	FABACEAE	<i>Dichilus lebeckioides</i>
ASPLENIACEAE	<i>Asplenium cordatum</i>	FABACEAE	<i>Dichrostachys cinerea subsp. africana</i>
ASTERACEAE	<i>Brachylaena huillensis</i>	FABACEAE	<i>Dichrostachys cinerea subsp. Africana</i>
ASTERACEAE	<i>Brachylaena ilicifolia</i>	FABACEAE	<i>Dolichos trilobus subsp. transvaalicus</i>
ASTERACEAE	<i>Brachylaena rotundata</i>	FABACEAE	<i>Elephantorrhiza burkei</i>
ASTERACEAE	<i>Denekia capensis</i>	FABACEAE	<i>Elephantorrhiza elephantina</i>
ASTERACEAE	<i>Felicia mossamedensis</i>	FABACEAE	<i>Elephantorrhiza goetzei</i>
ASTERACEAE	<i>Hirpicium bechuanense</i>	FABACEAE	<i>Eriosema burkei</i>
ASTERACEAE	<i>Pentzia calcarea</i>	FABACEAE	<i>Eriosema nutans</i>



ASTERACEAE	<i>Sphaeranthus peduncularis</i>	FABACEAE	<i>Eriosema psoraleoides</i>
BUDDLEJACEAE	<i>Nuxia gracilis</i>	FABACEAE	<i>Erythrina lysistemon</i>
BURSERACEAE	<i>Commiphora pyracanthoides</i>	FABACEAE	<i>Faidherbia albida</i>
CAPPARACEAE	<i>Cleome hirta</i>	FABACEAE	<i>Indigostrum costatum subsp. macrum</i>
CELASTRACEAE	<i>Maytenus undata</i>	FABACEAE	<i>Indigostrum parviflorum</i>
COLCHICACEAE	<i>Ornithoglossum vulgare</i>	FABACEAE	<i>Indigofera arrecta</i>
COMBRETACEAE	<i>Combretum apiculatum</i>	FABACEAE	<i>Indigofera circinnata</i>
COMBRETACEAE	<i>Combretum imberbe</i>	FABACEAE	<i>Indigofera comosa</i>
COMBRETACEAE	<i>Combretum molle</i>	FABACEAE	<i>Indigofera confusa</i>
COMBRETACEAE	<i>Combretum zeyheri</i>	FABACEAE	<i>Indigofera daleoides</i>
COMBRETACEAE	<i>Terminalia prunioides</i>	FABACEAE	<i>Indigofera enormis</i>
COMBRETACEAE	<i>Terminalia sericea</i>	FABACEAE	<i>Indigofera filipes</i>
COMMELINACEAE	<i>Commelina africana var. krebsiana</i>	FABACEAE	<i>Indigofera heterotricha</i>
CONVOLVULACEAE	<i>Ipomoea bolusiana</i>	FABACEAE	<i>Indigofera hilaris</i>
CONVOLVULACEAE	<i>Ipomoea sinensis subsp. blepharosepala</i>	FABACEAE	<i>Indigofera melanadenia</i>
CONVOLVULACEAE	<i>Xenostegia tridentata subsp. angustifolia</i>	FABACEAE	<i>Indigofera nebrowniana</i>
CUCURBITACEAE	<i>Coccinia sessilifolia</i>	FABACEAE	<i>Indigofera reducta</i>
CUCURBITACEAE	<i>Momordica balsamina</i>	FABACEAE	<i>Indigofera sanguinea</i>
CUCURBITACEAE	<i>Momordica repens</i>	FABACEAE	<i>Lablab purpureus subsp. uncinatus</i>
CYPERACEAE	<i>Courtoisina cyperoides</i>	FABACEAE	<i>Lotononis bainesii</i>
CYPERACEAE	<i>Cyperus rupestris</i>	FABACEAE	<i>Lotononis laxa</i>
CYPERACEAE	<i>Kyllinga alba</i>	FABACEAE	<i>Lotononis listii</i>
CYPERACEAE	<i>Lipocarpha nana</i>	FABACEAE	<i>Lotononis wilmsii</i>
EBENACEAE	<i>Euclea linearis</i>	FABACEAE	* <i>Medicago sativa</i>
EBENACEAE	<i>Euclea natalensis subsp. angustifolia</i>	FABACEAE	<i>Mundulea sericea</i>
EBENACEAE	<i>Euclea undulata</i>	FABACEAE	<i>Neonotonia wightii</i>
ELATINACEAE	<i>Bergia salaria</i>	FABACEAE	<i>Neorautanenia ficifolia</i>
EQUISETACEAE	<i>Equisetum ramosissimum</i>	FABACEAE	<i>Ormocarpum trichocarpum</i>
EUPHORBIACEAE	<i>Euphorbia guerichiana</i>	FABACEAE	<i>Otholobium polystictum</i>

EUPHORBIACEAE	<i>Euphorbia schinzii</i>	FABACEAE	<i>Otoptera burchellii</i>
EUPHORBIACEAE	<i>Jatropha zeyheri</i>	FABACEAE	<i>Pearsonia cajanifolia</i> subsp. <i>cajanifolia</i>
EUPHORBIACEAE	<i>Monadenium lugardiae</i>	FABACEAE	<i>Pearsonia cajanifolia</i> subsp. <i>cryptantha</i>
EUPHORBIACEAE	<i>Tragia dioica</i>	FABACEAE	<i>Pearsonia sessilifolia</i> subsp. <i>marginata</i>
FABACEAE	<i>Acacia caffra</i>	FABACEAE	<i>Peltophorum africanum</i>
FABACEAE	<i>Acacia erioloba</i>	FABACEAE	<i>Pterocarpus rotundifolius</i>
FABACEAE	<i>Acacia grandicornuta</i>	FABACEAE	<i>Pterolobium stellatum</i>
FABACEAE	<i>Acacia nigrescens</i>	FABACEAE	<i>Ptychlobium contortum</i>
FABACEAE	<i>Acacia nilotica</i> subsp. <i>Kraussiana</i>	FABACEAE	<i>Rhynchosia adenodes</i>
FABACEAE	<i>Acacia tortilis</i> subsp. <i>heteracantha</i>	FABACEAE	<i>Rhynchosia confusa</i>
FABACEAE	<i>Albizia tanganyicensis</i>	FABACEAE	<i>Rhynchosia crassifolia</i>
FABACEAE	<i>Bauhinia petersiana</i> subsp. <i>Macrantha</i>	FABACEAE	<i>Rhynchosia densiflora</i> subsp. <i>chrysadenia</i>
FABACEAE	<i>Burkea africana</i>	FABACEAE	<i>Rhynchosia galpinii</i>
FABACEAE	<i>Dichrostachys cinerea</i> subsp. <i>africana</i>	FABACEAE	<i>Rhynchosia komatiensis</i>
FABACEAE	<i>Faidherbia albida</i> (	FABACEAE	<i>Rhynchosia minima</i> var. <i>minima</i>
FABACEAE	<i>Indigofera bainesii</i>	FABACEAE	<i>Rhynchosia minima</i> var. <i>prostrata</i>
FABACEAE	<i>Indigofera enormis</i>	FABACEAE	<i>Rhynchosia monophylla</i>
FABACEAE	<i>Indigofera flavicans</i>	FABACEAE	<i>Rhynchosia sordida</i>
FABACEAE	<i>Indigofera heterotricha</i>	FABACEAE	<i>Rhynchosia spectabilis</i>
FABACEAE	<i>Indigofera trita</i> subsp. <i>subulata</i>	FABACEAE	<i>Rhynchosia totta</i>
FABACEAE	<i>Lotononis wilmsii</i>	FABACEAE	<i>Schotia brachypetala</i>
FABACEAE	<i>Ormocarpum trichocarpum</i>	FABACEAE	<i>Senna italica</i> subsp. <i>Arachoides</i>
FABACEAE	<i>Otoptera burchellii</i>	FABACEAE	<i>Sphenostylis angustifolia</i>
FABACEAE	<i>Rhynchosia densiflora</i> subsp. <i>Chrysadenia</i>	FABACEAE	<i>Stylosanthes fruticosa</i>
FABACEAE	<i>Schotia brachypetala</i>	FABACEAE	<i>Tephrosia acaciifolia</i>
FABACEAE	<i>Tephrosia burchellii</i>	FABACEAE	<i>Tephrosia capensis</i>
FABACEAE	<i>Tephrosia longipes</i>	FABACEAE	<i>Tephrosia longipes</i>
FABACEAE	<i>Tylosema fassoglense</i>	FABACEAE	<i>Tephrosia multijuga</i>
GERANIACEAE	<i>Monsonia glauca</i>	FABACEAE	<i>Tephrosia polystachya</i> var. <i>hirta</i>

HYPOXIDACEAE	<i>Hypoxis hemerocallidea</i>	FABACEAE	<i>Tephrosia polystachya</i> var. <i>polystachya</i>
ICACINACEAE	<i>Apodytes dimidiata</i>	FABACEAE	<i>Tephrosia radicans</i>
IRIDACEAE	<i>Gladiolus dolomiticus</i>	FABACEAE	<i>Tephrosia rhodesica</i>
JUNCACEAE	<i>Juncus rigidus</i>	FABACEAE	<i>Tephrosia villosa</i> subsp. <i>ehrenbergiana</i>
KIRKIACEAE	<i>Kirkia wilmsii</i>	FABACEAE	<i>Tylosema fassoglense</i>
LAMIACEAE	<i>Clerodendrum glabrum</i>	FABACEAE	<i>Vigna vexillata</i>
LAMIACEAE	<i>Clerodendrum ternatum</i>	FABACEAE	<i>Zornia capensis</i>
LAMIACEAE	<i>Orthosiphon suffrutescens</i>	FABACEAE	<i>Zornia glochidiata</i>
LAMIACEAE	<i>Vitex rehmannii</i>	FABACEAE	<i>Zornia linearis</i>
LORANTHACEAE	<i>Erianthemum ngamicum</i>	FABACEAE	<i>Zornia milneana</i>
LYTHRACEAE	<i>Nesaea dinteri</i> subsp. <i>elata</i>	FLACOURTIACEAE	<i>Flacourtia indica</i>
MAESACEAE	<i>Maesa lanceolata</i>	GENTIANACEAE	<i>Chironia palustris</i> subsp. <i>transvaalensis</i>
MALPIGHIACEAE	<i>Triaspis glaucophylla</i>	GENTIANACEAE	<i>Chironia purpurascens</i> subsp. <i>humilis</i>
MALVACEAE	* <i>Corchorus tridens</i>	GENTIANACEAE	<i>Enicostema axillare</i>
MALVACEAE	<i>Dombeya rotundifolia</i>	GERANIACEAE	<i>Monsonia glauca</i>
MALVACEAE	<i>Gossypium herbaceum</i> subsp. <i>africanum</i>	GISEKIACEAE	<i>Gisekia pharnacioides</i>
MALVACEAE	<i>Grewia flava</i>	HETEROPYXIDACEAE	<i>Heteropyxis natalensis</i>
MALVACEAE	<i>Grewia flavescens</i>	HYACINTHACEAE	<i>Bowiea volubilis</i>
MALVACEAE	<i>Grewia subspathulata</i>	HYACINTHACEAE	<i>Dipcadi glaucum</i>
MALVACEAE	<i>Grewia vernicosa</i>	HYACINTHACEAE	<i>Drimia altissima</i>
MALVACEAE	<i>Hermannia boraginiflora</i>	HYACINTHACEAE	<i>Drimia calcarata</i>
MALVACEAE	<i>Melhania rehmannii</i>	HYACINTHACEAE	<i>Drimia elata</i>
MALVACEAE	<i>Pavonia clathrata</i>	HYACINTHACEAE	<i>Ledebouria apertiflora</i>
MALVACEAE	<i>Sida ovata</i>	HYACINTHACEAE	<i>Ledebouria cooperi</i>
MOLLUGINACEAE	<i>Limeum sulcatum</i>	HYACINTHACEAE	<i>Ledebouria floribunda</i>
MORACEAE	<i>Ficus abutilifolia</i>	HYACINTHACEAE	<i>Ledebouria inquinata</i>
MORACEAE	<i>Ficus tettensis</i>	HYACINTHACEAE	<i>Ledebouria marginata</i>
PEDALIACEAE	<i>Dicerocaryum senecioides</i>	HYACINTHACEAE	<i>Ledebouria revoluta</i>
PEDALIACEAE	<i>Harpagophytum zeyheri</i>	HYACINTHACEAE	<i>Ornithogalum tenuifolium</i>
PEDALIACEAE	<i>Pterodiscus ngamicus</i>	HYACINTHACEAE	<i>Schizocarphus nervosus</i>



PHYLLANTHACEAE	<i>Bridelia mollis</i>	HYPERICACEAE	<i>Hypericum lalandii</i>
PHYLLANTHACEAE	<i>Flueggea virosa</i>	HYPOXIDACEAE	<i>Hypoxis filiformis</i>
POACEAE	<i>Dactyloctenium aegyptium</i>	HYPOXIDACEAE	<i>Hypoxis hemerocallidea</i>
POACEAE	<i>Urochloa brachyura</i>	HYPOXIDACEAE	<i>Hypoxis rigidula</i> var. <i>pilosissima</i>
POACEAE	<i>Urochloa mosambicensis</i>	HYPOXIDACEAE	<i>Hypoxis rigidula</i>
POACEAE	<i>Urochloa oligotricha</i>	ICACINACEAE	<i>Apodytes dimidiata</i>
POACEAE	<i>Urochloa panicoides</i>	IRIDACEAE	<i>Gladiolus dolomiticus</i>
POACEAE	<i>Urochloa trichopus</i>	IRIDACEAE	<i>Gladiolus longicollis</i> subsp. <i>platypetalus</i>
POLYGALACEAE	<i>Securidaca longepedunculata</i>	IRIDACEAE	<i>Gladiolus oatesii</i>
RHAMNACEAE	<i>Berchemia zeyheri</i>	IRIDACEAE	<i>Gladiolus permeabilis</i> subsp. <i>Edulis</i>
RHAMNACEAE	<i>Helinus integrifolius</i>	IRIDACEAE	<i>Gladiolus sericeovillosus</i> subsp. <i>calvatus</i>
RUBIACEAE	<i>Afrocanthium gilfillanii</i>	JUNCACEAE	<i>Juncus exsertus</i>
SALICACEAE	<i>Salix mucronata</i> subsp. <i>woodii</i>	JUNCACEAE	<i>Juncus oxycarpus</i>
SAPINDACEAE	<i>Erythrophysa transvaalensis</i>	JUNCACEAE	<i>Juncus punctorius</i>
SAPINDACEAE	<i>Hippobromus pauciflorus</i>	JUNCACEAE	<i>Juncus rigidus</i>
SAPOTACEAE	<i>Mimusops zeyheri</i>	KIRKIACEAE	<i>Kirkia wilmsii</i>
SCROPHULARIACEAE	<i>Aptosimum lineare</i>	LAMIACEAE	<i>Acrotome inflata</i>
SCROPHULARIACEAE	<i>Aptosimum patulum</i>	LAMIACEAE	<i>Aeollanthus buchnerianus</i>
SOLANACEAE	<i>Lycium cinereum</i>	LAMIACEAE	<i>Clerodendrum glabrum</i>
SOLANACEAE	<i>Solanum panduriforme</i>	LAMIACEAE	<i>Clerodendrum ternatum</i>
SOLANACEAE	<i>Withania somnifera</i>	LAMIACEAE	<i>Leonotis nepetifolia</i>
STRYCHNACEAE	<i>Strychnos cocculoides</i>	LAMIACEAE	<i>Leucas capensis</i>
STRYCHNACEAE	<i>Strychnos madagascariensis</i>	LAMIACEAE	<i>Leucas glabrata</i> var. <i>glabrata</i>
TYPHACEAE	<i>Typha capensis</i>	LAMIACEAE	<i>Leucas glabrata</i> var. <i>linearis</i>
VERBENACEAE	<i>Chascanum hederaceum</i>	LAMIACEAE	<i>Leucas neuflyzeana</i>
VERBENACEAE	<i>Chascanum incisum</i>	LAMIACEAE	<i>Mentha longifolia</i> subsp. <i>polyadena</i>
Grid: 2429AA		LAMIACEAE	<i>Ocimum americanum</i>
Family	<i>Species</i>	LAMIACEAE	<i>Ocimum gratissimum</i> subsp. <i>gratissimum</i>
ACANTHACEAE	<i>Asystasia atriplicifolia</i>	LAMIACEAE	<i>Ocimum obovatum</i>
ACANTHACEAE	<i>Asystasia schimperi</i>	LAMIACEAE	<i>Ocimum pseudoserratum</i>

ACANTHACEAE	<i>Barleria mackenii</i>	LAMIACEAE	<i>Orthosiphon suffrutescens</i>
ACANTHACEAE	<i>Barleria macrostegia</i>	LAMIACEAE	<i>Plectranthus hereroensis</i>
ACANTHACEAE	<i>Barleria obtusa</i>	LAMIACEAE	<i>Plectranthus neochilus</i>
ACANTHACEAE	<i>Blepharis breyeri</i>	LAMIACEAE	<i>Premna mooiensis</i>
ACANTHACEAE	<i>Blepharis innocua</i>	LAMIACEAE	<i>Pycnostachys reticulata</i>
ACANTHACEAE	<i>Blepharis subvolubilis</i>	LAMIACEAE	<i>Rothea hirsuta</i>
ACANTHACEAE	<i>Blepharis transvaalensis</i>	LAMIACEAE	<i>Rothea louwalbertsii</i>
ACANTHACEAE	<i>Crabbea angustifolia</i>	LAMIACEAE	<i>Salvia dolomitica</i>
ACANTHACEAE	<i>Crabbea hirsuta</i>	LAMIACEAE	<i>Stachys caffra</i>
ACANTHACEAE	<i>Dicliptera clinopodia</i>	LAMIACEAE	<i>Stachys spathulata</i>
ACANTHACEAE	<i>Dicliptera minor</i>	LAMIACEAE	<i>Syncolostemon canescens</i>
ACANTHACEAE	<i>Dyschoriste fischeri</i>	LAMIACEAE	<i>Tetradenia brevispicata</i>
ACANTHACEAE	<i>Dyschoriste rogersii</i>	LAMIACEAE	<i>Vitex rehmannii</i>
ACANTHACEAE	<i>Hypoestes forskoolii</i>	LENTIBULARIACEAE	<i>Utricularia gibba</i>
ACANTHACEAE	<i>Justicia betonica</i>	LENTIBULARIACEAE	<i>Utricularia stellaris</i>
ACANTHACEAE	<i>Justicia flava</i>	LINACEAE	<i>Linum thunbergii</i>
ACANTHACEAE	<i>Lepidagathis scabra</i>	LOBELIACEAE	<i>Cyphia transvaalensis</i>
ACANTHACEAE	<i>Monechma debile</i>	LOBELIACEAE	<i>Lobelia erinus</i>
ACANTHACEAE	<i>Petalidium oblongifolium</i>	LOPHIOCARPACEAE	<i>Lophiocarpus tenuissimus</i>
ACANTHACEAE	<i>Ruellia cordata</i>	LORANTHACEAE	<i>Agelanthus natalitius subsp. zeyheri</i>
ACANTHACEAE	<i>Ruttya ovata</i>	LORANTHACEAE	<i>Erianthemum dregei</i>
ACANTHACEAE	<i>Thunbergia atriplicifolia</i>	LORANTHACEAE	<i>Erianthemum ngamicum</i>
ACANTHACEAE	<i>Thunbergia neglecta</i>	LORANTHACEAE	<i>Tapinanthus quequensis</i>
AGAPANTHACEAE	<i>Agapanthus inapertus subsp. intermedius</i>	LORANTHACEAE	<i>Tapinanthus rubromarginatus</i>
ALLIACEAE	<i>Tulbaghia acutiloba</i>	LYTHRACEAE	<i>Nesaea anagalloides</i>
AMARANTHACEAE	* <i>Achyranthes aspera</i>	LYTHRACEAE	<i>Nesaea schinzii</i>
AMARANTHACEAE	<i>Achyropsis leptostachya</i>	MALPIGHIACEAE	<i>Sphegamnocarpus pruriens</i>
AMARANTHACEAE	<i>Aerva leucura</i>	MALPIGHIACEAE	<i>Triaspis glaucophylla</i>
AMARANTHACEAE	<i>Amaranthus thunbergii</i>	MALVACEAE	<i>Abutilon pycnodon</i>
AMARANTHACEAE	* <i>Gomphrena celosioides</i>	MALVACEAE	<i>Abutilon sonneratianum</i>



AMARANTHACEAE	<i>Guilleminea densa</i>	MALVACEAE	<i>Corchorus asplenifolius</i>
AMARANTHACEAE	<i>Hermbstaedia odorata</i>	MALVACEAE	* <i>Corchorus tridens</i>
AMARANTHACEAE	<i>Kyphocarpa angustifolia</i>	MALVACEAE	* <i>Corchorus trilocularis</i>
AMARANTHACEAE	<i>Pupalia lappacea</i>	MALVACEAE	<i>Dombeya burgessiae</i>
AMARANTHACEAE	<i>Sericorema remotiflora</i>	MALVACEAE	<i>Dombeya rotundifolia</i>
AMARYLLIDACEAE	<i>Ammocharis coranica</i>	MALVACEAE	<i>Gossypium herbaceum subsp. africanum</i>
AMARYLLIDACEAE	<i>Boophone disticha</i>	MALVACEAE	<i>Grewia flava</i>
AMARYLLIDACEAE	<i>Crinum lugardiae</i>	MALVACEAE	<i>Grewia flavescens</i>
AMARYLLIDACEAE	<i>Haemanthus humilis</i>	MALVACEAE	<i>Grewia monticola</i>
AMARYLLIDACEAE	<i>Nerine laticoma</i>	MALVACEAE	<i>Grewia occidentalis</i>
AMARYLLIDACEAE	<i>Scadoxus puniceus</i>	MALVACEAE	<i>Grewia retinervis</i>
ANACARDIACEAE	<i>Lannea discolor</i>	MALVACEAE	<i>Grewia subspathulata</i>
ANACARDIACEAE	<i>Lannea schweinfurthii</i> var. <i>stuhlmannii</i>	MALVACEAE	<i>Grewia vernicosa</i>
ANACARDIACEAE	<i>Ozoroa albicans</i>	MALVACEAE	<i>Hermannia boraginiflora</i>
ANACARDIACEAE	<i>Ozoroa paniculosa</i>	MALVACEAE	<i>Hermannia burkei</i>
ANACARDIACEAE	<i>Ozoroa sphaerocarpa</i>	MALVACEAE	<i>Hermannia floribunda</i>
ANACARDIACEAE	<i>Sclerocarya birrea subsp. caffra</i>	MALVACEAE	<i>Hermannia glanduligera</i>
ANACARDIACEAE	<i>Searsia discolor</i>	MALVACEAE	<i>Hermannia lancifolia</i>
ANACARDIACEAE	<i>Searsia engleri</i>	MALVACEAE	<i>Hermannia stellulata</i>
ANACARDIACEAE	<i>Searsia keetii</i>	MALVACEAE	<i>Hermannia umbratica</i>
ANACARDIACEAE	<i>Searsia lancea</i>	MALVACEAE	<i>Hibiscus calyphyllus</i>
ANACARDIACEAE	<i>Searsia leptodictya</i>	MALVACEAE	<i>Hibiscus engleri</i>
ANACARDIACEAE	<i>Searsia pentheri</i> (	MALVACEAE	<i>Hibiscus nigricaulis</i>
ANACARDIACEAE	<i>Searsia pyroides</i>	MALVACEAE	<i>Hibiscus praeteritus</i>
ANACARDIACEAE	<i>Searsia rehmanniana</i>	MALVACEAE	<i>Hibiscus pusillus</i>
ANACARDIACEAE	<i>Searsia rigida</i> var. <i>dentata</i>	MALVACEAE	<i>Hibiscus subreniformis</i>
ANACARDIACEAE	<i>Searsia rigida</i> var. <i>margaretae</i>	MALVACEAE	* <i>Hibiscus trionum</i>
ANACARDIACEAE	<i>Searsia transvaalensis</i>	MALVACEAE	<i>Hibiscus vitifolius subsp. vulgaris</i>
ANEMIACEAE	<i>Mohria vestita</i> Baker	MALVACEAE	<i>Melhanianthus acuminata</i> var. <i>agnosta</i>
ANNONACEAE	<i>Annona senegalensis</i>	MALVACEAE	<i>Melhanianthus burchellii</i>

ANTHERICACEAE	<i>Chlorophytum angulicaule</i>	MALVACEAE	<i>Melhania prostrata</i>
ANTHERICACEAE	<i>Chlorophytum aridum</i>	MALVACEAE	<i>Melhania transvaalensis</i>
ANTHERICACEAE	<i>Chlorophytum bowkeri</i>	MALVACEAE	<i>Pavonia burchellii</i>
ANTHERICACEAE	<i>Chlorophytum fasciculatum</i>	MALVACEAE	<i>Pavonia transvaalensis</i>
ANTHERICACEAE	<i>Chlorophytum galpinii</i>	MALVACEAE	<i>Sida chrysantha</i>
ANTHERICACEAE	<i>Chlorophytum recurvifolium</i>	MALVACEAE	<i>Sida cordifolia</i>
APIACEAE	<i>Alepidea setifera</i>	MALVACEAE	<i>Sida dregei</i>
APIACEAE	<i>Bupleurum mundii</i>	MALVACEAE	<i>Sida pseudocordifolia</i>
APIACEAE	<i>Deverra burchellii</i>	MALVACEAE	<i>Triumfetta pilosa var. tomentosa</i>
APIACEAE	<i>Heteromorpha arborescens var. abyssinica</i>	MALVACEAE	<i>Triumfetta rhomboidea</i>
APIACEAE	<i>Heteromorpha stenophylla var. transvaalensis</i>	MALVACEAE	<i>Triumfetta welwitschii</i>
APOCYNACEAE	<i>Acokanthera oppositifolia</i>	MALVACEAE	<i>Waltheria indica</i>
APOCYNACEAE	<i>Ancylobotrys capensis</i>	MELIACEAE	* <i>Melia azedarach</i>
APOCYNACEAE	<i>Asclepias aurea</i>	MELIACEAE	<i>Trichilia dregeana</i>
APOCYNACEAE	<i>Asclepias cucullata</i>	MELIACEAE	<i>Turraea obtusifolia</i>
APOCYNACEAE	<i>Asclepias densiflora</i>	MENISPERMACEAE	<i>Antizoma angustifolia</i>
APOCYNACEAE	<i>Brachystelma circinatum</i>	MOLLUGINACEAE	<i>Limeum fenestratum</i>
APOCYNACEAE	<i>Brachystelma hirtellum</i>	MOLLUGINACEAE	<i>Limeum sulcatum</i>
APOCYNACEAE	<i>Carissa bispinosa</i>	MOLLUGINACEAE	<i>Limeum viscosum</i>
APOCYNACEAE	<i>Ceropegia carnosia</i>	MOLLUGINACEAE	<i>Mollugo cerviana</i>
APOCYNACEAE	<i>Diplorhynchus condylocarpon</i>	MORACEAE	<i>Ficus abutilifolia</i>
APOCYNACEAE	<i>Fockea angustifolia</i>	MORACEAE	<i>Ficus glumosa</i>
APOCYNACEAE	<i>Gomphocarpus fruticosus subsp. Decipiens</i>	MORACEAE	<i>Ficus ingens</i>
APOCYNACEAE	<i>Gomphocarpus fruticosus</i>	MORACEAE	<i>Ficus salicifolia</i>
APOCYNACEAE	<i>Gomphocarpus glaucophyllus</i>	MORACEAE	<i>Ficus sur</i>
APOCYNACEAE	<i>Gomphocarpus tomentosus</i>	MYROTHAMNACEAE	<i>Myrothamnus flabellifolius</i>
APOCYNACEAE	<i>Orbea lutea</i>	MYRSINACEAE	<i>Rapanea melanophloeos</i>
APOCYNACEAE	<i>Orbea melanantha</i>	NYCTAGINACEAE	<i>Commicarpus pentandrus</i>
APOCYNACEAE	<i>Pachycarpus schinzianus</i>	NYMPHAEACEAE	<i>Nymphaea nouchali var. caerulea</i>

APOCYNACEAE	<i>Pentarrhinum insipidum</i>	OCHNACEAE	<i>Ochna holstii</i>
APOCYNACEAE	<i>Raphionacme hirsuta</i>	OCHNACEAE	<i>Ochna pretoriensis</i>
APOCYNACEAE	<i>Sarcostemma viminale</i>	OCHNACEAE	<i>Ochna pulchra</i>
APOCYNACEAE	<i>Secamone alpini</i>	OLACACEAE	<i>Ximenia caffra var. caffra</i>
APOCYNACEAE	<i>Stapelia gettliffei</i>	OLACACEAE	<i>Ximenia caffra var. natalensis</i>
APONOGETONACEAE	<i>Aponogeton stuhlmannii</i>	OLEACEAE	<i>Jasminum multipartitum</i>
AQUIFOLIACEAE	<i>Ilex mitis</i>	OLEACEAE	<i>Jasminum stenolobum</i>
ARACEAE	<i>Zantedeschia albomaculata</i> <i>subsp. albomaculata</i>	OLEACEAE	<i>Olea capensis subsp. enervis</i>
ARALIACEAE	<i>Cussonia natalensis</i>	OLEACEAE	<i>Olea europaea subsp. africana</i>
ARALIACEAE	<i>Cussonia transvaalensis</i>	ONAGRACEAE	* <i>Oenothera affinis</i>
ARALIACEAE	<i>Seemannaralia gerrardii</i>	ONAGRACEAE	* <i>Oenothera jamesii</i>
ASPARAGACEAE	<i>Asparagus buchananii</i>	ORCHIDACEAE	<i>Bonatea polypodantha</i>
ASPARAGACEAE	<i>Asparagus cooperi</i>	ORCHIDACEAE	<i>Disa patula var. transvaalensis</i>
ASPARAGACEAE	<i>Asparagus laricinus</i>	ORCHIDACEAE	<i>Eulophia hians var. inaequalis</i>
ASPARAGACEAE	<i>Asparagus suaveolens</i>	ORCHIDACEAE	<i>Eulophia hians var. nutans</i>
ASPARAGACEAE	<i>Asparagus virgatus</i>	ORCHIDACEAE	<i>Eulophia ovalis var. bainesii</i>
ASPHODELACEAE	<i>Aloe aculeata</i>	ORCHIDACEAE	<i>Eulophia speciosa</i>
ASPHODELACEAE	<i>Aloe affinis</i>	ORCHIDACEAE	<i>Eulophia streptopetala</i>
ASPHODELACEAE	<i>Aloe arborescens</i>	OROBANCHACEAE	<i>Alectra orobanchoides</i>
ASPHODELACEAE	<i>Aloe cryptopoda</i>	OROBANCHACEAE	<i>Alectra pumila</i>
ASPHODELACEAE	<i>Aloe globuligemma</i>	OROBANCHACEAE	<i>Alectra sessiliflora</i>
ASPHODELACEAE	<i>Aloe greatheadii var. davyana</i>	OROBANCHACEAE	<i>Alectra vogelii</i>
ASPHODELACEAE	<i>Aloe greatheadii</i>	OROBANCHACEAE	<i>Striga asiatica</i>
ASPHODELACEAE	<i>Aloe spicata</i>	OROBANCHACEAE	<i>Striga forbesii</i>
ASPHODELACEAE	<i>Aloe zebrina</i>	OROBANCHACEAE	<i>Striga gesnerioides</i>
ASPHODELACEAE	<i>Bulbine abyssinica</i>	ORTHOTRICHACEAE	<i>Schlotheimia rufopallens</i>
ASPHODELACEAE	<i>Bulbine angustifolia</i>	OXALIDACEAE	* <i>Oxalis corniculata</i>
ASPHODELACEAE	<i>Chortolirion angolense</i>	OXALIDACEAE	<i>Oxalis semiloba</i>
ASPHODELACEAE	<i>Kniphofia ensifolia</i>	PASSIFLORACEAE	<i>Adenia digitata</i>
ASPLENIACEAE	<i>Asplenium aethiopicum</i>	PASSIFLORACEAE	<i>Adenia fruticosa</i>



ASPLENIACEAE	<i>Asplenium boltonii</i>	PASSIFLORACEAE	<i>Adenia glauca</i>
ASPLENIACEAE	<i>Asplenium cordatum</i>	PASSIFLORACEAE	<i>Adenia gummifera</i>
ASTERACEAE	<i>Arctotis venusta</i>	PEDALIACEAE	<i>Dicerocaryum senecioides</i>
ASTERACEAE	<i>Artemisia afra</i>	PEDALIACEAE	<i>Harpagophytum zeyheri</i>
ASTERACEAE	<i>Aster peglerae</i>	PEDALIACEAE	<i>Holubia saccata</i>
ASTERACEAE	<i>Athrixia elata</i>	PEDALIACEAE	<i>Pterodiscus speciosus</i>
ASTERACEAE	<i>Berkheya carlinopsis</i> subsp. <i>magalismontana</i>	PEDALIACEAE	<i>Sesamum capense</i>
ASTERACEAE	<i>Berkheya densifolia</i>	PEDALIACEAE	<i>Sesamum triphyllum</i>
ASTERACEAE	<i>Berkheya radula</i>	PHYLLANTHACEAE	<i>Bridelia mollis</i>
ASTERACEAE	* <i>Bidens pilosa</i>	PHYLLANTHACEAE	<i>Flueggea virosa</i>
ASTERACEAE	<i>Blumea dregeanoides</i>	PHYLLANTHACEAE	<i>Phyllanthus incurvus</i>
ASTERACEAE	<i>Brachylaena rotundata</i>	PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i>
ASTERACEAE	<i>Callilepis leptophylla</i>	PHYLLANTHACEAE	<i>Phyllanthus parvulus</i> var. <i>garipensis</i>
ASTERACEAE	<i>Callilepis salicifolia</i>	PHYLLANTHACEAE	<i>Phyllanthus parvulus</i>
ASTERACEAE	<i>Conyza aegyptiaca</i>	PITTOSPORACEAE	<i>Pittosporum viridiflorum</i>
ASTERACEAE	* <i>Conyza bonariensis</i>	PLANTAGINACEAE	<i>Plantago longissima</i>
ASTERACEAE	<i>Conyza pinnata</i>	PLUMBAGINACEAE	<i>Plumbago zeylanica</i>
ASTERACEAE	<i>Conyza scabrida</i>	POACEAE	<i>Agrostis lachnantha</i>
ASTERACEAE	<i>Conyza ulmifolia</i>	POACEAE	<i>Andropogon appendiculatus</i>
ASTERACEAE	<i>Cotula anthemoides</i>	POACEAE	<i>Andropogon chinensis</i>
ASTERACEAE	<i>Denekia capensis</i>	POACEAE	<i>Andropogon eucomus</i>
ASTERACEAE	<i>Dicoma anomala</i> subsp. <i>Gerrardii</i>	POACEAE	<i>Andropogon huillensis</i>
ASTERACEAE	<i>Dicoma galpinii</i>	POACEAE	<i>Andropogon schirensis</i>
ASTERACEAE	<i>Dicoma macrocephala</i>	POACEAE	<i>Anthephora pubescens</i>
ASTERACEAE	<i>Dicoma schinzii</i>	POACEAE	<i>Aristida adscensionis</i>
ASTERACEAE	<i>Dicoma tomentosa</i>	POACEAE	<i>Aristida aequiglumis</i>
ASTERACEAE	<i>Eriocephalus luederitzianus</i>	POACEAE	<i>Aristida canescens</i>
ASTERACEAE	* <i>Ethulia conyzoides</i>	POACEAE	<i>Aristida congesta</i> subsp. <i>Barbicollis</i>
ASTERACEAE	<i>Felicia clavipilosa</i> subsp. <i>transvaalensis</i>	POACEAE	<i>Aristida congesta</i> subsp. <i>congesta</i>
ASTERACEAE	<i>Felicia fascicularis</i>	POACEAE	<i>Aristida diffusa</i> subsp. <i>burkei</i>

ASTERACEAE	<i>Felicia fruticosa</i> subsp. <i>Brevipedunculata</i>	POACEAE	<i>Aristida effusa</i>
ASTERACEAE	<i>Felicia mossamedensis</i>	POACEAE	<i>Aristida junciformis</i>
ASTERACEAE	<i>Felicia muricata</i>	POACEAE	<i>Aristida scabrivalvis</i>
ASTERACEAE	* <i>Flaveria bidentis</i>	POACEAE	<i>Aristida spectabilis</i>
ASTERACEAE	<i>Geigeria aspera</i>	POACEAE	<i>Aristida stipitata</i> subsp. <i>Graciliflora</i>
ASTERACEAE	<i>Geigeria burkei</i> var. <i>hirtella</i>	POACEAE	<i>Bewisia biflora</i>
ASTERACEAE	<i>Geigeria ornativa</i>	POACEAE	<i>Bothriochloa bladhii</i>
ASTERACEAE	<i>Gerbera viridifolia</i>	POACEAE	<i>Bothriochloa insculpta</i>
ASTERACEAE	<i>Helichrysum argyrosphaerum</i>	POACEAE	<i>Brachiaria brizantha</i>
ASTERACEAE	<i>Helichrysum candolleianum</i>	POACEAE	<i>Brachiaria nigropedata</i>
ASTERACEAE	<i>Helichrysum cephaloideum</i>	POACEAE	<i>Brachiaria serrata</i>
ASTERACEAE	<i>Helichrysum dasymallum</i>	POACEAE	<i>Cenchrus ciliaris</i>
ASTERACEAE	<i>Helichrysum harveyanum</i>	POACEAE	<i>Chloris gayana</i>
ASTERACEAE	<i>Helichrysum nudifolium</i> var. <i>nudifolium</i>	POACEAE	<i>Chloris virgata</i>
ASTERACEAE	<i>Helichrysum nudifolium</i> var. <i>oxyphyllum</i>	POACEAE	<i>Chrysopogon serrulatus</i>
ASTERACEAE	<i>Helichrysum polycladum</i>	POACEAE	* <i>Cymbopogon pospischilii</i>
ASTERACEAE	<i>Helichrysum setosum</i>	POACEAE	<i>Cynodon dactylon</i>
ASTERACEAE	<i>Helichrysum uninervium</i>	POACEAE	<i>Dactyloctenium aegyptium</i>
ASTERACEAE	<i>Helichrysum zeyheri</i>	POACEAE	<i>Dactyloctenium giganteum</i>
ASTERACEAE	<i>Hirpicium bechuanense</i>	POACEAE	<i>Diandrochloa namaquensis</i>
ASTERACEAE	<i>Kleinia longiflora</i>	POACEAE	<i>Digitaria eriantha</i>
ASTERACEAE	<i>Lactuca inermis</i>	POACEAE	<i>Digitaria monodactyla</i>
ASTERACEAE	<i>Laggera decurrens</i>	POACEAE	<i>Digitaria natalensis</i>
ASTERACEAE	<i>Litogyne gariepina</i>	POACEAE	<i>Digitaria velutina</i>
ASTERACEAE	* <i>Melanthera triternata</i>	POACEAE	<i>Diheteropogon amplexens</i>
ASTERACEAE	<i>Nidorella hottentotica</i>	POACEAE	<i>Echinochloa jubata</i>
ASTERACEAE	<i>Nidorella resedifolia</i>	POACEAE	<i>Elionurus muticus</i>
ASTERACEAE	<i>Osteospermum muricatum</i>	POACEAE	<i>Enneapogon cenchroides</i>
ASTERACEAE	<i>Philyrophyllum schinzii</i>	POACEAE	<i>Enneapogon scoparius</i>





ASTERACEAE	<i>Phymaspermum montanum</i>	POACEAE	<i>Eragrostis aspera</i>
ASTERACEAE	* <i>Pseudognaphalium luteo-album</i>	POACEAE	<i>Eragrostis barbinodis</i>
ASTERACEAE	<i>Pseudognaphalium oligandrum</i>	POACEAE	<i>Eragrostis capensis</i>
ASTERACEAE	<i>Psiadia punctulata</i>	POACEAE	<i>Eragrostis chloromelas</i>
ASTERACEAE	<i>Pulicaria scabra</i>	POACEAE	<i>Eragrostis cilianensis</i>
ASTERACEAE	<i>Schistostephium heptalobum</i>	POACEAE	<i>Eragrostis curvula</i>
ASTERACEAE	* <i>Schkuhria pinnata</i>	POACEAE	<i>Eragrostis cylindriflora</i>
ASTERACEAE	<i>Senecio barbertonicus</i>	POACEAE	<i>Eragrostis echinochloidea</i>
ASTERACEAE	<i>Senecio conrathii</i>	POACEAE	<i>Eragrostis gummiiflora</i>
ASTERACEAE	<i>Senecio digitalifolius</i>	POACEAE	<i>Eragrostis heteromera</i>
ASTERACEAE	<i>Senecio harveianus</i>	POACEAE	<i>Eragrostis hierniana</i>
ASTERACEAE	<i>Senecio microglossus</i>	POACEAE	<i>Eragrostis inamoena</i>
ASTERACEAE	<i>Senecio oxyriifolius</i>	POACEAE	<i>Eragrostis lappula</i>
ASTERACEAE	<i>Senecio pleistocephalus</i>	POACEAE	<i>Eragrostis plana</i>
ASTERACEAE	<i>Senecio serratuloides</i>	POACEAE	<i>Eragrostis racemosa</i>
ASTERACEAE	<i>Senecio venosus Harv.</i>	POACEAE	<i>Eragrostis rigidior</i>
ASTERACEAE	* <i>Sonchus oleraceus</i>	POACEAE	<i>Eragrostis sclerantha</i>
ASTERACEAE	<i>Stomatanthus africanus</i>	POACEAE	<i>Eragrostis superba</i>
ASTERACEAE	<i>Tarchonanthus camphoratus</i>	POACEAE	<i>Eragrostis trichophora</i>
ASTERACEAE	<i>Tarchonanthus trilobus var. galpinii</i>	POACEAE	<i>Eragrostis viscosa</i>
ASTERACEAE	<i>Ursinia nana subsp. leptophylla</i>	POACEAE	<i>Eustachys paspaloides</i>
ASTERACEAE	* <i>Verbesina encelioides</i>	POACEAE	<i>Fingerhuthia africana</i>
ASTERACEAE	<i>Vernonia fastigiata</i>	POACEAE	<i>Heteropogon contortus</i>
ASTERACEAE	<i>Vernonia galpinii</i>	POACEAE	<i>Hyparrhenia dregeana</i>
ASTERACEAE	<i>Vernonia staehelinoides</i>	POACEAE	<i>Hyparrhenia filipendula var. filipendula</i>
ASTERACEAE	* <i>Xanthium spinosum</i>	POACEAE	<i>Hyparrhenia filipendula var. pilosa</i>
ASTERACEAE	* <i>Zinnia peruviana</i>	POACEAE	<i>Hyparrhenia hirta</i>
BIGNONIACEAE	<i>Catophractes alexandri</i>	POACEAE	<i>Hyparrhenia newtonii</i>
BIGNONIACEAE	<i>Rhigozum obovatum</i>	POACEAE	<i>Hyparrhenia nyassae</i>
BLECHNACEAE	<i>Blechnum attenuatum</i>	POACEAE	<i>Hyparrhenia rufa</i>

BORAGINACEAE	<i>Cordia caffra</i>	POACEAE	<i>Hyparrhenia variabilis</i>
BORAGINACEAE	<i>Cynoglossum lanceolatum</i>	POACEAE	<i>Hyperthelia dissoluta</i>
BORAGINACEAE	<i>Ehretia obtusifolia</i>	POACEAE	<i>Lophacme digitata</i>
BORAGINACEAE	<i>Heliotropium ciliatum</i>	POACEAE	<i>Loudetia flavida</i>
BORAGINACEAE	<i>Heliotropium nelsonii</i>	POACEAE	<i>Loudetia pedicellata</i>
BORAGINACEAE	<i>Heliotropium zeylanicum</i>	POACEAE	<i>Loudetia simplex</i>
BRASSICACEAE	<i>Erucastrum griquense</i>	POACEAE	<i>Melinis nerviglumis</i>
BRASSICACEAE	* <i>Nasturtium officinale</i>	POACEAE	<i>Melinis repens subsp. grandiflora</i>
BRYACEAE	<i>Bryum argenteum</i>	POACEAE	<i>Melinis repens subsp. repens</i>
BUDDLEJACEAE	<i>Buddleja saligna</i>	POACEAE	<i>Microchloa kunthii</i>
BUDDLEJACEAE	<i>Buddleja salviifolia</i>	POACEAE	<i>Miscanthus junceus</i>
BUDDLEJACEAE	<i>Gomphostigma virgatum</i>	POACEAE	<i>Monocymbium ceresiiforme</i>
BURSERACEAE	<i>Commiphora angolensis</i>	POACEAE	<i>Oropetium capense</i>
BURSERACEAE	<i>Commiphora glandulosa</i>	POACEAE	<i>Panicum dregeanum</i>
BURSERACEAE	<i>Commiphora marlothii</i>	POACEAE	<i>Panicum maximum</i>
BURSERACEAE	<i>Commiphora mollis</i>	POACEAE	<i>Panicum natalense</i>
BURSERACEAE	<i>Commiphora pyracanthoides</i>	POACEAE	<i>Panicum subalbidum</i>
BURSERACEAE	<i>Commiphora schimperi</i>	POACEAE	* <i>Paspalum urvillei</i>
CAMPANULACEAE	<i>Wahlenbergia denticulata</i>	POACEAE	<i>Perotis patens</i>
CAMPANULACEAE	<i>Wahlenbergia undulata</i>	POACEAE	<i>Phragmites mauritianus</i>
CAPPARACEAE	<i>Boscia albitrunca</i>	POACEAE	<i>Pogonarthria squarrosa</i>
CAPPARACEAE	<i>Boscia foetida subsp. rehmanniana</i>	POACEAE	<i>Schizachyrium jeffreysii</i>
CAPPARACEAE	<i>Cadaba termitaria</i>	POACEAE	<i>Schizachyrium sanguineum</i>
CAPPARACEAE	<i>Cleome gynandra</i>	POACEAE	<i>Setaria incrassata</i>
CAPPARACEAE	<i>Cleome maculata</i>	POACEAE	<i>Setaria lindenbergiana</i>
CAPPARACEAE	<i>Cleome monophylla</i>	POACEAE	<i>Setaria sphacelata var. sericea</i>
CAPPARACEAE	<i>Cleome oxyphylla</i>	POACEAE	<i>Setaria sphacelata var. sphacelata</i>
CAPPARACEAE	<i>Cleome rubella</i>	POACEAE	<i>Setaria sphacelata var. torta</i>
CAPPARACEAE	<i>Maerua angolensis</i>	POACEAE	<i>Setaria verticillata</i>
CARYOPHYLLACEAE	<i>Dianthus zeyheri</i>	POACEAE	<i>Sorghum bicolor subsp. Drummondii</i>

CARYOPHYLLACEAE	<i>Pollichia campestris</i>	POACEAE	<i>Sorghum versicolor</i>
CARYOPHYLLACEAE	* <i>Polycarpaea corymbosa</i>	POACEAE	<i>Sporobolus africanus</i>
CELASTRACEAE	<i>Elaeodendron transvaalense</i>	POACEAE	<i>Sporobolus festivus</i>
CELASTRACEAE	<i>Gymnosporia buxifolia</i>	POACEAE	<i>Sporobolus fimbriatus</i>
CELASTRACEAE	<i>Gymnosporia maranguensis</i>	POACEAE	<i>Sporobolus pyramidalis</i>
CELASTRACEAE	<i>Gymnosporia senegalensis</i>	POACEAE	<i>Sporobolus stapfianus</i>
CELASTRACEAE	<i>Gymnosporia tenuispina</i>	POACEAE	<i>Sporobolus welwitschii</i>
CELASTRACEAE	<i>Maytenus undata</i>	POACEAE	<i>Stipagrostis uniplumis</i>
CELASTRACEAE	<i>Pleurostyliia capensis</i>	POACEAE	<i>Themeda triandra</i>
CHENOPODIACEAE	* <i>Chenopodium album</i>	POACEAE	<i>Trachypogon spicatus</i>
CHENOPODIACEAE	* <i>Chenopodium ambrosioides</i>	POACEAE	<i>Tragus berteronianus</i>
CHENOPODIACEAE	* <i>Chenopodium schraderianum</i>	POACEAE	<i>Tricholaena monachne</i>
COLCHICACEAE	<i>Ornithoglossum vulgare</i>	POACEAE	<i>Trichoneura grandiglumis</i>
COMBRETACEAE	<i>Combretum apiculatum</i>	POACEAE	<i>Tripogon minimus</i>
COMBRETACEAE	<i>Combretum imberbe</i>	POACEAE	<i>Triraphis andropogonoides</i>
COMBRETACEAE	<i>Combretum molle</i>	POACEAE	<i>Triraphis schinzii</i>
COMBRETACEAE	<i>Terminalia brachystemma</i>	POACEAE	<i>Urelytrum agropyroides</i>
COMBRETACEAE	<i>Terminalia sericea</i>	POACEAE	<i>Urochloa mosambicensis</i>
COMMELINACEAE	<i>Aneilema hockii</i>	POACEAE	<i>Urochloa oligotricha</i>
COMMELINACEAE	<i>Commelina africana</i> var. <i>krebsiana</i>	POACEAE	<i>Urochloa panicoides</i>
COMMELINACEAE	<i>Commelina africana</i> var. <i>lancispatha</i>	POACEAE	<i>Urochloa trichopus</i>
COMMELINACEAE	<i>Commelina eckloniana</i>	PODOCARPACEAE	<i>Podocarpus latifolius</i>
COMMELINACEAE	<i>Commelina erecta</i>	POLYGALACEAE	<i>Muraltia empetroides</i>
COMMELINACEAE	<i>Commelina livingstonii</i>	POLYGALACEAE	<i>Muraltia saxicola</i>
COMMELINACEAE	<i>Commelina modesta</i>	POLYGALACEAE	<i>Polygala africana</i>
COMMELINACEAE	<i>Cyanotis speciosa</i>	POLYGALACEAE	<i>Polygala albida</i>
COMMELINACEAE	<i>Floscopa glomerata</i>	POLYGALACEAE	<i>Polygala gerrardii</i>
CONVOLVULACEAE	<i>Convolvulus aschersonii</i>	POLYGALACEAE	<i>Polygala gracilentia</i>
CONVOLVULACEAE	<i>Convolvulus sagittatus</i>	POLYGALACEAE	<i>Polygala hottentotta</i>
CONVOLVULACEAE	<i>Evolvulus alsinoides</i>	POLYGALACEAE	<i>Polygala sphenoptera</i>

CONVOLVULACEAE	<i>Ipomoea albivenia</i>	POLYGALACEAE	<i>Polygala virgata</i> var. <i>decora</i>
CONVOLVULACEAE	<i>Ipomoea bathycolpos</i>	POLYGONACEAE	<i>Oxygonum dregeanum</i> subsp. <i>canescens</i> var. <i>canescens</i>
CONVOLVULACEAE	<i>Ipomoea bolusiana</i>	POLYGONACEAE	<i>Oxygonum dregeanum</i> subsp. <i>canescens</i> var. <i>dissectum</i>
CONVOLVULACEAE	<i>Ipomoea crassipes</i>	POLYGONACEAE	<i>Oxygonum sinuatum</i>
CONVOLVULACEAE	<i>Ipomoea magnusiana</i>	POLYGONACEAE	<i>Persicaria attenuata</i> subsp. <i>Africana</i>
CONVOLVULACEAE	<i>Ipomoea oblongata</i>	POLYGONACEAE	<i>Persicaria decipiens</i>
CONVOLVULACEAE	<i>Ipomoea obscura</i>	POLYGONACEAE	* <i>Persicaria lapathifolia</i>
CONVOLVULACEAE	<i>Ipomoea ommanneyi</i>	POLYGONACEAE	<i>Polygonum plebeium</i>
CONVOLVULACEAE	<i>Ipomoea papilio</i>	POLYGONACEAE	* <i>Rumex crispus</i>
CONVOLVULACEAE	<i>Ipomoea robertsiana</i>	POLYGONACEAE	<i>Rumex sagittatus</i>
CONVOLVULACEAE	<i>Ipomoea tenuipes</i>	PORTULACACEAE	<i>Portulaca collina</i>
CONVOLVULACEAE	<i>Merremia palmata</i>	PORTULACACEAE	* <i>Portulaca oleracea</i>
CONVOLVULACEAE	<i>Xenostegia tridentata</i> subsp. <i>Angustifolia</i>	PORTULACACEAE	<i>Portulaca pilosa</i>
CORNACEAE	<i>Curtisia dentata</i>	PORTULACACEAE	<i>Talinum tenuissimum</i>
CRASSULACEAE	<i>Cotyledon orbiculata</i> var. <i>oblonga</i>	POTTIACEAE	<i>Pseudocrossidium crinitum</i>
CRASSULACEAE	<i>Crassula lanceolata</i> subsp. <i>transvaalensis</i>	PROTEACEAE	<i>Faurea galpinii</i>
CRASSULACEAE	<i>Crassula sarcocaulis</i>	PROTEACEAE	<i>Faurea saligna</i>
CRASSULACEAE	<i>Kalanchoe paniculata</i>	PROTEACEAE	<i>Protea caffra</i>
CRASSULACEAE	<i>Kalanchoe rotundifolia</i>	PROTEACEAE	<i>Protea roupelliae</i>
CUCURBITACEAE	<i>Citrullus lanatus</i>	PROTEACEAE	<i>Protea welwitschii</i>
CUCURBITACEAE	<i>Coccinia adoensis</i>	PTERIDACEAE	<i>Adiantum poiretii</i>
CUCURBITACEAE	<i>Coccinia rehmannii</i>	RANUNCULACEAE	<i>Clematis brachiata</i>
CUCURBITACEAE	<i>Coccinia sessilifolia</i>	RANUNCULACEAE	* <i>Ranunculus multifidus</i>
CUCURBITACEAE	<i>Corallocarpus triangularis</i>	RHAMNACEAE	<i>Berchemia zeyheri</i>
CUCURBITACEAE	<i>Cucumis anguria</i> var. <i>longaculeatus</i>	RHAMNACEAE	<i>Helinus integrifolius</i>
CUCURBITACEAE	<i>Momordica balsamina</i>	RHAMNACEAE	<i>Phylica paniculata</i>
CUCURBITACEAE	<i>Momordica repens</i>	RHAMNACEAE	<i>Ziziphus mucronata</i>
CUCURBITACEAE	<i>Trochomeria macrocarpa</i>	RHAMNACEAE	<i>Ziziphus zeyheriana</i>

CYPERACEAE	<i>Abildgaardia ovata</i>	RICCIACEAE	<i>Riccia okahandjana</i>
CYPERACEAE	<i>Ascolepis capensis</i>	ROSACEAE	<i>Prunus africana</i>
CYPERACEAE	<i>Bulbostylis burchellii</i>	RUBIACEAE	<i>Agathisanthemum bojeri</i>
CYPERACEAE	<i>Bulbostylis contexta</i>	RUBIACEAE	<i>Anthospermum rigidum</i>
CYPERACEAE	<i>Bulbostylis hispidula</i> subsp. <i>pyriformis</i>	RUBIACEAE	<i>Canthium armatum</i>
CYPERACEAE	<i>Carex austro-africana</i>	RUBIACEAE	<i>Fadogia homblei</i>
CYPERACEAE	<i>Coleochloa setifera</i>	RUBIACEAE	<i>Galium capense</i>
CYPERACEAE	<i>Cyperus albostriatus</i>	RUBIACEAE	<i>Kohautia caespitosa</i> subsp. <i>Brachyloba</i>
CYPERACEAE	<i>Cyperus congestus</i>	RUBIACEAE	<i>Kohautia cynanchica</i>
CYPERACEAE	<i>Cyperus cyperoides</i> subsp. <i>Pseudoflavus</i>	RUBIACEAE	<i>Kohautia latibrachiata</i>
CYPERACEAE	<i>Cyperus deciduus</i>	RUBIACEAE	<i>Kohautia virgata</i>
CYPERACEAE	<i>Cyperus fastigiatus</i>	RUBIACEAE	<i>Oldenlandia herbacea</i>
CYPERACEAE	<i>Cyperus indecorus</i> var. <i>decurvatus</i>	RUBIACEAE	<i>Pavetta gardeniifolia</i>
CYPERACEAE	<i>Cyperus longus</i> var. <i>tenuiflorus</i>	RUBIACEAE	<i>Pavetta harborii</i>
CYPERACEAE	<i>Cyperus margaritaceus</i>	RUBIACEAE	<i>Pavetta schumanniana</i>
CYPERACEAE	<i>Cyperus obtusiflorus</i> var. <i>flavissimus</i>	RUBIACEAE	<i>Pavetta zeyheri</i>
CYPERACEAE	<i>Cyperus obtusiflorus</i>	RUBIACEAE	<i>Pentanisia angustifolia</i>
CYPERACEAE	<i>Cyperus pseudovestitus</i>	RUBIACEAE	<i>Psydrax livida</i>
CYPERACEAE	<i>Cyperus rotundus</i>	RUBIACEAE	<i>Rothmannia capensis</i>
CYPERACEAE	<i>Cyperus rupestris</i>	RUBIACEAE	<i>Rubia horrida</i>
CYPERACEAE	<i>Cyperus sexangularis</i>	RUBIACEAE	<i>Vangueria infausta</i>
CYPERACEAE	<i>Cyperus sphaerospermus</i>	RUTACEAE	<i>Calodendrum capense</i>
CYPERACEAE	<i>Cyperus usitatus</i>	RUTACEAE	<i>Vepris lanceolata</i>
CYPERACEAE	<i>Fimbristylis complanata</i>	RUTACEAE	<i>Zanthoxylum capense</i>
CYPERACEAE	<i>Fimbristylis dichotoma</i>	SALICACEAE	<i>Dovyalis zeyheri</i>
CYPERACEAE	<i>Fuirena stricta</i>	SANTALACEAE	<i>Osyris lanceolata</i>
CYPERACEAE	<i>Kyllinga alba</i>	SANTALACEAE	<i>Thesium procerum</i>
CYPERACEAE	<i>Kyllinga erecta</i>	SANTALACEAE	<i>Thesium resedoides</i>
CYPERACEAE	<i>Kyllinga melanosperma</i>	SAPINDACEAE	<i>Pappea capensis</i>



CYPERACEAE	<i>Lipocarpha rehmannii</i>	SAPOTACEAE	<i>Englerophytum magalismontanum</i>
CYPERACEAE	<i>Pycreus mundii</i>	SAPOTACEAE	<i>Mimusops zeyheri</i>
CYPERACEAE	<i>Pycreus pumilus</i>	SCROPHULARIACEAE	<i>Aptosimum elongatum</i>
CYPERACEAE	<i>Schoenoplectus brachyceras</i>	SCROPHULARIACEAE	<i>Aptosimum lineare</i>
CYPERACEAE	<i>Schoenoplectus muricinux</i>	SCROPHULARIACEAE	<i>Chaenostoma floribundum</i>
CYPERACEAE	<i>Schoenoplectus muriculatus</i>	SCROPHULARIACEAE	<i>Craterostigma plantagineum</i>
CYPERACEAE	<i>Scleria dregeana</i>	SCROPHULARIACEAE	<i>Halleria lucida</i>
DIOSCOREACEAE	<i>Dioscorea dregeana</i>	SCROPHULARIACEAE	<i>Jamesbrittenia accrescens</i>
DIOSCOREACEAE	<i>Dioscorea sylvatica</i> var. <i>brevipes</i>	SCROPHULARIACEAE	<i>Jamesbrittenia burkeana</i>
DIPSACACEAE	<i>Cephalaria zeyheriana</i>	SCROPHULARIACEAE	<i>Jamesbrittenia silenoides</i>
DIPSACACEAE	<i>Scabiosa columbaria</i>	SCROPHULARIACEAE	<i>Selago capitellata</i>
DRACAENACEAE	<i>Sansevieria aethiopica</i>	SCROPHULARIACEAE	<i>Selago ceciliae</i>
DRACAENACEAE	<i>Sansevieria hyacinthoides</i>	SCROPHULARIACEAE	<i>Selago lacunosa</i>
DRACAENACEAE	<i>Sansevieria pearsonii</i>	SCROPHULARIACEAE	<i>Veronica anagallis-aquatica</i>
DROSERACEAE	<i>Drosera burkeana</i>	SELAGINELLACEAE	<i>Selaginella dregei</i>
EBENACEAE	<i>Diospyros lycioides</i> subsp. <i>Guerkei</i>	SELAGINELLACEAE	<i>Selaginella mittenii</i>
EBENACEAE	<i>Diospyros lycioides</i> subsp. <i>lycioides</i>	SINOPTERIDACEAE	<i>Cheilanthes hirta</i>
EBENACEAE	<i>Diospyros lycioides</i> subsp. <i>nitens</i>	SINOPTERIDACEAE	<i>Cheilanthes inaequalis</i>
EBENACEAE	<i>Diospyros whyteana</i>	SINOPTERIDACEAE	<i>Cheilanthes multifida</i>
EBENACEAE	<i>Euclea crispa</i>	SINOPTERIDACEAE	<i>Cheilanthes viridis</i> var. <i>glauca</i>
EBENACEAE	<i>Euclea natalensis</i> subsp. <i>angustifolia</i>	SINOPTERIDACEAE	<i>Cheilanthes viridis</i> var. <i>viridis</i>
EBENACEAE	<i>Euclea undulata</i>	SINOPTERIDACEAE	<i>Pellaea calomelanos</i>
ELAPHOGLOSSACEAE	<i>Elaphoglossum acrostichoides</i>	SOLANACEAE	* <i>Datura ferox</i>
ELATINACEAE	<i>Bergia decumbens</i>	SOLANACEAE	* <i>Datura stramonium</i>
EQUISETACEAE	<i>Equisetum ramosissimum</i>	SOLANACEAE	<i>Lycium cinereum</i>
ERIOCAULACEAE	<i>Eriocaulon abyssinicum</i>	SOLANACEAE	* <i>Physalis peruviana</i>
EUPHORBIACEAE	<i>Acalypha angustata</i>	SOLANACEAE	<i>Solanum giganteum</i>
EUPHORBIACEAE	<i>Acalypha villicaulis</i>	SOLANACEAE	<i>Solanum lichtensteinii</i>
EUPHORBIACEAE	<i>Clutia monticola</i>	SOLANACEAE	<i>Solanum panduriforme</i>

EUPHORBIACEAE	<i>Clusia pulchella</i>	SOLANACEAE	<i>Solanum supinum</i>
EUPHORBIACEAE	<i>Croton gratissimus</i> var. <i>gratissimus</i>	SOLANACEAE	<i>Withania somnifera</i>
EUPHORBIACEAE	<i>Croton gratissimus</i> var. <i>subgratissimus</i>	STRYCHNACEAE	<i>Strychnos cocculoides</i>
EUPHORBIACEAE	<i>Croton megalobotrys</i>	STRYCHNACEAE	<i>Strychnos madagascariensis</i>
EUPHORBIACEAE	<i>Dalechampia capensis</i>	STRYCHNACEAE	<i>Strychnos pungens</i>
EUPHORBIACEAE	<i>Erythrococca menyharthii</i>	STRYCHNACEAE	<i>Strychnos spinosa</i>
EUPHORBIACEAE	<i>Euphorbia clavarioides</i> var. <i>truncata</i>	TECOPHILAEACEAE	<i>Walleria nutans</i>
EUPHORBIACEAE	<i>Euphorbia clivicola</i>	THELYPTERIDACEAE	<i>Amauropelta bergiana</i>
EUPHORBIACEAE	<i>Euphorbia enormis</i>	THYMELAEACEAE	<i>Gnidia burchellii</i>
EUPHORBIACEAE	<i>Euphorbia inaequilatera</i>	THYMELAEACEAE	<i>Gnidia capitata</i>
EUPHORBIACEAE	<i>Euphorbia ingens</i>	THYMELAEACEAE	<i>Gnidia kraussiana</i>
EUPHORBIACEAE	<i>Euphorbia maleolens</i>	THYMELAEACEAE	<i>Gnidia microcephala</i>
EUPHORBIACEAE	<i>Euphorbia schinzii</i>	THYMELAEACEAE	<i>Gnidia sericocephala</i>
EUPHORBIACEAE	<i>Euphorbia striata</i>	THYMELAEACEAE	<i>Gnidia splendens</i>
EUPHORBIACEAE	<i>Euphorbia tirucalli</i>	TRICHOLOMATACEAE	<i>Coriscium viride</i>
EUPHORBIACEAE	<i>Euphorbia transvaalensis</i>	TURNERACEAE	<i>Tricliceras longepedunculatum</i>
EUPHORBIACEAE	<i>Jatropha zeyheri</i>	URTICACEAE	<i>Obetia tenax</i>
EUPHORBIACEAE	<i>Tragia dioica</i>	URTICACEAE	<i>Pouzolzia mixta</i>
EUPHORBIACEAE	<i>Tragia okanyua</i>	VAHLIACEAE	<i>Vahlia capensis</i>
EUPHORBIACEAE	<i>Tragia rupestris</i>	VELLOZIACEAE	<i>Xerophyta humilis</i>
FABACEAE	<i>Acacia ataxacantha</i>	VELLOZIACEAE	<i>Xerophyta retinervis</i>
FABACEAE	<i>Acacia burkei</i>	VERBENACEAE	<i>Chascanum hederaceum</i>
FABACEAE	<i>Acacia caffra</i>	VERBENACEAE	<i>Chascanum incisum</i>
FABACEAE	<i>Acacia erioloba</i>	VERBENACEAE	<i>Chascanum pinnatifidum</i>
FABACEAE	<i>Acacia exuvialis</i>	VERBENACEAE	<i>Lantana rugosa</i>
FABACEAE	<i>Acacia gerrardii</i>	VERBENACEAE	<i>Lippia javanica</i>
FABACEAE	<i>Acacia grandicornuta</i>	VERBENACEAE	<i>Priva africana</i>
FABACEAE	<i>Acacia karroo</i>	VERBENACEAE	* <i>Verbena aristigera</i>
FABACEAE	<i>Acacia nilotica</i> subsp. <i>kraussiana</i>	VERBENACEAE	* <i>Verbena bonariensis</i>

FABACEAE	<i>Acacia permixta</i>	VERBENACEAE	* <i>Verbena officinalis</i>
FABACEAE	<i>Acacia rehmanniana</i>	VISCACEAE	<i>Viscum capense</i>
FABACEAE	<i>Acacia robusta</i>	VISCACEAE	<i>Viscum rotundifolium</i>
FABACEAE	<i>Acacia tenuispina</i>	VISCACEAE	<i>Viscum tuberculatum</i>
FABACEAE	<i>Acacia tortilis subsp. heteracantha</i>	VISCACEAE	<i>Viscum verrucosum</i>
FABACEAE	<i>Albizia tanganyicensis</i>	VITACEAE	<i>Cissus cactiformis</i>
FABACEAE	<i>Alysicarpus zeyheri</i>	VITACEAE	<i>Cyphostemma humile subsp. dolichopus</i>
FABACEAE	<i>Argyrobium transvaalense</i>	VITACEAE	<i>Cyphostemma oleraceum</i>
		VITACEAE	<i>Cyphostemma woodii</i>
		VITACEAE	<i>Rhoicissus revoilii</i>
		XYRIDACEAE	<i>Xyris capensis</i>
		ZYGOPHYLLACEAE	<i>Tribulus terrestris</i>

## Appendix B: Plant Species List

Family	Species Name	Common Name
Acanthaceae	<i>Ruellia cordata</i>	Veld Violet
Agavaceae	<i>Agave americana</i>	Century plant
Amaryllidaceae	<i>Hippeastrum sp.</i>	Red Lion Lily
Anacardiaceae	<i>Lannea discolor</i>	Live Long Lannea
Anacardiaceae	<i>Mangifera indica</i>	Mango Tree
Anacardiaceae	<i>Ozoroa paniculosa</i>	Common resin tree
Anacardiaceae	<i>Sclerocarya birrea</i>	Marula
Anacardiaceae	<i>Searsia leptodictya</i>	Mountain karee
Anacardiaceae	<i>Searsia pyroides</i>	Wild currant
Apiaceae	<i>Centella asiatica</i>	Pennywort
Apocynaceae	<i>Carissa bispinosa</i>	Forest Num num
Apocynaceae	<i>Catharanthus roseus</i>	Periwinkle
Apocynaceae	<i>Sarcostemma viminalis</i>	Rapunzel plant
Araliaceae	<i>Cussonia paniculata</i>	Highveld cabbage tree
Asparagaceae	<i>Asparagus laricinus</i>	Wild asparagus
Asphodelaceae	<i>Aloe cryptopoda</i>	Geelaalwyn
Asphodelaceae	<i>Aloe greatheadii</i>	Spotted aloe
Asphodelaceae	<i>Aloe marlothii</i>	Mountain aloe
Asteraceae	<i>Bidens pilosa</i>	Black Jack
Asteraceae	<i>Brachylena sp.</i>	
Asteraceae	<i>Geigeria burkei</i>	Vermeersiektebosie



Family	Species Name	Common Name
Asteraceae	<i>Litogyne gariepina</i>	Dwarf sage
Asteraceae	<i>Mantiscalca salmantica</i>	Mantiscalca
Asteraceae	<i>Schkuhria pinnata</i>	Dwarf marigold
Asteraceae	<i>Senecio barbertonicus</i>	Succulent Bush
Asteraceae	<i>Senecio latifolius</i>	Ragwort
Asteraceae	<i>Tagetes minuta</i>	Tall khakhi weed
Asteraceae	<i>Tarconanthus camphoratus</i>	Camphor bush
Asteraceae	<i>Vernonia fastigiata</i>	Narrow leaved vernonia
Asteraceae	<i>Xanthium strumarium</i>	Spiny cocklebur
Asteraceae	<i>Zinnia peruviana</i>	Redstar zinnia
Burseraceae	<i>Commiphora neglecta</i>	Sweet-root corkwood
Burseraceae	<i>Commiphora pyracanthoides</i>	Corkwood
Cactaceae	<i>Opuntia ficus-indica</i>	Prickley pear
Caesalpinaceae	<i>Senna pendula var. glabrata</i>	Easter Cassia
Capparaceae	<i>Boscia albitrunca</i>	Witgat boom
Capparaceae	<i>Boscia foetida</i>	Stink sheperds tree
Caricaceae	<i>Carica papaya</i>	Pawpaw tree
Celastraceae	<i>Gymnosporia buxifolia</i>	Spike thorn
Celastraceae	<i>Gymnosporia senegalensis</i>	Red spike thorn
Combretaceae	<i>Combretum hereroense</i>	Russet bushwillow
Combretaceae	<i>Combretum imberbe</i>	Leadwood
Combretaceae	<i>Combretum zeyheri</i>	Large-fruited bushwillow
Combretaceae	<i>Terminalia prunoides</i>	Lowveld cluster leaf
Convolvulaceae	<i>Convolvulus sp.</i>	-
Crassulaceae	<i>Kalanchoe sp.</i>	-
Crassulaceae	<i>Cotyledon orbiculata</i>	Pig's ear





Family	Species Name	Common Name
Cyperaceae	<i>Bulbostylis sp.</i>	-
Cyperaceae	<i>Cyperus sp.</i>	-
Cyperaceae	<i>Kyllinga erecta</i>	White sedge
Ebenaceae	<i>Diospyros lycioides</i>	Star apple
Ebenaceae	<i>Diospyrus villosa</i>	-
Ebenaceae	<i>Euclea crispa</i>	Blue guarri
Ebenaceae	<i>Euclea divinorum</i>	Magic guarri
Ebenaceae	<i>Euclea natalensis</i>	Natal guarri
Erythricaceae	<i>Erythrina lysistemon</i>	Coral Tree
Euphorbiaceae	<i>Euphorbia milii</i>	Christ plant
Euphorbiaceae	<i>Ricinus communis</i>	Castor oil plant
Euphorbiaceae	<i>Croton gratissimus</i>	Lavender feverberry
Euphorbiaceae	<i>Euphorbia ingens</i>	Candelabra tree
Fabaceae	<i>Acacia burkeii</i>	Black Monkey Thorn
Fabaceae	<i>Acacia caffra</i>	Common hook thorn
Fabaceae	<i>Acacia gerrardii</i>	Red thorn
Fabaceae	<i>Acacia grandicornuta</i>	Horned thorn
Fabaceae	<i>Acacia karroo</i>	Sweet thorn
Fabaceae	<i>Acacia permixa</i>	Hairy acacia
Fabaceae	<i>Albizia versicolor</i>	False thorn
Fabaceae	<i>Bauhinia variegata</i>	Orchid tree
Fabaceae	<i>Crotalaria schunzii</i>	Rattlepods
Fabaceae	<i>Dichrostachys cinerea</i>	Sickle bush
Fabaceae	<i>Indigofera heterotricha</i>	Hairy indigo
Fabaceae	<i>Phaseolus vulgaris</i>	Common green bean
Fabaceae	<i>Schotia brachypetala</i>	Weeping boer-bean

Family	Species Name	Common Name
Fabaceae	<i>Trifolium repens</i>	White clover
Geraniaceae	<i>Monsonia senegalensis</i>	Pink angel bush
Heteropyxidaceae	<i>Heteropyxis natalensis</i>	Lavendar tree
Lamiaceae	<i>Plectranthus fruticosus</i>	Pink spur flower
Lamiaceae	<i>Vitex obovata</i>	Kei vingerleaf
Lauraceae	<i>Persea americana</i>	Avocado Tree
Lythraceae	<i>Ammania baccifera</i>	Acrid weed
Malpighiaceae	<i>Triaspris glaucophylla</i>	Blue shield fruit
Malvaceae	<i>Ceiba pentandra</i>	Kapok Tree
Malvaceae	<i>Gossypium herbaceum</i>	Wild cotton
Malvaceae	<i>Hermania cristata</i>	Crested hermannia
Malvaceae	<i>Hibiscus cannabinus</i>	Wild stockrose
Meliaceae	<i>Melia azedarach</i>	Chinaberry
Moraceae	<i>Ficus glumosa</i>	Hairy rock fig
Moraceae	<i>Ficus salicifolia</i>	Willow leaf fig
Moraceae	<i>Ficus sycamorus</i>	Sycamore fig
Myrtaceae	<i>Syzigium cordatum</i>	Water berry
Nyctingaceae	<i>Bougainvillea spinosa</i>	Paper flower
Oleaceae	<i>Olea europaea subsp.africana</i>	Wild olive
Papaveraceae	<i>Argemone ochrolauca</i>	Mexican poppy
Pedaliaceae	<i>Cerototheca triloba</i>	Rhodesian foxglove
Pedaliaceae	<i>Sesamum triphyllum</i>	Wild sesame
Poaceae	<i>Andropogon schirensis</i>	Stab grass
Poaceae	<i>Aristida diffusa</i>	Iron grass
Poaceae	<i>Aristida scabrivalvis</i>	Purple three-awn
Poaceae	<i>Bothriochloa insculpta</i>	Pinhole grass



Family	Species Name	Common Name
Poaceae	<i>Chloris virgata</i>	Feather-top chloris
Poaceae	<i>Cynodon dactylon</i>	Couch grass
Poaceae	<i>Dactyloctenium aegyptium</i>	Common crowfoot
Poaceae	<i>Eragrostis capensis</i>	Heart seed love grass
Poaceae	<i>Eragrostis cilianensis</i>	Stink love grass
Poaceae	<i>Fingerhuthia africana</i>	Thimble grass
Poaceae	<i>Helictotrichon turgidulum</i>	Small oats grass
Poaceae	<i>Heteropogon contortus</i>	Spear grass
Poaceae	<i>Melinis nerviglumis</i>	Bristle leaved red top
Poaceae	<i>Melinis repens</i>	Natal red top
Poaceae	<i>Panicum maximum</i>	Guinea grass
Poaceae	<i>Panicum natalense</i>	Natal panicum
Poaceae	<i>Perotis patens</i>	Cat's tail
Poaceae	<i>Pogonarthria squarrosa</i>	Herringbone grass
Poaceae	<i>Sporobolus centrifugus</i>	Olive dropseed
Poaceae	<i>Urochloa panicoides</i>	Herringbone grass
Poaceae	<i>Zea mays</i>	Mielies
Poaceae	<i>Aristida congesta</i>	Tassle three-awn
Poaceae	<i>Eragrostis curvula</i>	Weeping love grass
Poaceae	<i>Eragrostis plana</i>	Tough love grass
Poaceae	<i>Eragrostis rigidior</i>	Curley leaf
Poaceae	<i>Hyparrhenia hirta</i>	Common thatching grass
Poaceae	<i>Imperata cylindrica</i>	Cottonwool grass
Poaceae	<i>Phragmites australis</i>	Common reed
Poaceae	<i>Themeda triandra</i>	Red grass
Rhamnaceae	<i>Berchemia zeyheri</i>	Red Ivory

Family	Species Name	Common Name
Rhamnaceae	<i>Ziziphus mucronata</i>	Buffalo thorn
Sapindaceae	<i>Dodonaea angustifolia</i>	Sand Olive
Sapindaceae	<i>Pappea capensis</i>	Jacket plum
Sapotaceae	<i>Englerophytum magaliesmontanum</i>	Stemfruit
Scrophulariaceae	<i>Aptosimum lineare</i>	Carpet flower
Simaroubaceae	<i>Kirkia wilmsii</i>	Mountain seringa
Solanaceae	<i>Solanum incanum</i>	Thorn Apple
Solanaceae	<i>Solanum panduriform</i>	Bitterappel
Sterculiaceae	<i>Dombeya rotundifolia</i>	Wild pear
Sterculiaceae	<i>Sterculia rogersii</i>	Star Chestnut
Tiliaceae	<i>Grewia bicolor</i>	White Raisin
Tiliaceae	<i>Grewia flava</i>	Velvet Raisin
Urticaceae	<i>Obetia tenax</i>	Rock tree Nettle
Velloziaceae	<i>Xerophyta retinervis</i>	Black stick lilly
Vitaceae	<i>Rhoicissus tridentata</i>	Bushmans grape

### Appendix C: List of expected mammal species

Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Cheetah	<i>Acinonyx jubatus</i>	Vulnerable	Vulnerable	Vulnerable
Spiny Mouse	<i>Acomys spinosissimus</i>	Least Concern	Least Concern	Not listed
Impala	<i>Aepyceros melampus</i>	Least Concern	Least Concern	Not listed
Red Veld Rat	<i>Aethomys chrysophilus</i>	Least Concern	Least Concern	Not listed
Tete Veld Rat	<i>Aethomys ineptus</i>	Least Concern	Least Concern	Not listed
Namaqua Rock Mouse	<i>Aethomys namaquensis</i>	Endangered	Least Concern	Not listed
Red Hartebeest	<i>Alcelaphus buselaphus</i>	Least Concern	Least Concern	Not listed
Hottentot's Golden Mole	<i>Amblysomus hottentotus</i>	Not evaluated	Data Deficient	Not listed
Springbuck	<i>Antidorcas marsupialis</i>	Least Concern	Least Concern	Not listed
African Clawless Otter	<i>Aonyx capensis</i>	Least Concern	Least Concern	Protected
South African Hedgehog	<i>Atelerix frontalis</i>	Least Concern	Near Threatened	Protected
Water Mongoose	<i>Atilax paludinosus</i>	Least Concern	Least Concern	Not listed
Yellow Golden Mole	<i>Calcochloris obtusirostris</i>	Least Concern	Vulnerable	Not listed
Side-striped Jackal	<i>Canis adustus</i>	Least Concern	Near Threatened	Not listed
Black-backed Jackal	<i>Canis mesomelas</i>	Least Concern	Least Concern	Not listed
Caracal	<i>Caracal caracal</i>	Least Concern	Least Concern	Not listed
Red Duiker	<i>Cephalophus natalensis</i>	Least Concern	Least Concern	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
White Rhinoceros	<i>Ceratotherium simum</i>	Near Threatened	Least Concern	Protected
Vervet Monkey	<i>Cercopithecus aethiops pygerythrus</i>	Least Concern	Least Concern	Not listed
Stairs's or Mozambique Monkey	<i>Cercopithecus mitis erythrarchus</i>	Least Concern	Least Concern	Not listed
Ansorge's Free-tailed Bat	<i>Chaerephon ansorgei</i>	Least Concern	Least Concern	Not listed
Little Free-tailed Bat	<i>Chaerephon pumila</i>	Least Concern	Least Concern	Not listed
African Civet	<i>Civettictis civetta</i>	Least Concern	Least Concern	Not listed
Percival's Trident Bat	<i>Cloeotis percivali</i>	Near Threatened	Critically Endangered	Not listed
Blue Wildebeest	<i>Connochaetes taurinus taurinus</i>	Least Concern	Least Concern	Not listed
Giant Rat	<i>Cricetomys gambianus</i>	Least Concern	Vulnerable	Vulnerable
Reddish-grey Musk Shrew	<i>Crocidura cyanea</i>	Least Concern	Data Deficient	Not listed
Tiny Musk Shrew	<i>Crocidura fuscomurina</i>	Least Concern	Data Deficient	Not listed
Lesser Red Musk Shrew	<i>Crocidura hirta</i>	Least Concern	Data Deficient	Not listed
Maquassie Musk Shrew	<i>Crocidura maquassiensis</i>	Least Concern	Vulnerable	Not listed
Swamp Musk Shrew	<i>Crocidura mariquensis</i>	Least Concern	Data Deficient	Not listed
Lesser Grey-brown Musk Shrew	<i>Crocidura silacea</i>	Least Concern	Data Deficient	Not listed
Spotted Hyaena	<i>Crocuta crocuta</i>	Least Concern	Near Threatened	Protected
Common Molerat	<i>Cryptomys hottentotus</i>	Least Concern	Least Concern	Not listed
Yellow Mongoose	<i>Cynictis penicillata</i>	Least Concern	Least Concern	Not listed
Tsessebe	<i>Damaliscus lunatus lunatus</i>	Least Concern	Endangered	Endangered





Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Blesbuck	<i>Damaliscus pygargus phillipsi</i>	Least Concern	Least Concern	Not listed
Water Rat	<i>Dasymys incomtus</i>	Least Concern	Near Threatened	Not listed
Grey Climbing Mouse	<i>Dendromus melanotis</i>	Least Concern	Least Concern	Not listed
Brants' Climbing Mouse	<i>Dendromus mesomelas</i>	Least Concern	Least Concern	Not listed
Chestnut Climbing Mouse	<i>Dendromus mystacalis</i>	Least Concern	Least Concern	Not listed
Nyika Climbing Mouse	<i>Dendromus nyikae</i>	Least Concern	Near Threatened	Not listed
Short-tailed Gerbil	<i>Desmodillus auricularis</i>	Least Concern	Least Concern	Not listed
Black Rhino	<i>Diceros bicornis minor</i>	Critically Endangered	Vulnerable	Not listed
Short-snouted Elephant-shrew	<i>Elephantulus brachyrhynchus</i>	Least Concern	Data Deficient	Not listed
Bushveld Elephant-shrew	<i>Elephantulus intufi</i>	Least Concern	Data Deficient	Not listed
Rock Elephant-shrew	<i>Elephantulus myurus</i>	Least Concern	Least Concern	Not listed
Gambian Epauletted Fruit Bat	<i>Epomophorus gambianus crypturus</i>	Least Concern	Data Deficient	Not listed
Wahlberg's Epauletted Fruit Bat	<i>Epomophorus wahlbergi</i>	Least Concern	Least Concern	Not listed
Long-tailed Serotine Bat	<i>Eptesicus hottentotus</i>	Least Concern	Least Concern	Not listed
Burchell's Zebra	<i>Equus burchellii</i>	Least Concern	Least Concern	Not listed
African Wild Cat	<i>Felis silvestris</i>	Least Concern	Least Concern	Not listed
Lesser Bushbaby	<i>Galago moholi</i>	Least Concern	Least Concern	Not listed
Slender Mongoose	<i>Galerella sanguinea</i>	Least Concern	Least Concern	Not listed
Small-spotted Genet	<i>Genetta genetta</i>	Least Concern	Least Concern	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Large-spotted Genet	<i>Genetta tigrina</i>	Least Concern	Least Concern	Not listed
Hairy-footed Gerbil	<i>Gerbillurus paeaba</i>	Least Concern	Least Concern	Not listed
Giraffe	<i>Giraffa camelopardalis</i>	Least Concern	Least Concern	Not listed
Butterfly Bat	<i>Glauconycteris variegatus</i>	Least Concern	Near Threatened	Not listed
Mozambique Woodland Mouse	<i>Grammomys cometes</i>	Least Concern	Data Deficient	Not listed
Woodland Mouse	<i>Grammomys dolichurus</i>	Least Concern	Data Deficient	Not listed
Woodland Dormouse	<i>Graphiurus murinus</i>	Least Concern	Least Concern	Not listed
Rock Dormouse	<i>Graphiurus platyops</i>	Least Concern	Data Deficient	Not listed
Dwarf Mongoose	<i>Helogale parvula</i>	Least Concern	Least Concern	Not listed
Large Grey Mongoose	<i>Herpestes ichneumon</i>	Least Concern	Least Concern	Not listed
Yellow-spotted Hyrax	<i>Heterohyrax brucei</i>	Least Concern	Least Concern	Not listed
Hippopotamus	<i>Hippopotamus amphibius</i>	Least Concern	Least Concern	Not listed
Sundevall's Leaf-nosed Bat	<i>Hipposideros caffer</i>	Least Concern	Data Deficient	Not listed
Roan Antelope	<i>Hippotragus equinus</i>	Least Concern	Vulnerable	Vulnerable
Sable Antelope	<i>Hippotragus niger niger</i>	Least Concern	Vulnerable	Not listed
Brown Hyaena	<i>Hyaena brunnea</i>	Near Threatened	Near Threatened	Protected
Cape Porcupine	<i>Hystrix africaeaustralis</i>	Least Concern	Least Concern	Not listed
White-tailed Mongoose	<i>Ichneumia albicauda</i>	Least Concern	Least Concern	Not listed
Striped Polecat	<i>Ictonyx striatus</i>	Least Concern	Least Concern	Not listed
Damara Woolly Bat	<i>Kerivoula argentata</i>	Least Concern	Endangered	Not listed
Lesser Woolly Bat	<i>Kerivoula lanosa</i>	Least Concern	Near Threatened	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Waterbuck	<i>Kobus ellipsiprymnus ellipsiprymnus</i>	Least Concern	Least Concern	Not listed
Botswana Long-eared Bat	<i>Laephotis botswanae</i>	Near Threatened	Vulnerable	Not listed
Single-striped Mouse	<i>Lemniscomys rosalia</i>	Least Concern	Data Deficient	Not listed
Cape Hare	<i>Lepus capensis</i>	Least Concern	Least Concern	Not listed
Scrub Hare	<i>Lepus saxatilis</i>	Least Concern	Least Concern	Not listed
African Elephant	<i>Loxodonta africana</i>	Endangered	Least Concern	Protected
Spotted-necked Otter	<i>Lutra maculicollis</i>	Vulnerable	Near Threatened	Protected
African Wild Dog	<i>Lycaon pictus</i>	Vulnerable	Endangered	Endangered
Pangolin	<i>Manis temminckii</i>	Near Threatened	Vulnerable	Vulnerable
Multimammate Mouse	<i>Mastomys coucha</i>	Least Concern	Least Concern	Not listed
Natal Multimammate Mouse	<i>Mastomys natalensis</i>	Least Concern	Least Concern	Not listed
Honey Badger	<i>Mellivora capensis</i>	Least Concern	Near Threatened	Not listed
Lesser Long-fingered Bat	<i>Miniopterus fraterculus</i>	Near Threatened	Near Threatened	Not listed
Schreibers' Long-fingered Bat	<i>Miniopterus schreibersii</i>	Near Threatened	Near Threatened	Not listed
Angolan Free-tailed Bat	<i>Mops condylurus</i>	Least Concern	Least Concern	Not listed
Midas Free-tailed Bat	<i>Mops midas</i>	Least Concern	Least Concern	Not listed
Banded Mongoose	<i>Mungos mungo</i>	Least Concern	Least Concern	Not listed
Desert Pygmy Mouse	<i>Mus indutus</i>	Least Concern	Least Concern	Not listed
Pygmy Mouse	<i>Mus minutoides</i>	Least Concern	Least Concern	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Thomas' Pygmy Mouse	<i>Mus neavei</i>	Least Concern	Data Deficient	Not listed
Dark-footed Forest Shrew	<i>Myosorex cafer</i>	Least Concern	Data Deficient	Not listed
Forest Shrew	<i>Myosorex varius</i>	Least Concern	Data Deficient	Not listed
Rufous Hairy Bat	<i>Myotis bocagei</i>	Least Concern	Data Deficient	Not listed
Temminck's Hairy Bat	<i>Myotis tricolor</i>	Not Evaluated	Near Threatened	Not listed
Welwitsch's Hairy Bat	<i>Myotis welwitschii</i>	Least Concern	Near Threatened	Not listed
Gunning's Golden Mole	<i>Neamblysomus gunningi</i>	Vulnerable	Endangered	Endangered
Juliana's Golden Mole	<i>Neamblysomus julianae</i>	Critically Endangered	Vulnerable	Vulnerable
Cape Serotine Bat	<i>Neoromicia capensis</i>	Least Concern	Least Concern	Not listed
Banana Bat	<i>Neoromicia nanus</i>	Least Concern	Least Concern	Not listed
Aloe Bat	<i>Neoromicia zuluensis</i>	Near Threatened	Least Concern	Not listed
Common Slit-faced Bat	<i>Nycteris thebaica</i>	Least Concern	Least Concern	Not listed
Wood's Slit-faced Bat	<i>Nycteris woodi</i>	Near Threatened	Near Threatened	Not listed
Schlieffen's Bat	<i>Nycticeinops schlieffeni</i>	Near Threatened	Least Concern	Not listed
Klipspringer	<i>Oreotragus oreotragus</i>	Least Concern	Least Concern	Not listed
Antbear	<i>Orycteropus afer</i>	Least Concern	Least Concern	Not listed
Gemsbuck	<i>Oryx gazella</i>	Least Concern	Least Concern	Not listed
Bat-eared Fox	<i>Otocyon megalotis</i>	Least Concern	Least Concern	Not listed
Thick-tailed Bushbaby	<i>Otolemur crassicaudatus</i>	Least Concern	Least Concern	Not listed
Angoni Vlei Rat	<i>Otomys angoniensis</i>	Least Concern	Least Concern	Not listed
Vlei Rat	<i>Otomys irroratus</i>	Least Concern	Least Concern	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Laminate Vlei Rat	<i>Otomys laminatus</i>	Least Concern	Least Concern	Not listed
Leopard	<i>Panthera pardus</i>	Least Concern	Least Concern	Vulnerable
Chacma Baboon	<i>Papio ursinus</i>	Least Concern	Least Concern	Not listed
Selous' Mongoose	<i>Paracynictis selousi</i>	Least Concern	Data Deficient	Not listed
Tree Squirrel	<i>Paraxerus cepapi</i>	Least Concern	Least Concern	Not listed
Springhare	<i>Pedetes capensis</i>	Vulnerable	Least Concern	Not listed
Grey Rhebok	<i>Pelea capreolus</i>	Least Concern	Least Concern	Not listed
Four-toed Elephant-shrew	<i>Petrodromus tetradactylus</i>	Least Concern	Endangered	Endangered
Warthog	<i>Phacochoerus africanus</i>	Least Concern	Least Concern	Not listed
Anchieta's Pipistrelle	<i>Pipistrellus anchietae</i>	Vulnerable	Near Threatened	Not listed
Kuhl's Pipistrelle	<i>Pipistrellus hesperidus</i>	Least Concern	Least Concern	Not listed
Rusty Bat	<i>Pipistrellus rusticus</i>	Least Concern	Near Threatened	Not listed
African Weasel	<i>Poecilogale albinucha</i>	Least Concern	Data Deficient	Not listed
Bushpig	<i>Potamochoerus porcus koiropotamus</i>	Least Concern	Least Concern	Not listed
Rock Dassie	<i>Procavia capensis</i>	Least Concern	Least Concern	Not listed
Jameson's Red Rock Rabbit	<i>Pronolagus randensis</i>	Least Concern	Least Concern	Not listed
Hewitt's Red Rock Rabbit	<i>Pronolagus saundersiae</i>	Least Concern	Least Concern	Not listed
Aardwolf	<i>Proteles cristatus</i>	Least Concern	Least Concern	Not listed
Steenbuck	<i>Raphicerus campestris</i>	Least Concern	Least Concern	Not listed
Sharp's Grysback	<i>Raphicerus sharpei</i>	Least Concern	Near Threatened	Protected
Common Reedbuck	<i>Redunca arundinum</i>	Least Concern	Least Concern	Protected
Mountain Reedbuck	<i>Redunca fulvorufula</i>	Least Concern	Least Concern	Not listed
Striped Mouse	<i>Rhabdomys pumilio</i>	Least Concern	Least Concern	Not listed



Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Peak-saddle Horseshoe Bat	<i>Rhinolophus blasii</i>	Least Concern	Vulnerable	Not listed
Geoffroy's Horseshoe Bat	<i>Rhinolophus clivosus</i>	Least Concern	Near Threatened	Not listed
Darling's Horseshoe Bat	<i>Rhinolophus darlingi</i>	Least Concern	Near Threatened	Not listed
Rüppell's Horseshoe Bat	<i>Rhinolophus fumigatus</i>	Least Concern	Near Threatened	Not listed
Hildebrandt's Horseshoe Bat	<i>Rhinolophus hildebrandtii</i>	Least Concern	Near Threatened	Not listed
Lander's Horseshoe Bat	<i>Rhinolophus landeri</i>	Least Concern	Near Threatened	Not listed
Bushveld Horseshoe Bat	<i>Rhinolophus simulator</i>	Least Concern	Least Concern	Not listed
Swinny's Horseshoe Bat	<i>Rhinolophus swinnyi</i>	Least Concern	Endangered	Not listed
Meller's Mongoose	<i>Rhynchogale melleri</i>	Least Concern	Data Deficient	Not listed
Egyptian Fruit Bat	<i>Rousettus aegyptiacus</i>	Least Concern	Least Concern	Not listed
Pouched Mouse	<i>Saccostomus campestris</i>	Least Concern	Least Concern	Not listed
Flat-headed Free-tailed Bat	<i>Sauromys petrophilus</i>	Least Concern	Least Concern	Not listed
Yellow House Bat	<i>Scotophilus dinganii</i>	Least Concern	Least Concern	Not listed
Lesser Yellow House Bat	<i>Scotophilus viridis</i>	Least Concern	Least Concern	Not listed
Krebs's Fat Mouse	<i>Steatomys krebsii</i>	Least Concern	Least Concern	Not listed
Fat Mouse	<i>Steatomys pratensis</i>	Near Threatened	Least Concern	Not listed
Least Dwarf Shrew	<i>Suncus infinitesimus</i>	Least Concern	Data Deficient	Not listed
Greater Dwarf Shrew	<i>Suncus lixus</i>	Least Concern	Data Deficient	Not listed
Lesser Dwarf Shrew	<i>Suncus varilla</i>	Least Concern	Data Deficient	Not listed





Common Name	Scientific Name	IUCN Status (Global)	IUCN Status (National)	NEMBA Status
Common Duiker	<i>Sylvicapra grimmia</i>	Least Concern	Least Concern	Not listed
Buffalo	<i>Syncerus caffer</i>	Least Concern	Least Concern	Not listed
Egyptian Free-tailed Bat	<i>Tadarida aegyptiaca</i>	Least Concern	Least Concern	Not listed
Mauritian Tomb Bat	<i>Taphozous mauritanus</i>	Least Concern	Least Concern	Not listed
Highveld Gerbil	<i>Tatera brantsii</i>	Least Concern	Least Concern	Not listed
Bushveld Gerbil	<i>Tatera leucogaster</i>	Least Concern	Data Deficient	Not listed
Common Eland	<i>Taurotragus oryx</i>	Least Concern	Least Concern	Not listed
Tree Rat	<i>Thallomys paedulus</i>	Least Concern	Least Concern	Not listed
Greater Cane Rat	<i>Thryonomys swinderianus</i>	Least Concern	Least Concern	Not listed
Nyala	<i>Tragelaphus angasii</i>	Least Concern	Least Concern	Not listed
Bushbuck	<i>Tragelaphus scriptus</i>	Least Concern	Least Concern	Not listed
Kudu	<i>Tragelaphus strepsiceros</i>	Least Concern	Least Concern	Not listed
Cape Fox	<i>Vulpes chama</i>	Least Concern	Least Concern	Protected

**Appendix D: List of expected bird species**

<b>2428BB</b>	<b>2429AA</b>
1 Ostrich	Ostrich
6 Great Crested Grebe	6 Great Crested Grebe
8 Dabchick	8 Dabchick
50 Pinkbacked Pelican	50 Pinkbacked Pelican
55 Whitebreasted Cormorant	55 Whitebreasted Cormorant
58 Reed Cormorant	58 Reed Cormorant
60 Darter	60 Darter
62 Grey Heron	62 Grey Heron
63 Blackheaded Heron	63 Blackheaded Heron
64 Goliath Heron	64 Goliath Heron
65 Purple Heron	65 Purple Heron
66 Great White Egret	66 Great White Egret
67 Little Egret	67 Little Egret
68 Yellowbilled Egret	68 Yellowbilled Egret
69 Black Egret	69 Black Egret
71 Cattle Egret	71 Cattle Egret
72 Squacco Heron	72 Squacco Heron
74 Greenbacked Heron	74 Greenbacked Heron
76 Blackcrowned Night Heron	76 Blackcrowned Night Heron
77 Whitebacked Night Heron	77 Whitebacked Night Heron
78 Little Bittern	78 Little Bittern
79 Dwarf Bittern	79 Dwarf Bittern
81 Hamerkop	81 Hamerkop
83 White Stork	83 White Stork
84 Black Stork	84 Black Stork



<b>2428BB</b>	<b>2429AA</b>
85 Abdim's Stork	85 Abdim's Stork
89 Marabou Stork	89 Marabou Stork
90 Yellowbilled Stork	90 Yellowbilled Stork
91 Sacred Ibis	91 Sacred Ibis
93 Glossy Ibis	92 Bald Ibis
94 Hadedda Ibis	93 Glossy Ibis
95 African Spoonbill	94 Hadedda Ibis
96 Greater Flamingo	95 African Spoonbill
97 Lesser Flamingo	96 Greater Flamingo
99 Whitefaced Duck	97 Lesser Flamingo
100 Fulvous Duck	99 Whitefaced Duck
101 Whitebacked Duck	100 Fulvous Duck
102 Egyptian Goose	101 Whitebacked Duck
104 Yellowbilled Duck	102 Egyptian Goose
105 African Black Duck	104 Yellowbilled Duck
106 Cape Teal	105 African Black Duck
107 Hottentot Teal	106 Cape Teal
108 Redbilled Teal	107 Hottentot Teal
112 Cape Shoveller	108 Redbilled Teal
113 Southern Pochard	109 Pintail
115 Knobbilled Duck	112 Cape Shoveller
116 Spurwinged Goose	113 Southern Pochard
117 Maccoa Duck	114 Pygmy Goose
118 Secretarybird	115 Knobbilled Duck
122 Cape Vulture	116 Spurwinged Goose
123 Whitebacked Vulture	117 Maccoa Duck



<b>2428BB</b>	<b>2429AA</b>
124 Lappetfaced Vulture	118 Secretarybird
126 Black Kite	120 Egyptian Vulture
126.1 Yellowbilled Kite	122 Cape Vulture
127 Blackshouldered Kite	123 Whitebacked Vulture
128 Cuckoo Hawk	124 Lappetfaced Vulture
130 Honey Buzzard	126 Black Kite
131 Black Eagle	126.1 Yellowbilled Kite
132 Tawny Eagle	127 Blackshouldered Kite
133 Steppe Eagle	128 Cuckoo Hawk
135 Wahlberg's Eagle	130 Honey Buzzard
136 Booted Eagle	131 Black Eagle
137 African Hawk Eagle	132 Tawny Eagle
138 Ayres' Eagle	133 Steppe Eagle
140 Martial Eagle	135 Wahlberg's Eagle
142 Brown Snake Eagle	136 Booted Eagle
143 Blackbreasted Snake Eagle	137 African Hawk Eagle
148 African Fish Eagle	138 Ayres' Eagle
149 Steppe Buzzard	140 Martial Eagle
152 Jackal Buzzard	142 Brown Snake Eagle
154 Lizard Buzzard	143 Blackbreasted Snake Eagle
156 Ovambo Sparrowhawk	148 African Fish Eagle
157 Little Sparrowhawk	149 Steppe Buzzard
158 Black Sparrowhawk	152 Jackal Buzzard
159 Little Banded Goshawk	154 Lizard Buzzard
160 African Goshawk	156 Ovambo Sparrowhawk
161 Gabar Goshawk	157 Little Sparrowhawk



<b>2428BB</b>	<b>2429AA</b>
162 Pale Chanting Goshawk	158 Black Sparrowhawk
164 Eurasian Marsh Harrier	159 Little Banded Goshawk
165 African Marsh Harrier	160 African Goshawk
166 Montagu's Harrier	161 Gabar Goshawk
167 Pallid Harrier	162 Pale Chanting Goshawk
169 Gymnogone	164 Eurasian Marsh Harrier
170 Osprey	165 African Marsh Harrier
171 Peregrine Falcon	166 Montagu's Harrier
172 Lanner Falcon	167 Pallid Harrier
173 Northern Hobby Falcon	169 Gymnogone
179 Western Redfooted Kestrel	170 Osprey
180 Eastern Redfooted Kestrel	171 Peregrine Falcon
181 Rock Kestrel	172 Lanner Falcon
182 Greater Kestrel	173 Northern Hobby Falcon
183 Lesser Kestrel	179 Western Redfooted Kestrel
188 Coqui Francolin	180 Eastern Redfooted Kestrel
189 Crested Francolin	181 Rock Kestrel
191 Shelley's Francolin	182 Greater Kestrel
196 Natal Francolin	183 Lesser Kestrel
199 Swainson's Francolin	188 Coqui Francolin
200 Common Quail	189 Crested Francolin
201 Harlequin Quail	191 Shelley's Francolin
203 Helmeted Guineafowl	196 Natal Francolin
205 Kurrichane Buttonquail	199 Swainson's Francolin
208 Blue Crane	200 Common Quail
210 African Rail	201 Harlequin Quail



<b>2428BB</b>	<b>2429AA</b>
211 Corncrake	203 Helmeted Guineafowl
212 African Crake	205 Kurrichane Buttonquail
213 Black Crake	208 Blue Crane
214 Spotted Crake	210 African Rail
215 Baillon's Crake	211 Corncrake
217 Redchested Flufftail	212 African Crake
223 Purple Gallinule	213 Black Crake
226 Common Moorhen	214 Spotted Crake
227 Lesser Moorhen	215 Baillon's Crake
228 Redknobbed Coot	217 Redchested Flufftail
229 African Finfoot	223 Purple Gallinule
231 Stanley's Bustard	226 Common Moorhen
233 Whitebellied Korhaan	227 Lesser Moorhen
237 Redcrested Korhaan	228 Redknobbed Coot
239.1 Whitewinged Korhaan	229 African Finfoot
240 African Jacana	231 Stanley's Bustard
242 Old World Painted Snipe	233 Whitebellied Korhaan
245 Ringed Plover	237 Redcrested Korhaan
248 Kittlitz's Plover	239.1 Whitewinged Korhaan
249 Threebanded Plover	240 African Jacana
252 Caspian Plover	242 Old World Painted Snipe
255 Crowned Plover	245 Ringed Plover
258 Blacksmith Plover	248 Kittlitz's Plover
260 Wattled Plover	249 Threebanded Plover
264 Common Sandpiper	252 Caspian Plover
265 Green Sandpiper	255 Crowned Plover





<b>2428BB</b>	<b>2429AA</b>
266 Wood Sandpiper	258 Blacksmith Plover
269 Marsh Sandpiper	260 Wattled Plover
270 Greenshank	264 Common Sandpiper
272 Curlew Sandpiper	265 Green Sandpiper
274 Little Stint	266 Wood Sandpiper
281 Sanderling	269 Marsh Sandpiper
284 Ruff	270 Greenshank
286 Ethiopian Snipe	272 Curlew Sandpiper
290 Whimbrel	274 Little Stint
294 Pied Avocet	281 Sanderling
295 Blackwinged Stilt	284 Ruff
297 Spotted Dikkop	286 Ethiopian Snipe
298 Water Dikkop	290 Whimbrel
300 Temminck's Courser	294 Pied Avocet
303 Bronzewinged Courser	295 Blackwinged Stilt
315 Greyheaded Gull	297 Spotted Dikkop
338 Whiskered Tern	300 Temminck's Courser
339 Whitewinged Tern	303 Bronzewinged Courser
347 Doublebanded Sandgrouse	315 Greyheaded Gull
348 Feral Pigeon	338 Whiskered Tern
349 Rock Pigeon	339 Whitewinged Tern
350 Rameron Pigeon	347 Doublebanded Sandgrouse
352 Redeyed Dove	348 Feral Pigeon
354 Cape Turtle Dove	349 Rock Pigeon
355 Laughing Dove	350 Rameron Pigeon
356 Namaqua Dove	352 Redeyed Dove



<b>2428BB</b>	<b>2429AA</b>
358 Greenspotted Dove	354 Cape Turtle Dove
361 African Green Pigeon	355 Laughing Dove
373 Grey Lourie	356 Namaqua Dove
374 Eurasian Cuckoo	358 Greenspotted Dove
375 African Cuckoo	361 African Green Pigeon
377 Redchested Cuckoo	373 Grey Lourie
378 Black Cuckoo	374 Eurasian Cuckoo
380 Great Spotted Cuckoo	375 African Cuckoo
381 Striped Cuckoo	377 Redchested Cuckoo
382 Jacobin Cuckoo	378 Black Cuckoo
385 Klaas's Cuckoo	380 Great Spotted Cuckoo
386 Diederik Cuckoo	381 Striped Cuckoo
391 Burchell's Coucal	382 Jacobin Cuckoo
392 Barn Owl	385 Klaas's Cuckoo
393 Grass Owl	386 Diederik Cuckoo
395 Marsh Owl	391 Burchell's Coucal
396 African Scops Owl	392 Barn Owl
397 Whitefaced Owl	393 Grass Owl
398 Pearlspotted Owl	395 Marsh Owl
400 Cape Eagle Owl	396 African Scops Owl
401 Spotted Eagle Owl	397 Whitefaced Owl
402 Giant Eagle Owl	398 Pearlspotted Owl
404 Eurasian Nightjar	400 Cape Eagle Owl
405 Fierynecked Nightjar	401 Spotted Eagle Owl
406 Rufouscheeked Nightjar	402 Giant Eagle Owl
408 Freckled Nightjar	404 Eurasian Nightjar



<b>2428BB</b>	<b>2429AA</b>
411 Eurasian Swift	405 Fierynecked Nightjar
412 Black Swift	406 Rufouscheeked Nightjar
415 Whiterumped Swift	408 Freckled Nightjar
416 Horus Swift	411 Eurasian Swift
417 Little Swift	412 Black Swift
418 Alpine Swift	415 Whiterumped Swift
421 Palm Swift	416 Horus Swift
424 Speckled Mousebird	417 Little Swift
425 Whitebacked Mousebird	418 Alpine Swift
426 Redfaced Mousebird	421 Palm Swift
428 Pied Kingfisher	424 Speckled Mousebird
429 Giant Kingfisher	425 Whitebacked Mousebird
430 Halfcollared Kingfisher	426 Redfaced Mousebird
431 Malachite Kingfisher	428 Pied Kingfisher
432 Pygmy Kingfisher	429 Giant Kingfisher
433 Woodland Kingfisher	430 Halfcollared Kingfisher
435 Brownhooded Kingfisher	431 Malachite Kingfisher
436 Greyhooded Kingfisher	432 Pygmy Kingfisher
437 Striped Kingfisher	433 Woodland Kingfisher
438 Eurasian Bee-eater	435 Brownhooded Kingfisher
440 Bluecheeked Bee-eater	437 Striped Kingfisher
441 Carmine Bee-eater	438 Eurasian Bee-eater
443 Whitefronted Bee-eater	441 Carmine Bee-eater
444 Little Bee-eater	443 Whitefronted Bee-eater
445 Swallowtailed Bee-eater	444 Little Bee-eater
446 Eurasian Roller	445 Swallowtailed Bee-eater



<b>2428BB</b>	<b>2429AA</b>
447 Lilacbreasted Roller	446 Eurasian Roller
449 Purple Roller	447 Lilacbreasted Roller
451 African Hoopoe	449 Purple Roller
452 Redbilled Woodhoopoe	451 African Hoopoe
454 Scimitarbilled Woodhoopoe	452 Redbilled Woodhoopoe
457 Grey Hornbill	454 Scimitarbilled Woodhoopoe
458 Redbilled Hornbill	457 Grey Hornbill
459 Southern Yellowbilled Hornbill	458 Redbilled Hornbill
464 Blackcollared Barbet	459 Southern Yellowbilled Hornbill
465 Pied Barbet	464 Blackcollared Barbet
470 Yellowfronted Tinker Barbet	465 Pied Barbet
473 Crested Barbet	470 Yellowfronted Tinker Barbet
474 Greater Honeyguide	473 Crested Barbet
476 Lesser Honeyguide	474 Greater Honeyguide
478 Sharpbilled Honeyguide	476 Lesser Honeyguide
481 Bennett's Woodpecker	478 Sharpbilled Honeyguide
483 Goldentailed Woodpecker	481 Bennett's Woodpecker
486 Cardinal Woodpecker	483 Goldentailed Woodpecker
487 Bearded Woodpecker	486 Cardinal Woodpecker
489 Redthroated Wryneck	487 Bearded Woodpecker
492 Melodious Lark	489 Redthroated Wryneck
493 Monotonous Lark	492 Melodious Lark
494 Rufousnaped Lark	493 Monotonous Lark
496 Flappet Lark	494 Rufousnaped Lark
497 Fawncoloured Lark	496 Flappet Lark



<b>2428BB</b>	<b>2429AA</b>
498 Sabota Lark	497 Fawncoloured Lark
501 Shortclawed Lark	498 Sabota Lark
505 Dusky Lark	501 Shortclawed Lark
507 Redcapped Lark	506 Spikeheeled Lark
515 Chestnutbacked Finchlark	507 Redcapped Lark
516 Greybacked Finchlark	515 Chestnutbacked Finchlark
518 Eurasian Swallow	518 Eurasian Swallow
520 Whitethroated Swallow	520 Whitethroated Swallow
523 Pearlbreasted Swallow	523 Pearlbreasted Swallow
524 Redbreasted Swallow	524 Redbreasted Swallow
526 Greater Striped Swallow	526 Greater Striped Swallow
527 Lesser Striped Swallow	527 Lesser Striped Swallow
528 South African Cliff Swallow	528 South African Cliff Swallow
529 Rock Martin	529 Rock Martin
530 House Martin	530 House Martin
532 Sand Martin	532 Sand Martin
533 Brownthroated Martin	533 Brownthroated Martin
534 Banded Martin	534 Banded Martin
538 Black Cuckooshrike	538 Black Cuckooshrike
541 Forktailed Drongo	541 Forktailed Drongo
543 Eurasian Golden Oriole	543 Eurasian Golden Oriole
545 Blackheaded Oriole	545 Blackheaded Oriole
547 Black Crow	547 Black Crow
548 Pied Crow	548 Pied Crow
552 Ashy Tit	552 Ashy Tit
554 Southern Black Tit	554 Southern Black Tit



<b>2428BB</b>	<b>2429AA</b>
557 Cape Penduline Tit	557 Cape Penduline Tit
558 Grey Penduline Tit	558 Grey Penduline Tit
560 Arrowmarked Babbler	560 Arrowmarked Babbler
568 Blackeyed Bulbul	568 Blackeyed Bulbul
569 Terrestrial Bulbul	569 Terrestrial Bulbul
576 Kurrichane Thrush	572 Sombre Bulbul
580 Groundscraper Thrush	576 Kurrichane Thrush
581 Cape Rockthrush	580 Groundscraper Thrush
583 Shorttoed Rockthrush	581 Cape Rockthrush
586 Mountain Chat	583 Shorttoed Rockthrush
587 Capped Wheatear	586 Mountain Chat
589 Familiar Chat	587 Capped Wheatear
593 Mocking Chat	588 Buffstreaked Chat
595 Anteating Chat	589 Familiar Chat
596 Stonechat	593 Mocking Chat
601 Cape Robin	595 Anteating Chat
602 Whitethroated Robin	596 Stonechat
613 Whitebrowed Robin	601 Cape Robin
615 Kalahari Robin	602 Whitethroated Robin
619 Garden Warbler	613 Whitebrowed Robin
620 Whitethroat	615 Kalahari Robin
621 Titbabbler	619 Garden Warbler
625 Icterine Warbler	620 Whitethroat
626 Olivetree Warbler	621 Titbabbler
628 Great Reed Warbler	625 Icterine Warbler
631 African Marsh Warbler	626 Olivetree Warbler





<b>2428BB</b>	<b>2429AA</b>
633 Eurasian Marsh Warbler	628 Great Reed Warbler
634 Eurasian Sedge Warbler	631 African Marsh Warbler
635 Cape Reed Warbler	633 Eurasian Marsh Warbler
638 African Sedge Warbler	634 Eurasian Sedge Warbler
643 Willow Warbler	635 Cape Reed Warbler
645 Barthroated Apalis	638 African Sedge Warbler
651 Longbilled Crombec	643 Willow Warbler
653 Yellowbellied Eremomela	645 Barthroated Apalis
655 Greencapped Eremomela	648 Yellowbreasted Apalis
656 Burntnecked Eremomela	651 Longbilled Crombec
657.1 Greybacked Bleating Warbler	653 Yellowbellied Eremomela
658 Desert Barred Warbler	655 Greencapped Eremomela
661 Grassbird	656 Burntnecked Eremomela
664 Fantailed Cisticola	657.1 Greybacked Bleating Warbler
665 Desert Cisticola	658 Desert Barred Warbler
666 Cloud Cisticola	661 Grassbird
667 Ayres' Cisticola	664 Fantailed Cisticola
671 Tinkling Cisticola	665 Desert Cisticola
672 Rattling Cisticola	666 Cloud Cisticola
677 Levillant's Cisticola	667 Ayres' Cisticola
679 Lazy Cisticola	671 Tinkling Cisticola
681 Neddicky	672 Rattling Cisticola
683 Tawnyflanked Prinia	677 Levillant's Cisticola
685 Blackchedsted Prinia	679 Lazy Cisticola
689 Spotted Flycatcher	681 Neddicky



<b>2428BB</b>	<b>2429AA</b>
691 Bluegrey Flycatcher	683 Tawnyflanked Prinia
693 Fantailed Flycatcher	685 Blackchested Prinia
694 Black Flycatcher	689 Spotted Flycatcher
695 Marico Flycatcher	691 Bluegrey Flycatcher
696 Pallid Flycatcher	693 Fantailed Flycatcher
698 Fiscal Flycatcher	694 Black Flycatcher
700 Cape Batis	695 Marico Flycatcher
701 Chinspot Batis	696 Pallid Flycatcher
706 Fairy Flycatcher	698 Fiscal Flycatcher
710 Paradise Flycatcher	700 Cape Batis
711 African Pied Wagtail	701 Chinspot Batis
713 Cape Wagtail	706 Fairy Flycatcher
714 Yellow Wagtail	710 Paradise Flycatcher
716 Grassveld Pipit	711 African Pied Wagtail
717 Longbilled Pipit	713 Cape Wagtail
718 Plainbacked Pipit	714 Yellow Wagtail
719 Buffy Pipit	716 Grassveld Pipit
720 Striped Pipit	717 Longbilled Pipit
722 Tree Pipit	718 Plainbacked Pipit
723 Bushveld Pipit	719 Buffy Pipit
727 Orangethroated Longclaw	720 Striped Pipit
731 Lesser Grey Shrike	722 Tree Pipit
732 Fiscal Shrike	723 Bushveld Pipit
733 Redbacked Shrike	727 Orangethroated Longclaw
735 Longtailed Shrike	731 Lesser Grey Shrike
736 Southern Boubou	732 Fiscal Shrike



<b>2428BB</b>	<b>2429AA</b>
739 Crimsonbreasted Shrike	733 Redbacked Shrike
740 Puffback	735 Longtailed Shrike
741 Brubru	736 Southern Boubou
743 Threestreaked Tchagra	739 Crimsonbreasted Shrike
744 Blackcrowned Tchagra	740 Puffback
748 Orangebreasted Bush Shrike	741 Brubru
751 Greyheaded Bush Shrike	743 Threestreaked Tchagra
753 White Helmetshrike	744 Blackcrowned Tchagra
756 Whitecrowned Shrike	747 Gorgeous Bush Shrike
760 Wattled Starling	748 Orangebreasted Bush Shrike
761 Plumcoloured Starling	751 Greyheaded Bush Shrike
762 Burchell's Starling	753 White Helmetshrike
764 Glossy Starling	754 Redbilled Helmetshrike
765 Greater Blue-eared Starling	756 Whitecrowned Shrike
769 Redwinged Starling	760 Wattled Starling
772 Redbilled Oxpecker	761 Plumcoloured Starling
775 Malachite Sunbird	764 Glossy Starling
779 Marico Sunbird	769 Redwinged Starling
785 Greater Doublecollared Sunbird	772 Redbilled Oxpecker
787 Whitebellied Sunbird	774 Gurney's Sugarbird
792 Black Sunbird	775 Malachite Sunbird
796 Cape White-eye	779 Marico Sunbird
799 Whitebrowed Sparrowweaver	785 Greater Doublecollared Sunbird
801 House Sparrow	787 Whitebellied Sunbird
802 Great Sparrow	792 Black Sunbird



<b>2428BB</b>	<b>2429AA</b>
803 Cape Sparrow	796 Cape White-eye
804 Southern Greyheaded Sparrow	799 Whitebrowed Sparrowweaver
805 Yellowthroated Sparrow	801 House Sparrow
806 Scalyfeathered Finch	802 Great Sparrow
807 Thickbilled Weaver	803 Cape Sparrow
810 Spectacled Weaver	804 Southern Greyheaded Sparrow
811 Spottedbacked Weaver	805 Yellowthroated Sparrow
813 Cape Weaver	806 Scalyfeathered Finch
814 Masked Weaver	807 Thickbilled Weaver
815 Lesser Masked Weaver	810 Spectacled Weaver
819 Redheaded Weaver	811 Spottedbacked Weaver
820 Cuckoofinch	813 Cape Weaver
821 Redbilled Quelea	814 Masked Weaver
824 Red Bishop	815 Lesser Masked Weaver
826 Golden Bishop	819 Redheaded Weaver
829 Whitewinged Widow	820 Cuckoofinch
831 Redcollared Widow	821 Redbilled Quelea
832 Longtailed Widow	824 Red Bishop
833 Goldenbacked Pytilia	826 Golden Bishop
834 Melba Finch	827 Yellowrumped Widow
840 Bluebilled Firefinch	829 Whitewinged Widow
841 Jameson's Firefinch	831 Redcollared Widow
842 Redbilled Firefinch	832 Longtailed Widow
844 Blue Waxbill	833 Goldenbacked Pytilia
845 Violeteared Waxbill	834 Melba Finch



<b>2428BB</b>	<b>2429AA</b>
846 Common Waxbill	840 Bluebilled Firefinch
847 Blackcheeked Waxbill	841 Jameson's Firefinch
850 Swee Waxbill	842 Redbilled Firefinch
852 Quail Finch	844 Blue Waxbill
854 Orangebreasted Waxbill	845 Violeteared Waxbill
855 Cutthroat Finch	846 Common Waxbill
856 Redheaded Finch	847 Blackcheeked Waxbill
857 Bronze Mannikin	850 Swee Waxbill
860 Pintailed Whydah	852 Quail Finch
861 Shafttailed Whydah	854 Orangebreasted Waxbill
862 Paradise Whydah	855 Cutthroat Finch
864 Black Widowfinch	856 Redheaded Finch
865 Purple Widowfinch	857 Bronze Mannikin
867 Steelblue Widowfinch	860 Pintailed Whydah
869 Yelloweyed Canary	861 Shafttailed Whydah
870 Blackthroated Canary	862 Paradise Whydah
878 Yellow Canary	864 Black Widowfinch
881 Streakyheaded Canary	865 Purple Widowfinch
884 Goldenbreasted Bunting	867 Steelblue Widowfinch
885 Cape Bunting	869 Yelloweyed Canary
886 Rock Bunting	870 Blackthroated Canary
887 Larklike Bunting	872 Cape Canary
	878 Yellow Canary
	881 Streakyheaded Canary
	884 Goldenbreasted Bunting
	885 Cape Bunting



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<b>2428BB</b>	<b>2429AA</b>
	886 Rock Bunting
	887 Larklike Bunting



## Appendix E: List of expected reptile species

Scientific name	Common name	Distribution within Limpopo
<i>Acanthocercus atricollis</i>	Southern Tree Agama	Limited
<i>Acontias percivali</i>	Percival's Legless Skink	Narrow
<i>Acontias plumbeus</i>	Giant Legless Skink	Limited
<i>Agama aculeata</i>	Ground Agama	Wide
<i>Agama armata</i>	Peter's Ground Agama	Wide
<i>Agama atra</i>	Southern Rock Agama	Limited
<i>Amblyodipsas concolor</i>	Natal Purple glossed Snake	Narrow
<i>Amblyodipsas polylepis</i>	Common Purple glossed Snake	Wide
<i>Aparallactus capensis</i>	Cape Centipede Eater	Wide
<i>Aspidelaps scutatus</i>	Shield nose Snake	Limited
<i>Bitis arietans</i>	Puff Adder	Wide
<i>Causus defilippii</i>	Snouted Night Adder	Limited
<i>Causus rhombeatus</i>	Common Night Adder	Wide
<i>Chamaeleo dilepsis</i>	Flap neck Chameleon	Wide
<i>Cordylus breyeri</i>	Waterberg Girdled Lizard	Narrow
<i>Cordylus tropidosternum</i>	Tropical Girdled Lizard	Limited
<i>Cordylus vandami</i>	Van Dam's Girdled Lizard	Narrow
<i>Cordylus vittifer</i>	Transvaal Girdled Lizard	Wide
<i>Crotaphopeltis hotamboeia</i>	Herald Snake	Wide
<i>Dalophia pistillum</i>	Blunt tailed Worm Lizard	Narrow
<i>Dasypeltis scabra</i>	Common Egg eater	Wide
<i>Dendroaspis polylepsis</i>	Black Mamba	Limited
<i>Dispholidus typus</i>	Boomslang	Wide
<i>Duberria lutrix</i>	Common Slug eater	Wide

Scientific name	Common name	Distribution within Limpopo
<i>Elapsoidea boulengeri</i>	Boulenger's Garter Snake	Limited
<i>Elapsoidea sunderwallii</i>	Sundervall's Garter Snake	Wide
<i>Geochelone pardalis</i>	Leopard Tortoise	Wide
<i>Gerrhosaurus flavigularis</i>	Yellow throated Plated Lizard	Wide
<i>Gerrhosaurus major</i>	Roughscaled Plated Lizard	Limited
<i>Gerrhosaurus nigrolineatus</i>	Black lined Plated Lizard	Limited L
<i>Gerrhosaurus validus</i>	Giant Plated Lizard	Limited
<i>Hemachatus haemachatus</i>	Rinkhals	Limited
<i>Hemidactylus mabouia</i>	Moreau's Tropical House Gecko	Wide
<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko	Limited
<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	Limited
<i>Ichnotropis capensis</i>	Cape Rough scaled Lizard	Limited
<i>Ichnotropis squamulosa</i>	Common Rough scaled Lizard	Wide
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	Limited
<i>Kinixys spekii</i>	Speke's Hinged Tortoise	Limited
<i>Lamprophis aurora</i>	Aurora House Snake	Wide
<i>Lamprophis fuliginosus</i>	Brown House Snake	Wide
<i>Lamprophis guttatus</i>	Spotted House Snake	Limited
<i>Lamprophis inornatus</i>	Olive House Snake	Limited
<i>Leptotyphlops conjunctus</i>	Cape Thread Snake	Limited
<i>Leptotyphlops longicaudus</i>	Long tailed Thread Snake	Limited
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	Wide
<i>Lycodonomorphus rufulus</i>	Common Brown Water Snake	Wide
<i>Lycophidion capense</i>	Cape Wolf Snake	Wide
<i>Lycophidion variegatum</i>	Variegated Wolf Snake	Limited

Scientific name	Common name	Distribution within Limpopo
<i>Lygodactylus capensis</i>	Cape Dwarf Gecko	Wide
<i>Lygosoma sundervallii</i>	Sundervall's Writhing Skink	Limited
<i>Mabuya capensis</i>	Cape Skink	Wide
<i>Mabuya striata</i>	Striped Skink	Wide
<i>Mabuya varia</i>	Variable Skink	Wide
<i>Mehelya capensis</i>	Cape File Snake	Wide
<i>Mehelya nyassae</i>	Black File Snake	Wide
<i>Monopeltis infuscata</i>	Dusky Spade snouted Worm Lizard	Wide
<i>Naja annulifera</i>	Snouted Cobra	Limited
<i>Naja mossambica</i>	Mozambique Spitting Cobra	Wide
<i>Nucras holubi</i>	Holub's Sandveld Lizard	Wide
<i>Nucras intertexta</i>	Spotted Sandveld Lizard	Wide
<i>Nucras ornata</i>	Ornate Sandveld Lizard	Wide
<i>Pachydactylus punctatus</i>	Speckled Thicktoed Gecko	Limited
<i>Pachydactylus turneri</i>	Turner's Thicktoed Gecko	Limited
<i>Panaspis sp.</i>	Spotted neck Snake-eyed Skink	Limited
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	Wide
<i>Pedioplanis lineocellata</i>	Spotted Sand Lizard	Limited
<i>Pelomedusa subrufa</i>	Marsh or Helmeted Terrapin	Wide
<i>Pelusios sinuatus</i>	Serrated Hinged Terrapin	Limited
<i>Philothamnus hoplogaster</i>	Green Water Snake	Wide
<i>Philothamnus natalensis</i>	Eastern Green Snake	Limited
<i>Philothamnus semivariatus</i>	Spotted Bush Snake	Wide
<i>Prosymna bivittata</i>	Twostriped Shovelnout	Limited

Scientific name	Common name	Distribution within Limpopo
<i>Prosymna sundervallii</i>	Sundervall's Shovelnout	Limited
<i>Psammophis brevirostris</i>	Shortsnouted Grass Snake	Wide
<i>Psammophis crucifer</i>	Cross marked Grass Snake	Limited
<i>Psammophis mossambicus</i>	Olive Grass Snake	Wide
<i>Psammophis subtaeniatus</i>	Stripe bellied Sand Snake	Limited
<i>Psammophylax rhombeatus</i>	Rhombic Skaapsteker	Wide
<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker	Wide
<i>Pseudaspis cana</i>	Mole Snake	Wide
<i>Python natalensis</i>	Southern African Python	Wide
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	Wide
<i>Telescopus semiannulatus</i>	Eastern Tiger Snake	Wide
<i>Thelotornis capensis</i>	Vine Snake	Limited
<i>Typhlops bibronii</i>	Bibron's Blind Snake	Wide
<i>Varanus albigularis</i>	Rock Monitor	Wide
<i>Varanus niloticus</i>	Water Monitor	Wide

**Appendix F: List of expected amphibian**

Scientific Name	Common Name	IUCN Status
<i>Afrana angolensis</i>	Common River Frog	
<i>Afrivalus aureus</i>	Golden Leaf-Folding Frog	Rare
<i>Breviceps adspersus</i>	Bushveld Rain Frog	
<i>Bufo fenoulheti</i>	Northern Pygmy Toad	
<i>Bufo garmani</i>	Olive Toad	
<i>Bufo gutturalis</i>	Guttural Toad	
<i>Cacosternum boettgeri</i>	Common Caco	
<i>Hyperolius pickersgilli</i>	Pickersgill's Reed Frog	Rare
<i>Kassina senegalensis</i>	Bubbling Kassina	
<i>Phrynobatrachus mababiensis</i>	Dwarf Puddle Frog	
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	
<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	
<i>Ptychadena anchietae</i>	Plain Grass frog	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	Endangered
<i>Schismaderma carens</i>	Red Toad	
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	
<i>Xenopus laevis</i>	Common Platanna	