

**APPENDIX M**

# Terrestrial Ecology Assessment

**REPORT**

# Terrestrial Ecology Impact Assessment for the Turflakte Project

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1784950-322461-5

August 2019



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## APPENDICES

### APPENDIX A

Location of Flora and Fauna Sampling Points

### APPENDIX B

List of Flora Species Recorded in the Study Area during the Field Programme (Table 1)

and

The BODATSA Flora List for the 2327DA QDC (Table 2)

### APPENDIX C

Mammals Recorded and Potentially Occurring in the Study Area

### APPENDIX D

Birds Recorded and Potentially Occurring in the Study Area (Master list based on SABAP2 records for the 2327DA QDC)

### APPENDIX E

Herpetofauna Recorded and Potentially Occurring in the Study Area

### APPENDIX F

Document Limitations



## 1.0 INTRODUCTION

Golder Associates Africa (Pty) Ltd (Golder) was appointed by Exxaro Coal (Pty) Ltd to conduct a terrestrial ecological assessment of sites associated with the proposed Turfvlakte Project, at Grootegeluk Coal Mine, near the town of Lephalale in the Limpopo Province, South Africa. The terrestrial ecological assessment forms part of the larger Environmental and Social Impact Assessment (ESIA) process, which is aimed at obtaining the necessary rights and authorisations to undertake a proposed mining project.

This report provides a baseline ecological characterisation of the affected portion of the farm Turfvlakte 463 and other sites associated with proposed mine infrastructure.

### 1.1 Location and Delimits of the Study Area

The farm Turfvlakte 463 is located approximately 16 km west of the town of Lephalale in the Limpopo Province (Figure 1). The entire farm is 965 ha in extent and is positioned at the centre of a development triangle formed by the neighbouring Grootegeluk Coal Mine, Eskom's Matimba and Medupi Power Stations, and various facilities associated with these operations.

The majority of proposed mine infrastructure will be located on a 427 ha portion of the Turfvlakte 463 farm, with remaining infrastructure sited on immediately adjacent land (comprising approx. 188 ha). The total extent of the study area for the terrestrial ecological assessment thus totals 615 ha and is shown in Figure 2.

All affected land forms part of the Exxaro-owned Manketti Game Reserve and is characterised by unmodified natural habitat, currently used for game farming and conservation.

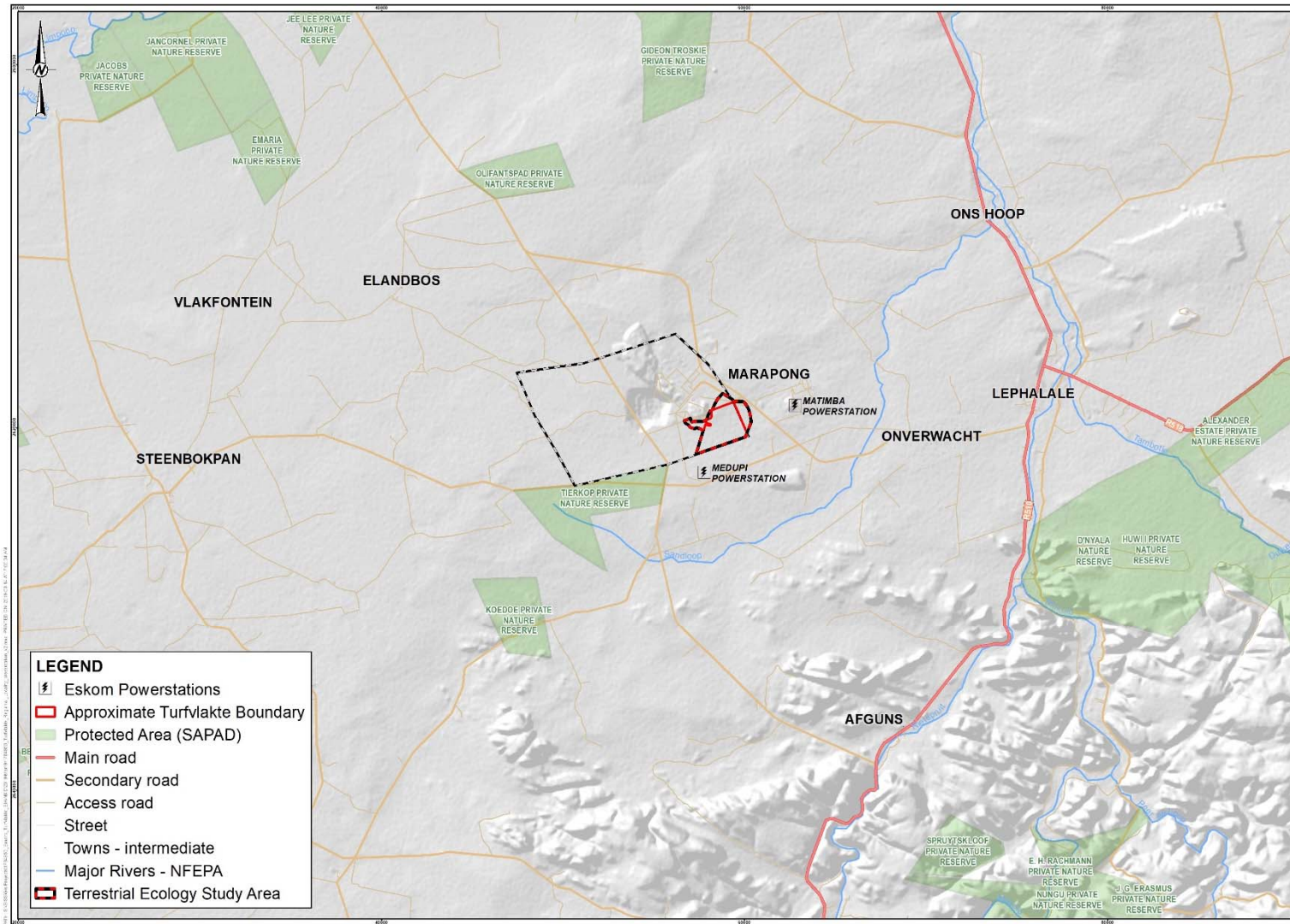


Figure 1: Regional location of the Turfvlakte farm and Grootegeluk Coal Mine



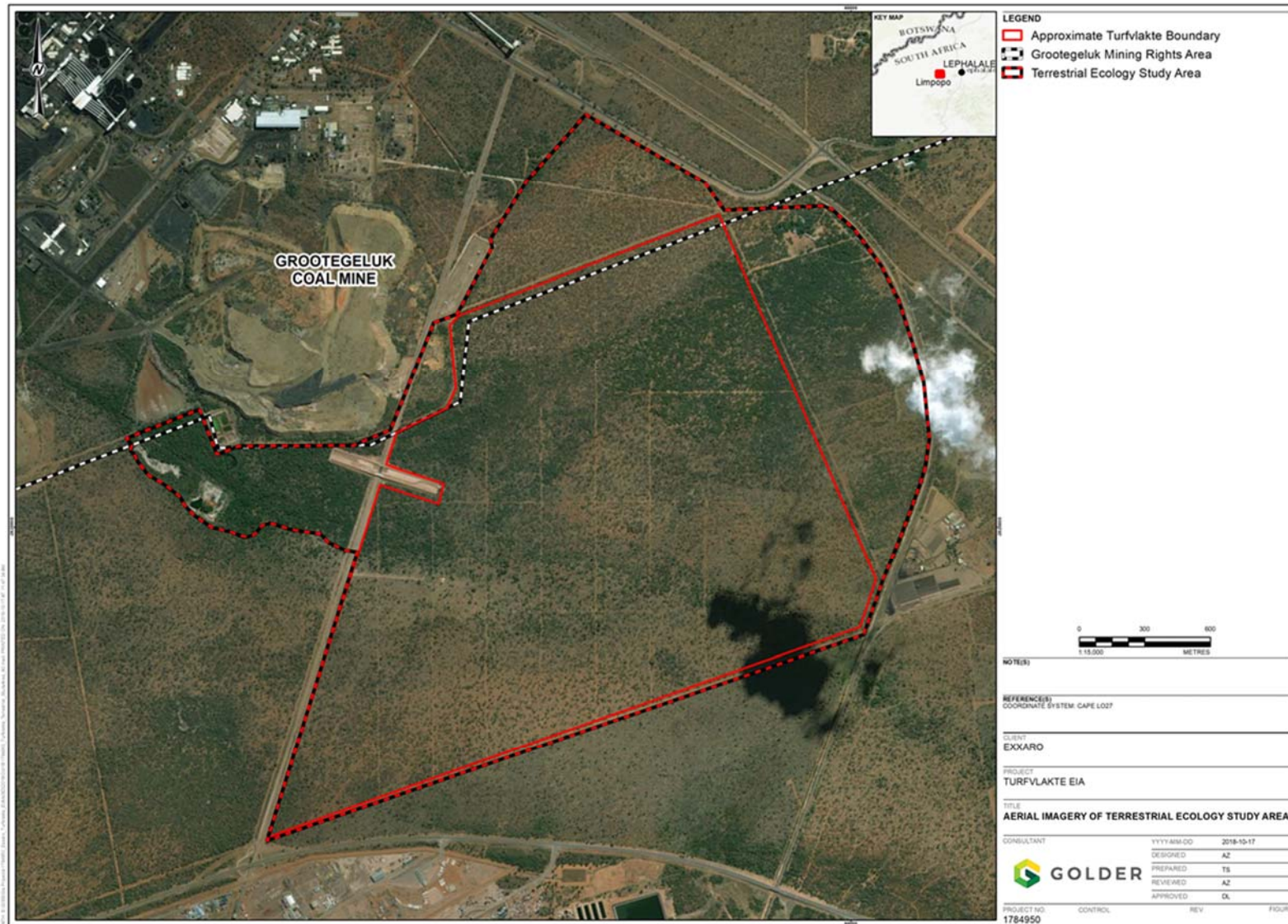


Figure 2: Aerial image of the study area used for the terrestrial ecology study

## 1.2 Terms of Reference

The principal aim of the study was to develop a baseline ecological characterisation of the study area, with which to inform a later impact assessment process. In line with this, specific objectives of the study include:

- Present a baseline description of the study area's terrestrial ecology (i.e. floral and faunal communities);
- Identify species (Red List and protected species) and sites of conservation importance occurring in the study area;
- Identify key ecological processes that occur in the study area and surrounding landscape; and
- Identify potential ecological impacts that should be considered during the environmental impact assessment process.

## 2.0 LEGISLATIVE FRAMEWORK

The following national and provincial legislation were consulted during the study:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998);
- National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004);
- Environment Conservation Act (ECA) (Act No. 73 of 1989);
- Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983);
- National Forests Act (NFA) (Act No. 84 of 1998); and
- Limpopo Environmental Management Act (LEMA) (Act No. 7 of 2003).

## 3.0 STUDY METHODOLOGY

The terrestrial ecological assessment included a literature review and a field programme. The tasks associated with these components are discussed below:

### 3.1 Literature Review

#### 3.1.1 Vegetation Types and Floral Species

- A general habitat description relevant to the study area was obtained from Scholes and Walker (1993) and Mucina and Rutherford (2006);
- The formal conservation context of the region at a national and provincial level was established based on the National List of Threatened Ecosystems (ref. NEMBA Threatened Ecosystems, 2011) and the Limpopo Conservation Plan V2 (2013);
- A list of potential floral species likely to occur in the study area was compiled based primarily on data obtained from the South African National Biodiversity Institute's (SANBI) online Botanical Database of Southern Africa<sup>1</sup> (ref. BODATSA, 2016) for the 2327DA quarter degree square;
- Existing specialist floral studies relevant to the study area were also reviewed as additional data sources. These included Golder (2011, 2012 & 2015) and NSS (2011); and
- A recent draft wetland study of the Turfvlakte farm property was also consulted (ref. GroundTruth, 2018).

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<sup>1</sup> Successor of SANBI's POSA Database

## 3.1.2 Faunal Characterisation

### 3.1.2.1 Mammals

- A list of expected mammal species was compiled by consulting Stuart and Stuart (2007) and MammalMAP (ref. ADU - Virtual Museum, 2015); and
- Additional literature sources consulted for mammal data included Golder (2011, 2012 & 2015) and NSS (2011).

### 3.1.2.2 Birds

- A list of bird species expected for the study area was based on the South African Bird Atlas Project 2 (ADU - SABAP2, 2011) records for the pentads 2335\_2730, 2340\_2730 and 2340\_2735. Additional literature sources consulted for bird data included Golder (2011, 2012 & 2015) and NSS (2011); and
- Marnewick *et al.* (2015) was consulted for a description of the nearby Waterberg System Important Bird Area (IBA).

### 3.1.2.3 Herpetofauna (Reptiles and Amphibians)

- Expected reptile and amphibian species lists were based on the distribution maps presented in Branch (1998), Alexander and Marais (2010) and Bates *et al.* (2014) for reptiles, and Minter *et al.* (2004) and du Preez and Carruthers, (2009) for amphibian species; and
- Additional data were also sourced from the ReptileMAP and FrogMAP (ref. ADU - Virtual Museum, 2015) and from Golder (2011, 2012 & 2015) and NSS (2011).

### 3.1.2.4 Arthropods

Data on arthropods of conservation importance potentially occurring in the study area were obtained from Henning *et al.* (2009) and the records of the ADU - Virtual Museum's (2015) SpiderMAP and ScorpionMAP. Exxaro (2014) was also reviewed with regard to the probable presence of baboon spiders in the study area.

## 3.2 Field Programme

The field programme included two field surveys; a wet-season field survey was undertaken from the 29<sup>th</sup> January to 2<sup>nd</sup> February 2018, and the dry-season survey from the 11<sup>th</sup> to 15<sup>th</sup> June 2018. The programme included both flora and fauna sampling.

Sampling methodologies are discussed in sections 3.2.1 and 3.2.2.

### 3.2.1 Flora Surveys

- Belt transects were used to sample vegetation in the local study area (Tainton, 1999). Transects were approximately 100 X 6 m in dimension and were located in representative habitat/vegetation communities (see APPENDIX A for flora sampling locations);
- Vegetation communities were also traversed on foot and any unusual or unrecorded plant species were documented; and
- Several reference works were used to identify floral species including, *inter alia*; Van Wyk & Van Wyk (1997), Van Wyk & Malan (1998), Smit (1999), Van Oudtshoorn (1999), Coates Palgrave (2002), Schmidt *et al.*, (2007), and Van Der Walt (2009). Flora nomenclature is in line with Germishuizen *et al.*, (2006), although more recent name changes were used where applicable.

## 3.2.2 Fauna Surveys

### 3.2.2.1 Mammals

The mammal survey comprised both active and passive sampling:

- Active sampling included the use of Sherman traps and motion-triggered camera traps. Traps were baited and placed at selected fauna sampling sites in representative vegetation communities (Hoffman *et al.*, 2010) (see APPENDIX A for fauna sampling locations); and
- Passive sampling included the recording of opportunistic observations/encounters of mammals, the identification of mammal tracks, faeces, burrows and feedings signs.

As required, Skinner & Smithers (1990), Stuart & Stuart (2007) and Stuart & Stuart (2013) were used for identification purposes.

### 3.2.2.2 Birds

- Birds were surveyed based on visual and call identification. Birds were searched for by walking slowly through vegetation and recording all species seen or heard. Care was taken to remain at any point of bird activity and record all the species present, particularly mixed species flocks; and
- Incidental observations were also recorded throughout the field survey. Where necessary, identifications were verified using Sinclair *et al.*, (2011) and the Roberts Multimedia Birds of SA Android App. for bird calls.

### 3.2.2.3 Herpetofauna (Reptiles and Amphibians)

Sampling for reptiles and amphibians included both active and passive sampling, and followed the protocols outlined by Eekhout (2010). Sampling methods included:

- Pitfall traps with drift fences – 5 - 10 litre buckets were dug into the ground and linked with plastic drift fences, creating a trapping array – see Figure 3. Trapping arrays were located at fauna sampling sites;
- Funnel trapping – funnel traps were used in conjunction with pitfall traps and drift fences;
- Acoustic identification – night-time acoustic identification was used to survey for amphibians during the wet season field survey; and
- Opportunistic observations/encounters - reptiles and amphibians encountered in the study area during the field programme.

Branch (1998) and Alexander and Marais (2010) were used for reptile identification. du Preez and Carruthers (2009) was used to identify amphibians.

### 3.2.2.4 Arthropods

- Arthropod sampling included the placement of pitfall traps at the fauna survey sites and the recording of species encountered during opportunistic observations;
- Focus groups included ants, ground living beetles, termites, leafhoppers, and scorpions:
  - Special emphasis was placed on determining the presence/possible presence of Baboon spiders (Family Theraphosidae) – as these taxa are of conservation value and are known to occur in the area. This was done through live-catches (in pitfall traps) and by searching for silk-lined burrows; and
- Reference works used to identify arthropods included Leeming (2003), Picker *et al.*, (2004) and Dippenaar-Schoeman (2014). Identification was done to the lowest possible taxonomic level.



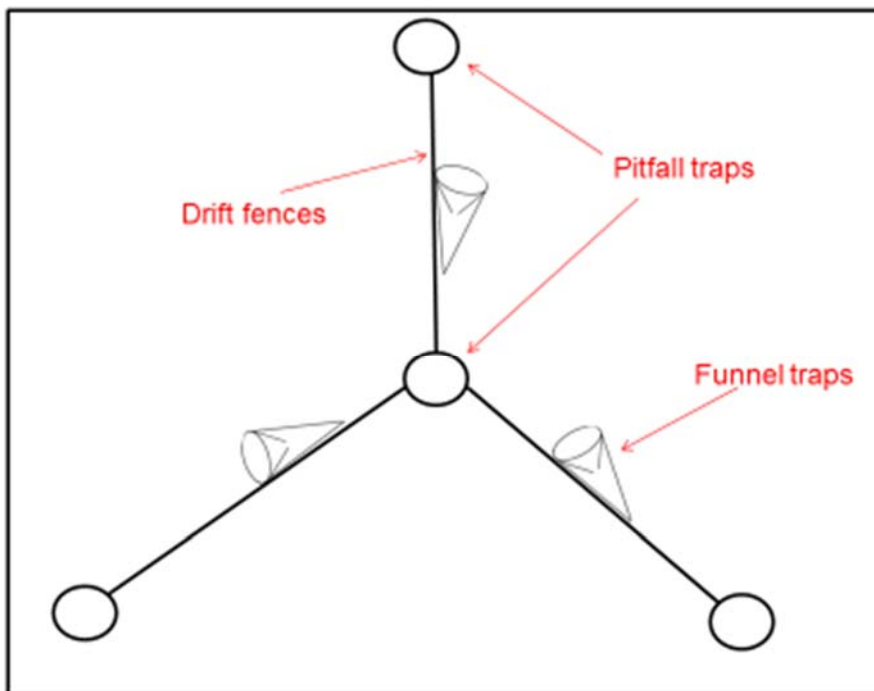


Figure 3: Schematic of a typical pitfall and funnel trap array

### 3.3 Assessment of Biodiversity Value

#### 3.3.1 Vegetation Community Sensitivity Analysis

Based on data collected during the field programme, vegetation communities were described according to their structure and composition. Edwards (1983) was used to guide the structural classification. Vegetation communities were also mapped.

Habitat sensitivity was then determined by subjectively assessing the ecological integrity and conservation importance of identified vegetation communities. The habitat sensitivity criteria presented in Table 1 were developed by Golder Africa and were used to guide the habitat sensitivity analysis.

Table 1: Criteria for rating of habitat sensitivity

| Score       | Ecological Integrity   | Conservation Importance   |
|-------------|--|---|
| <b>HIGH</b> | Habitats of high ecological integrity have compositional, structural and functional characteristics that are close to the natural/sustainable state (i.e. reference conditions). As such, they have a combination of the following attributes: <ul style="list-style-type: none"> <li>■ Key floral and faunal indicators are present or highly likely to be present;</li> <li>■ Large habitat patch that is mostly unfragmented and has a high level of connectivity to adjacent natural habitat patches;</li> </ul> | Habitats of high conservation importance or irreplaceability have one or a combination of the following attributes: <ul style="list-style-type: none"> <li>■ Pristine or relatively undisturbed habitat displaying high species richness;</li> <li>■ Areas playing an important functional role in ecological processes at a landscape scale (e.g. high levels of connectivity, source patches, water attenuation, etc.);</li> <li>■ Niche or relatively rare/unique habitat within the landscape that contributes to overall habitat heterogeneity;</li> </ul> |



| Score             | Ecological Integrity  | Conservation Importance   |
|-------------------|---|---|
|                   | <ul style="list-style-type: none"> <li>■ Has little to no evidence of anthropogenic disturbances (pollution, earth works, etc.); and</li> <li>■ Little or no alien invasive species establishment.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Areas designated by provincial or national authorities as having high conservation importance, sensitivity or irreplaceability; and</li> <li>■ Areas with confirmed presence or high probability of occurrence of Red List and/or protected species.</li> </ul>  |
| <b>MODERATE</b>   | <p>Habitats of moderate ecological integrity have a combination of the following attributes:</p> <ul style="list-style-type: none"> <li>■ Moderate levels of anthropogenic disturbance; and</li> <li>■ Despite disturbances, habitat maintains much of the same functional attributes as areas in a natural/sustainable state.</li> </ul>   | <p>Habitats of moderate conservation importance have a combination of the following attributes:</p> <ul style="list-style-type: none"> <li>■ Intermediate levels of species richness;</li> <li>■ No or low probability of Red List and/or protected species as determined by critical habitat assessments; and</li> <li>■ Disturbed areas that are situated adjacent to habitat of high ecological integrity and/or conservation importance and therefore may play a role as an ecological support area.</li> </ul> |
| <b>LOW</b>        | <p>Habitats of low ecological integrity have a combination of the following attributes:</p> <ul style="list-style-type: none"> <li>■ Severely modified from natural state as a consequence of anthropogenic activities, with poor species richness and all or most key floral and faunal indicators absent;</li> <li>■ Highly fragmented areas, with little or no connectivity to adjacent natural habitat;</li> <li>■ High incidence of alien species establishment; and</li> <li>■ Successful rehabilitation may restore some degree of habitat integrity.</li> </ul> | <p>Habitats of low conservation importance are typically transformed or highly disturbed, with little or no ecological integrity. These areas are species poor and in their current form, play little role in ecological processes and thus cannot contribute toward biodiversity conservation.</p>   |
| <b>Negligible</b> | <p>Completely transformed or developed areas with no natural habitat remaining and limited scope for rehabilitation.</p>  | <p>Completely transformed or developed areas with no natural habitat remaining and limited scope for rehabilitation.</p>  |

### 3.3.2 Species of Conservation Importance

#### 3.3.2.1 Listing Criteria

The Red List and protected status of floral and faunal species occurring or potential occurring in the study area was based on:

- Regional/National Red List Status, as per the International Union for the Conservation of Nature (IUCN) assessment criteria - specifically:
  - Red List of South African Plants Version (SANBI, 2017);
  - Red List of Mammals of South Africa, Lesotho and Swaziland (EWT, 2016);
  - Regional Red List for Birds of South Africa, Lesotho and Swaziland (BirdLife South Africa, 2015b);
  - Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.*, 2014); and
  - Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter *et al.*, 2004).
- National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) - Threatened or Protected Species List (Notice 389 of 2013) (NEMBA ToPS List, 2013);
- National Forests Act (Act No. 84 of 1998) – List of Protected Tree Species (ref. National Forests Act 1998); and
- Limpopo Environmental Management Act (Act No. 7 of 2003), specifically Schedule 2 and 3 concerning Specially Protected and Protected Animals respectively, and Schedule 11 and 12 concerning Specially Protected and Protected Plants respectively (ref. Limpopo Environmental Management Act 2003).

### 3.3.2.2 *Habitat Suitability Assessments*

Based on the lists of species of conservation importance potentially occurring in the study area as per the literature review, the '*probability of occurrence*' of species was determined by conducting habitat suitability assessments. The following parameters were used in the assessments:

- **Habitat requirements:** Most threatened and endemic species have very specific habitat requirements. The presence of these habitats in the study area was evaluated;
- **Habitat status:** The status or ecological condition of available habitat in the area was assessed. Often a high level of habitat degradation will negate the potential presence of sensitive species; and
- **Habitat linkage:** Dispersal and movement between natural areas for breeding and feeding are important population-level processes. Habitat connectivity within the study area and to surrounding natural habitat and corridors was evaluated to determine the likely persistence of species of concern in the study area.

Probability of occurrence is presented in three categories, namely:

- **Possible:** The species may occur on the site, or move through the site (in the case of mobile species), due to potential habitat and/or resources;
- **Probable:** The species is likely to occur on the site due to suitable habitat and resources being present on the site; or
- **Unlikely:** The species will not likely occur on the site due to lack of suitable habitat and resources.

Species that were observed/documentated in the study area during the field programme are listed as **recorded**.

### 3.3.3 *Alien Invasive Floral Species*

Alien invasive plant species were categorised according to the following listings:

- Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983); and/or
- National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) - 2016 listing.

### 3.3.4 Medicinal Flora Species

Assessment of the medicinal value and utility of floral species recorded in the study area was based on Van Wyk *et al.* (2009).

## 4.0 STUDY LIMITATIONS

The following limitations are applicable to this study:

- Little rain had fallen prior to the wet season field visit, and consequently vegetation in the herbaceous layer was mostly dormant/senescent, with negligible new season growth. This prevented an assessment of the composition and abundance of herbaceous species (i.e. grasses, forbs/herbs) during the optimal growing period; and
- The absence or non-recording of a specific floral or faunal species, at a particular time, does not necessarily indicate that 1) the species does not occur there; 2) the species does not utilise resources in that area; or 3) the area does not play an ecological support role in the life-history of that species.

## 5.0 BASELINE ECOLOGICAL CHARACTERISATION OF THE STUDY AREA

### 5.1 General Biophysical Environment

The study area is located in the Limpopo Sweet Bushveld (ref. SVcb19) vegetation type of the savanna biome (Mucina and Rutherford, 2006) (refer to Figure 4). The attributes of the savanna biome and the Limpopo Sweet Bushveld vegetation type are discussed below:

#### 5.1.1 Savanna Biome

The savanna biome is the largest biome in South Africa, covering approximately 35% of the country's land surface (Scholes and Walker, 1993). Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, yet distinct woody plant component. Primary determinants of savanna composition, structure and functioning are; fire, a distinct seasonal climate, substrate type, and browsing and grazing by large herbivores (Scholes and Walker, 1993).

Compositionally, Africa's savannas are distinguished as either fine-leaved savannas or broad-leaved savannas. The distribution of these forms is based primarily on soil fertility (Scholes and Walker, 1993); fine-leaved savannas occur on nutrient rich soils and are dominated by microphyllous woody species of the *Mimosaceae* family (most commonly *Acacias*<sup>2</sup>). These savannas have a productive and diverse herbaceous layer that is dominated by grasses, and can support large populations of mammalian herbivores (Scholes and Walker, 1993).

Conversely, broad-leaved savannas usually occur on nutrient poor soils and are dominated by macrophyllous woody species from the *Combretaceae* family (common genera: *Combretum* & *Terminalia*). Compared to fine-leaved savannas, broad-leaved savannas are less productive and support a lower herbivore biomass (Scholes and Walker, 1993).

#### 5.1.2 Limpopo Sweet Bushveld

Limpopo Sweet Bushveld extends northwards from the lower reaches of the Crocodile and Marico Rivers to the Limpopo Valley and into Botswana. This vegetation type is dominated by elements of Low & Robelo's (1996) Sweet Bushveld and Acocks (1953) Arid Sweet Bushveld (Mucina and Rutherford, 2006).

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<sup>2</sup> Members of the African *Acacia* genus have been parsed into the genera *Vachellia* and *Senegalia* (Kull and Rangan, 2012). The use of the *Acacia* name however, has been retained by many scholars as a colloquial and collective term for Africa's iconic thorn trees.

## Vegetation and Landscape features

Limpopo Sweet Bushveld is characterised by undulating or irregular plains dominated by open woodland. A number of tributaries of the Limpopo River traverse this vegetation type (Mucina and Rutherford, 2006).

### Important Plant Taxa

Based on Mucina & Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type. They note the following species as important taxa in the Limpopo Sweet Bushveld vegetation type:

- **Trees:** *Senegalia burkei*, *S. mellifera* subsp. *detinens*, *Vachellia robusta*, *V. erioloba*, *V. nilotica*, *V. tortilis* subsp. *heteracantha*, *V. fleckii*, *Albizia anthelmintica*, *Boscia albitrunca*, *Combretum apiculatum*, *C. hereroense*, *Commiphora pyracanthoides*, *C. africana*, *Dichrostachys cinerea*, *Peltophorum africanum* and *Terminalia sericea*;
- **Shrubs:** *Ehretia rigida*, *Catophractes alexandri*, *Euclea undulata*, *Rhigozum obovatum*, *Cadaba aphylla*, *Grewia flava*, *Leucosphaera bainesii* and *Diospyros lycioides* subsp. *lycioides*;
- **Graminoids:** *Digitaria eriantha*, *Enneapogon cenchroides*, *Eragrostis lehmanniana*, *E. pallens*, *E. rigidior*, *Panicum maximum*, *P. coloratum*, *Schmidtia pappophoroides*, *Aristida congesta*, *Cymbopogon verticillata*, *Ischaemum afrum*, *Stipagrostis uniplumis* and *Urochloa mossambicensis*;
- **Herbs:** *Acanthosicyos naudinianus*, *Commelina benghalensis*, *Harpagophytum procumbens* subsp. *transvaalense*, *Hemizygia elliotii* and *Hermbstaedia odorata*; and
- **Endemic Taxon:** The succulent herb *Piранthus atosanguineus* is endemic to this region.

## 5.2 Formal Conservation Considerations

### 5.2.1 Limpopo Conservation Plan

The total extent of Limpopo Sweet Bushveld is approximately 1 200 513 ha, of which, about 6.9% has been transformed and 0.6% is protected (Limpopo Conservation Plan V2, 2013). Despite the poor level of formal protection, Limpopo Sweet Bushveld is considered Least Threatened by both the national and provincial biodiversity assessments (Limpopo Conservation Plan V2, 2013).

According to the Limpopo Conservation Plan's mapping of critical biodiversity areas (CBA), the study area is located on land designated as 'Ecological Support Area 1' (see Figure 5). This designation characterises both natural and degraded land that supports CBAs by maintain ecological processes (Limpopo Conservation Plan V2, 2013). The advocated management objective of such land is to limit biodiversity loss by maintaining ecosystem functioning and connectivity, and listed incompatible land uses include, *inter alia*, mining and industry (Limpopo Conservation Plan V2, 2013).

### 5.2.2 Protected Areas

#### Nature Reserves and Conservation Areas

A number of statutorily declared nature reserves, as well as informal conservation areas are present in the broader region surrounding the study area. These include Marakele National Park, D'Nyala Nature Reserve, Welgevonden Private Nature Reserve, Hans Strijdom Nature Reserve and the neighbouring Tierkop Private Nature Reserve. Refer to Figure 1 for a map showing the location of some of the recognised protected areas in region.

### **Important Bird Areas**

The Waterberg System IBA is approximately 1 321 450 ha in extent (Marnewick *et al.*, 2015), comprising the whole Waterberg plateau and dominates the region to the south-east of the study area. The IBA supports populations of several globally and regionally threatened species, including *inter alia*, a significantly large colony of between 800 - 850 pairs of Cape Vulture (*Gyps coprotheres*) (Marnewick *et al.*, 2015).

### **Waterberg Biosphere Reserve**

The Waterberg Biosphere Reserve occupies much (approx. 650 000 ha) of the Waterberg district to the south of the study area. The concept of biosphere reserves is fairly recent and has been recognised by UNESCO as a means to promote the conservation and sustainable use of land within a particular area. The Waterberg Biosphere Reserve is recognised by UNESCO.

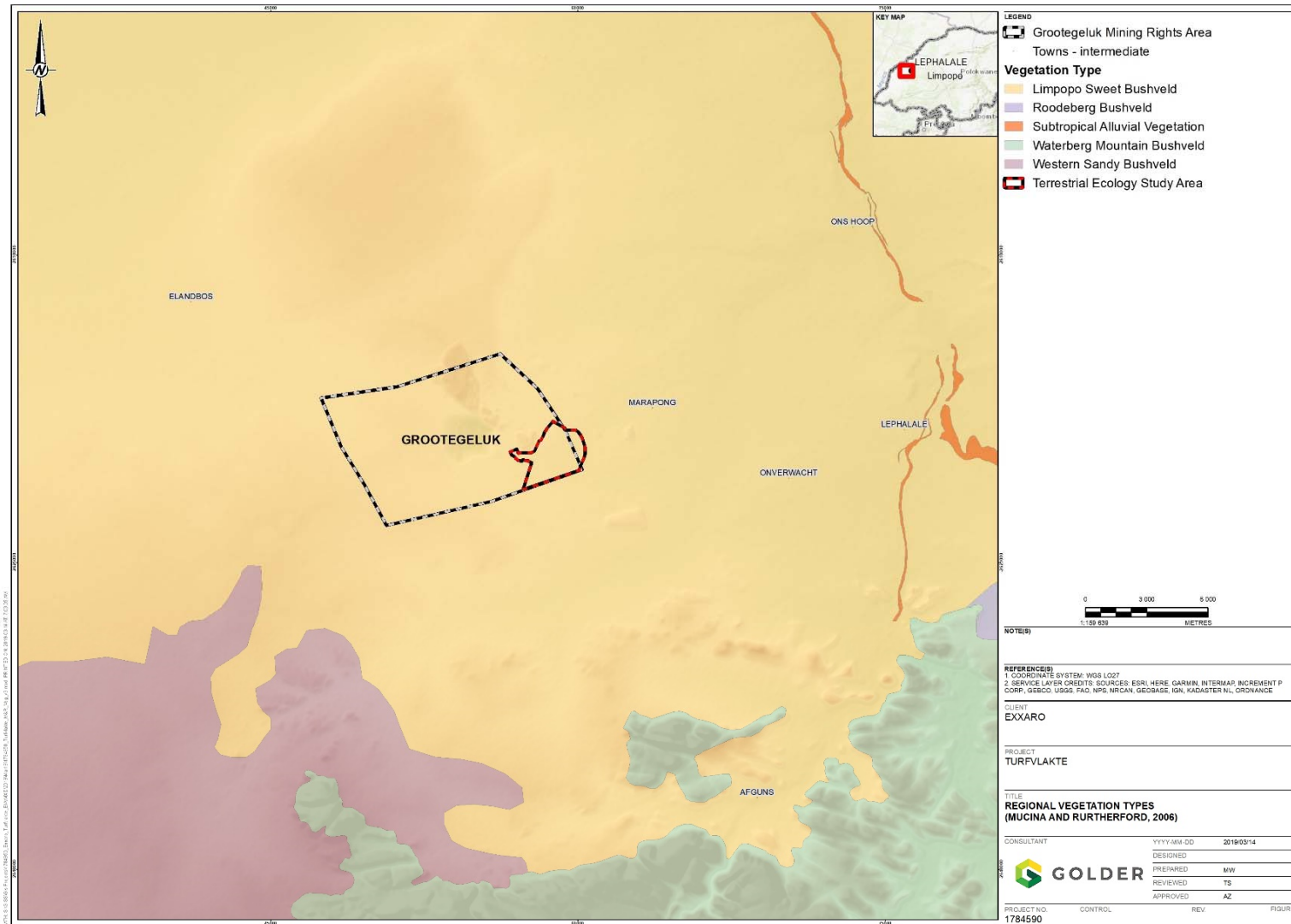


Figure 4: Turfvlakte farm in relation to Mucina & Rutherford’s (2006) regional vegetation types

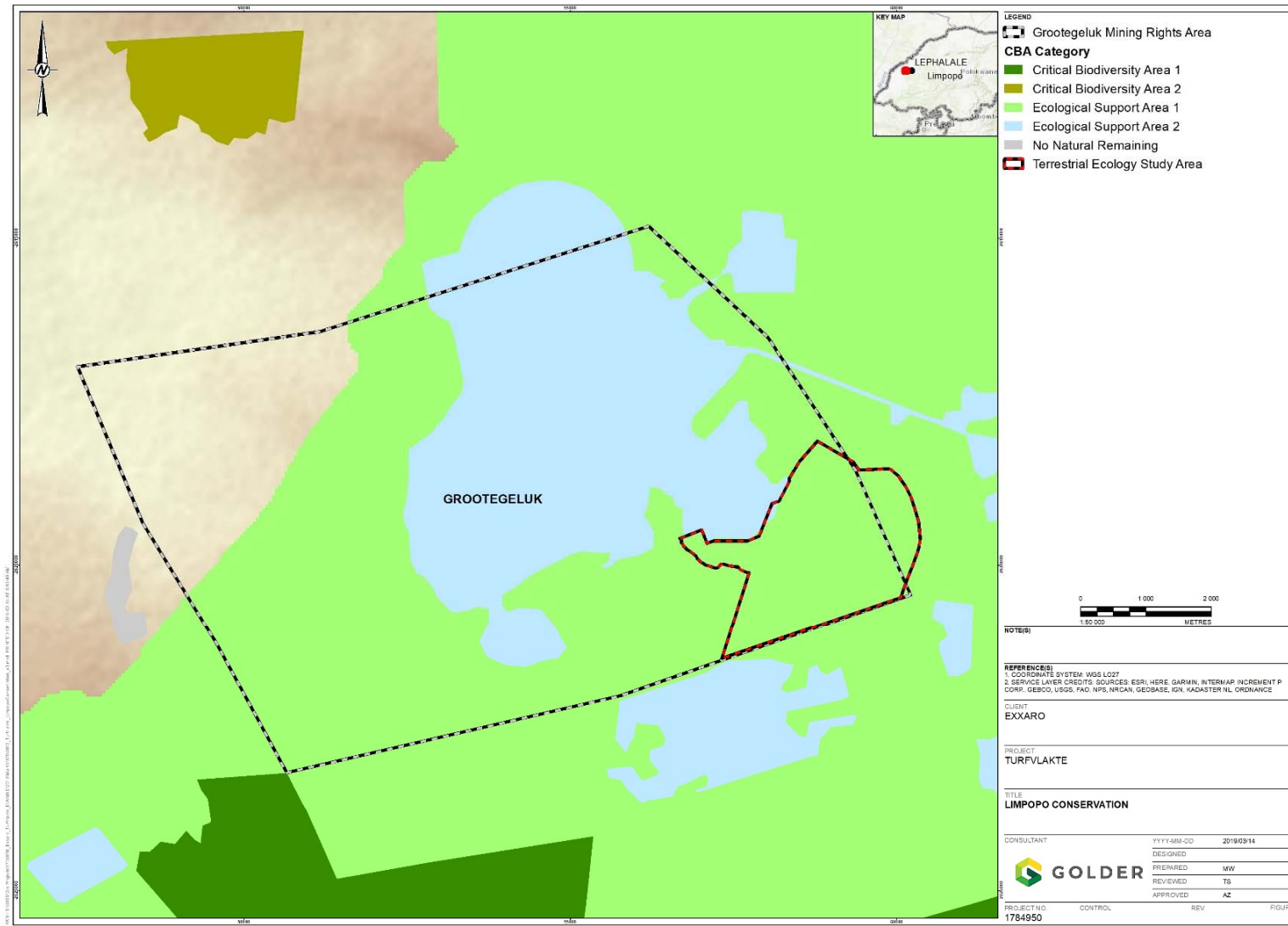


Figure 5: The Limpopo Conservation Plan (2013) and the Turfvlakte farm boundary



### 5.3 General Characteristics of the Study Area and Surrounding Landscape

The study area comprises natural bushveld habitat, typical of vegetation in the region (Figure 6). Disturbances are minimal, and mostly limited to a network of game viewing vehicle tracks and larger gravel roads. Several exploration drill pads that have been cleared of vegetation were also noted throughout the study area. The topography, like much of the surrounding landscape, is generally flat, with only slight changes in elevation.

The study area forms part of the larger Manketti Game Reserve, which is approximately 22 000 ha in extent and envelopes much of Grootegeluk Coal Mine. The reserve is surrounded by a standard game fence (height: 2.25 - 2.4 m), with smaller (approx. height 1 m) internal fences partitioning the reserve from various mine facilities. A conveyor from Grootegeluk Mine to Medupi Power Station marks the western boundary of the Turfvlakte farm. Unlike the surrounding game fence, the security fence enclosing the conveyor corridor is a square-mesh fence that is topped with barbed wire and is impermeable to the movement of large fauna (see Figure 7). A broad vehicle bridge that has been constructed over the conveyor for future mining purposes and connects the Turfvlakte farm to the remainder of Manketti Game Reserve and currently provides a passage for fauna to move between the two areas.

Several shallow depressions or pans and three artificial waterholes/dams are present in the study area. The artificial waterholes/dams receive supplementary water (shown in Figure 8), and are the only reliable, year-round source of drinking water for wildlife in the study area. The natural depressions/pans were dry at the time of both the wet- and dry-season field surveys (Figure 9). It is expected they hold water only temporarily after sufficient rain, whereupon they will also be used for drinking and wallowing by wildlife. For a brief summary of the pans and water holes in the study area refer to section 5.4.2.

Beyond completely transformed and developed sites associated with Grootegeluk Coal Mine, the adjacent power station, as well as various ancillary facilities and residential settlements, most of the broader landscape surrounding the study area consists of undeveloped natural habitat – refer to Figure 10 for land cover imagery. Although this land is partially fragmented by numerous farm fences and various vehicle tracks and gravel roads, it constitutes viable and functional habitat due to its natural condition. Ecological processes prevalent in the study area therefore form part of, and contribute toward, broader landscape-scale ecological integrity and functioning.



**Figure 6: View across the study area from the conveyor bridge**



**Figure 7: Conveyor and square-mesh fence that separates Turfvlakte farm from the remainder of Manketti Game Reserve**



**Figure 8: Artificial waterhole in the study area that receives supplementary water and is used by wildlife as a source of drinking water**



**Figure 9: One of several dry natural depression/pans in the study area**

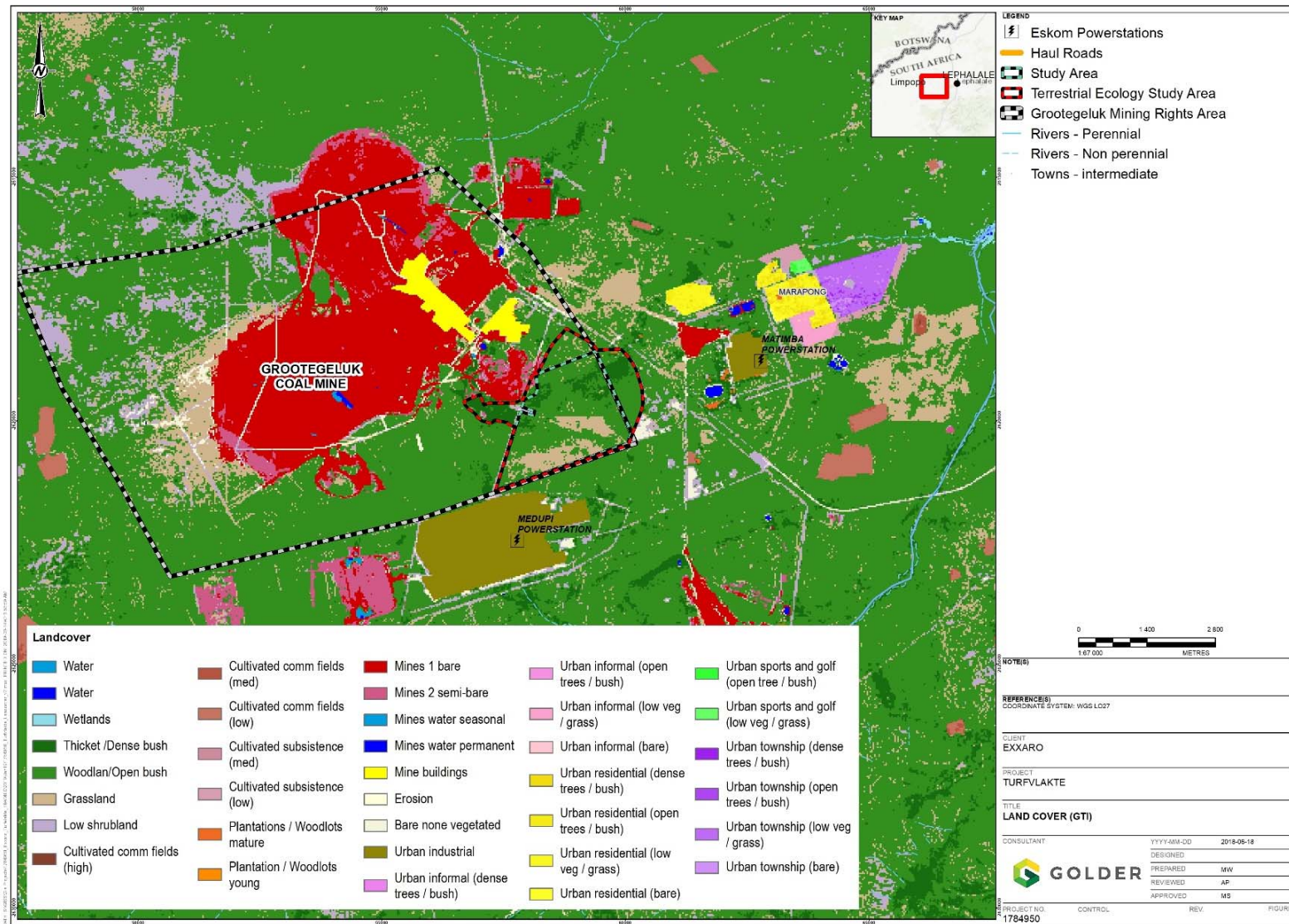


Figure 10: GeoTerra Imagery land cover classification of the Turfvlakte farm and surrounding landscape

## 5.4 Flora Assessment

### 5.4.1 Vegetation Communities

In many African savannas, soil properties at a landscape scale vary between 'upland' and 'bottomland' areas, with clay content generally increasing downslope. This influences soil moisture availability and soil fertility, which in turn, affect vegetation patterns that typically manifest as a predictable topographically-linked soil-vegetation sequence, known as a catena (Du Toit *et al.*, 2003; Scholes and Walker, 1993).

Although the topography of the study area is generally flat, a slight gradient along a north-west to south-east axis is present. The north-west is an 'upland area' (approx. 890 masl) and is characterised by deep sandy soils with low (<5%) clay content, and a dominance of broad-leafed vegetation. Conversely, the south-east is a 'low-land' area (approx. 878 masl), characterised by more clayey soils (>5%) and a prevalence of fine-leafed woody species.

Five vegetation communities were identified in the study area. These were recognised based primarily on diagnostic woody species and overall vegetation structure, with the structural classification broadly in line with Edwards (1983).

Identified vegetation communities are:

- Short Open *Vachellia tortilis* Bushveld;
- Tall *Senegalia nigrescens* Bushveld;
- Open *Combretum apiculatum* – *Terminalia sericea* Bushveld;
- *Spirostachys africana* - *Vachellia grandicornuta* Woodland; and
- *Euclea undulata* Thicket.

Identified vegetation communities are described in section 5.4.1.1 through to section 5.4.1.5, along with representative photographs. A map showing the spatial distribution of vegetation communities across the study area is provided in Figure 11.



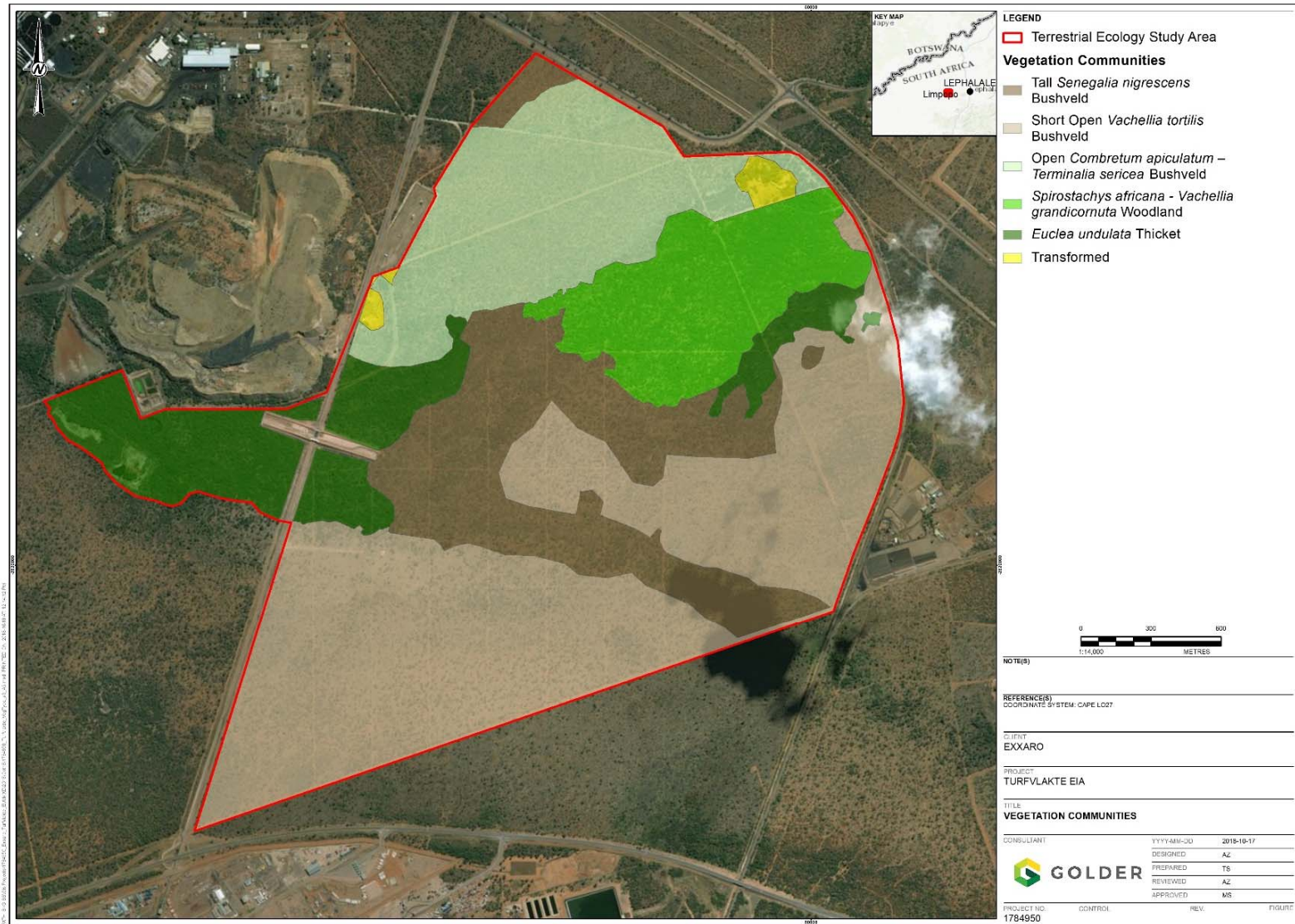


Figure 11: Vegetation map for the study area

### 5.4.1.1 Short Open *Vachellia tortilis* Bushveld

This community is the largest (approx. 254 ha) and dominates much of the southern and south-eastern portion of the study area (refer to vegetation map in Figure 11). It is characterised by open short (<3 m) savanna, with a moderately well-developed herbaceous layer (Figure 12 and Figure 13). The soils underlying areas of Short Open *Vachellia tortilis* Bushveld are deep red, apedal sands.

Woody species composition comprises a mixture of broad- and fine-leaved species. Small to medium-sized *Vachellia tortilis*<sup>3</sup> trees dominate the upper woody component, with several other shorter taxa also frequently recorded including *Commiphora pyracanthoides*, *Dichrostachys cinerea* and various *Grewia* species. Scattered tall trees are present in this community, mostly comprising *Combretum imberbe*, *Senegalia nigrescens* and *Vachellia erioloba*.

The dwarf shrub *Melhania acuminata* var. *acuminata* is common in the herbaceous layer, along with the grasses *Eragrostis rigidior*, *Schmidtia pappophoroides* and various *Aristida* species. Other taxa common in the herbaceous layer include *inter alia*; *Kyphocarpa angustifolia*, *Solanum tettense* var. *renschii* and *Waltheria indica*. Refer to APPENDIX B for a list of flora recorded in this community.

#### Sensitivity Aspects

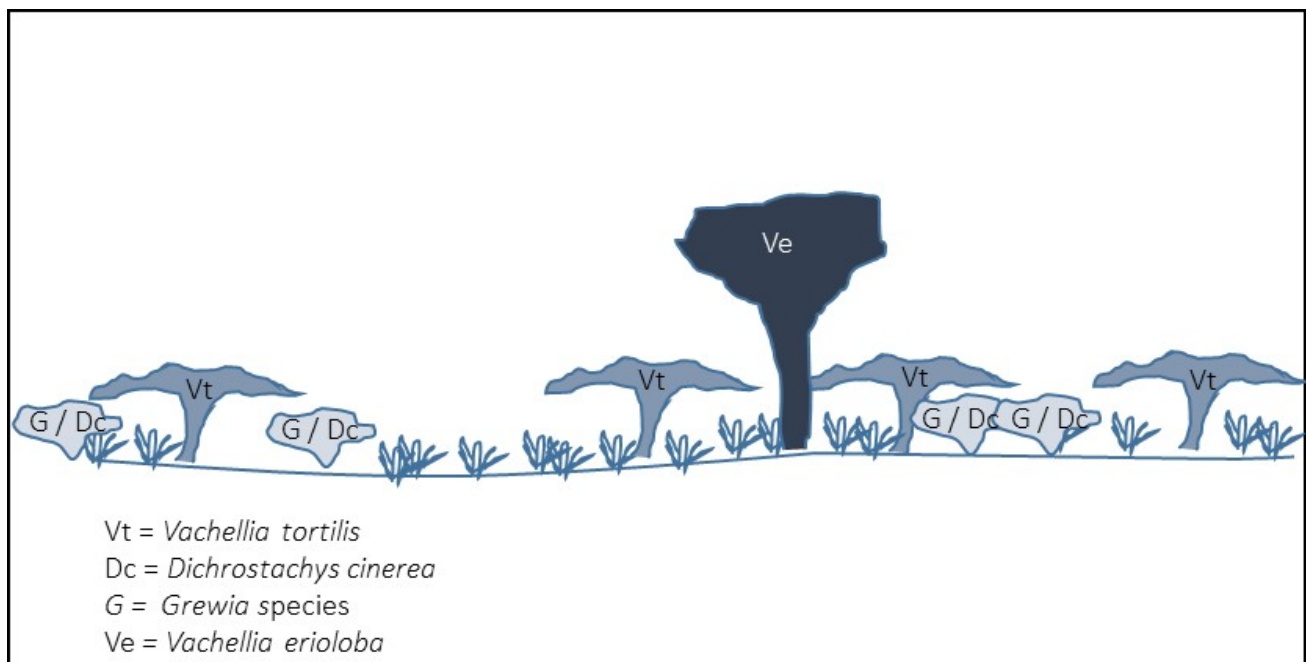
This large vegetation community remains in good ecological condition. Outside of a network of vehicle game-viewing tracks there is little evidence of anthropogenic disturbances or the establishment of alien invasive plant species. Accordingly, its ecological integrity is rated high.

Areas of Short Open *Vachellia tortilis* Bushveld provide important foraging habitat for fauna, particularly browsing and grazing ungulates. Three protected trees were recorded in this community during the field survey, namely *Boscia albitrunca*, *Combretum imberbe* and *Vachellia erioloba*. Considering these factors, the conservation importance of this vegetation community is therefore also considered high.



Figure 12: Typical example of Short Open *Vachellia tortilis* Bushveld in the study area

<sup>3</sup> Formerly *Acacia tortilis*



**Figure 13: Schematic structural representation of typical Short Open *Vachellia tortilis* Bushveld**

#### 5.4.1.2 Tall *Senegalia nigrescens* Bushveld

Tall *Senegalia nigrescens*<sup>4</sup> Bushveld is the second largest community (approx. 109 ha) and is found in a u-shaped band in the centre of the study area (Figure 11). The structure of this community is characterised by an open to partially-closed tall upper woody canopy, with a lower tree and shrub component and a moderate to well-developed herbaceous layer. Soils are consistent with those underlying the Short Open *Vachellia tortilis* Bushveld, i.e. deep red, apedal sands.

In terms of composition, this community shares many of the same species as Short Open *Vachellia tortilis* Bushveld, however there are noticeable physiognomic (structural) difference between the two. Although not necessarily dominant, the presence of numerous tall *Senegalia nigrescens* trees is diagnostic of this community. These trees can occur fairly sparsely (Figure 14) or fairly close together, creating pockets of partially-closed woodland as shown in Figure 15 (also see Figure 16).

Other woody taxa that were frequently recorded growing as small trees and shrubs in the lower woody strata include *Dichrostachys cinerea*, *Euclea undulata*, various *Grewia* spp. and *Vachellia tortilis*. *Melhania acuminata* var. *acuminata* is common in the herbaceous layer. Recorded grasses include *inter alia*; *Aristida adscensionis*, *Aristida stipata*, *Cenchrus ciliaris*, *Digitaria eriantha*, *Enneapogon cenchroides*, *Melinis repens*, *Panicum maximum* and *Schmidtia pappophoroides*.

Listed alien invasive flora recorded in this community include *Datura strumarium*, *Opuntia ficus-indica*, *Opuntia cf humifusa* and *Ricinus communis*. These species were not abundant and were only recorded at localised disturbed sites.

Refer to APPENDIX B for a list of flora recorded in this community.

<sup>4</sup> Formerly *Acacia nigrescens*



### Sensitivity Aspects

Protected trees recorded in Tall *Senegalia nigrescens* Bushveld include *Boscia albitrunca*, *Combretum imberbe* and *Vachellia erioloba*.

Although not recorded in the study area, the small succulents *Stapelia gigantea* and *Aloe cf zebrina* have been recorded in this vegetation community, but at a location within the main Grootegeluk Mine complex. These two taxa are listed as protected under Schedule 12 of the Limpopo Environmental Management Act (2003). It is possible that both species are present in the Tall *Senegalia nigrescens* Bushveld vegetation community within the study area itself.

At discrete low-lying or depressed sites in this community, several pans are present (Figure 9) (note: soil survey indicated that the pans are not located on areas of measurably elevated clay soils). These pans fill with water after sufficient rain and provide valuable wallowing and drinking sites for wildlife (e.g. Warthog). They may also be aestivating sites for the Giant Bullfrog (*Pyxicephalus adspersus*) – a species of conservation importance, that has been previously documented to the north of Manketti (pers. comm. F. Swanepoel) (refer to section 5.5.3). Pans are thus considered sensitive features within the landscape. Refer to section 5.4.2 for a brief summary of pans in the study area, and the study done by GroundTruth (2018) for more detail.

The Tall *Senegalia nigrescens* Bushveld vegetation community remains relatively undisturbed and has a high ecological integrity. The conservation importance of this vegetation community is considered high.



Figure 14: Open area of Tall *Senegalia nigrescens* Bushveld



Figure 15: Partially closed area of Tall *Senegalia nigrescens* Bushveld

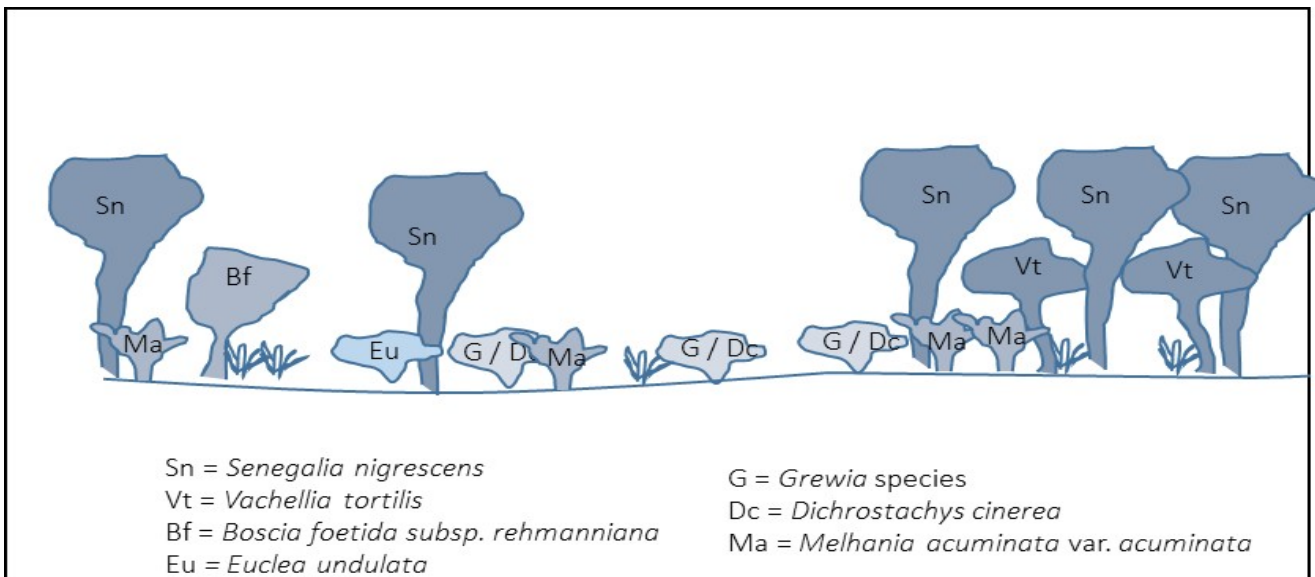


Figure 16: Schematic structural representation of typical Tall *Senegalia nigrescens* Bushveld

### 5.4.1.3 Open *Combretum apiculatum* – *Terminalia sericea* Bushveld

Open *Combretum apiculatum* – *Terminalia sericea* Bushveld is restricted to a band along northern boundary of the study area (Figure 11). This is an 'upland' area of about 101 ha that is characterised by very deep, reddish-brown fine sandy soils, with a low clay content (<5%) relative to soils in the other vegetation communities.

Structurally, it is defined as short open savanna (Figure 17 and Figure 18). A variety of broad-leaf species dominate the woody component, which is parsed into a defined lower and upper strata. Both grasses and forbs are present in the herbaceous layer, and coverage was moderate.

In terms of composition, taller woody species that are dominant in this vegetation community, and that largely define its classification, are *Combretum apiculatum* and *Terminalia sericea*, while shorter woody species that are particularly common in the lower strata include *Dichrostachys cinerea*, *Grewia flavescens* and *Grewia bicolor*. Other woody species that are characteristic of, although not necessarily abundant in, this vegetation community include *inter alia*; *Burkea africana*, *Combretum hereroense*, *Combretum zeyheri* and *Gardenia volkensii*. Dominant grasses recorded in the community include *Aristida stipata*, *Eragrostis pallens*, *Perotis patens* and *Stipagrostis uniplumis*. The dwarf shrubs *Blepharis subvolubilis* subsp. *subvolubilis* and *Heliotropium lineare* were common herbaceous species. Refer to APPENDIX B for a list of flora recorded in this community.

#### Sensitivity Aspects

Four protected trees recorded in Open *Combretum apiculatum* – *Terminalia sericea* Bushveld include *Sclerocarya birrea* subsp. *caffra*, *Securidaca longepedunculata*, *Vachellia erioloba* and *Spirostachys africana*. The former three species are protected according to the provisions of the National Forests Act, 1998), while *Spirostachys africana* is protected under the Limpopo Environmental Management Act (2003). The community remains in good condition, and both ecological integrity and conservation importance are rated high.



Figure 17: Open *Combretum apiculatum* – *Terminalia sericea* Bushveld

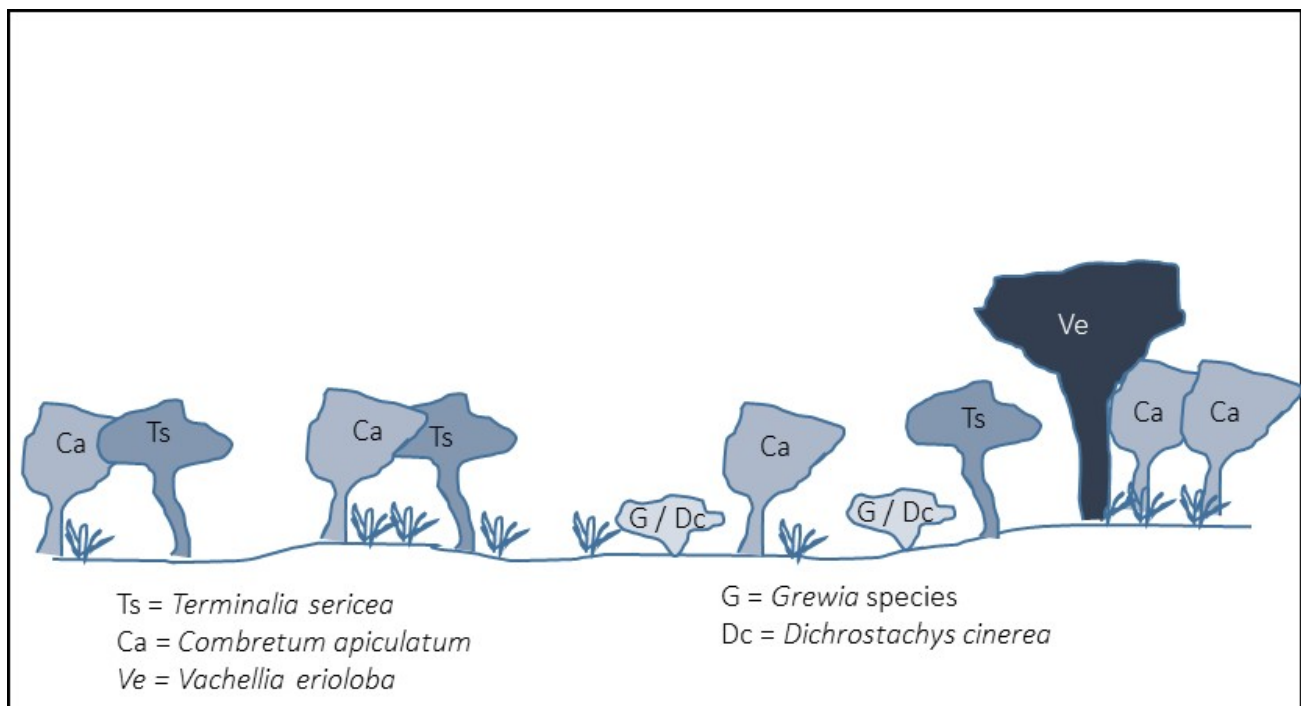


Figure 18: Schematic structural representation of typical *Combretum apiculatum* – *Terminalia sericea* Bushveld

#### 5.4.1.4 *Spirostachys africana* – *Vachellia grandicornuta* Woodland

The *Spirostachys africana* - *Vachellia grandicornuta* Woodland vegetation community occurs in a prominent patch of about 68 ha that is readily discerned on aerial imagery in the east of the study area (Figure 11). Soils are fine loamy sands.

This community essentially comprises two physiognomic units. The first is a tall closed woodland, where the broad-leaved *Spirostachys africana* and the fine-leaved *Vachellia grandicornuta* are generally co-dominants of the upper canopy, although the former frequently occurs in almost monospecific stands. The lower canopy is confined to a few scattered shorter trees and shrubs, while the herbaceous layer is very poorly developed – ostensibly a consequence of high shade levels caused by the dense tree canopy, or potentially, allelopathic effects of *Spirostachys africana* (see Figure 19 and Figure 20). Common woody species in the lower canopy include *Dichrostachys cinerea*, *Boscia foetida* subsp. *rehmanniana*, *Euclea undulata*, *Grewia bicolor* and *Grewia flava*.

The second unit occurs in small pockets, in amongst the taller woodland. These pockets are characterised by an open, sparse upper-canopy (comprising mostly scattered *Vachellia grandicornuta* and *Boscia foetida* subsp. *rehmanniana* trees), and an open- to closed lower canopy. *Euclea undulata* is the dominant lower canopy species and often forms dense thickets that approximate the *Euclea undulata* thicket community discussed in section 5.4.1.5.

Refer to APPENDIX B for a list of flora recorded in this community.

#### Sensitivity Aspects

Areas of *Spirostachys africana* - *Vachellia grandicornuta* Woodland are relatively undisturbed and are rated as having a high ecological integrity.

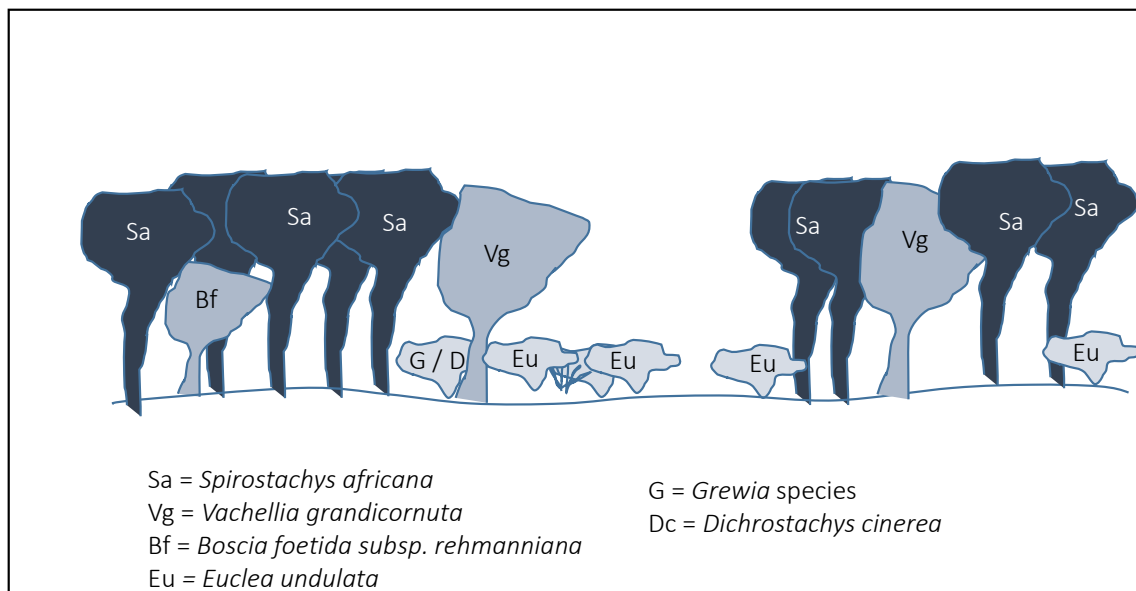
A number of small natural pans/depressions are present in areas of *Spirostachys africana* - *Vachellia grandicornuta* Woodland and like those in the Tall *Senegalia nigrescens* Bushveld community, these pans should be considered sensitive ecological features.



Protected trees recorded in this community include *Elaeodendron transvaalense*, *Spirostachys africana* and *Vachellia erioloba*. The conservation importance of this vegetation community is rated high.



**Figure 19: *Spirostachys africana* - *Vachellia grandicornuta* Woodland.** This patch is characterised by almost monospecific stands of *Spirostachys africana* (tamboti) trees and a negligible herbaceous layer



**Figure 20: Schematic structural representation of typical *Spirostachys africana* - *Vachellia grandicornuta* Woodland**

### 5.4.1.5 *Euclea undulata* Thicket

This is a variable vegetation community that is located mostly in the west of the study area (approx. area 76 ha) (Figure 11). It ranges from fairly short thicket (between 2.5 to 3 m) to a taller form (>5 m) that is characterised by large trees overtopping dense scrub below. Soils are reddish to grey coloured fine loamy sand.

The short shrub *Euclea undulata* is dominant to common in many areas, and several other woody species are also locally either co-dominant or abundant. These include *Dichrostachys cinerea*, *Diospyros lycioides* subsp. *lycioides*, *Grewia flava* and *Vachellia tortilis*.

Frequently recorded taller trees in areas mapped as *Euclea undulata* thicket include *Combretum imberbe* and a number of *Acacias* such as *Senegalia nigrescens*, *Vachellia erioloba* and *Vachellia robusta*. In open areas, *Melhania acuminata* var. *acuminata* is very common in the herbaceous layer, but in densely vegetated areas the herbaceous layer is very sparse to non-existent as a result of high shade levels (see Figure 21 to Figure 23). Grasses recorded include *Enneapogon cenchroides*, *Eragrostis* species and *Panicum maximum*.

The listed alien invasive species *Cereus jamacaru* (CARA Category 1 and NEMBA Category 1b) and *Melia azedarach* (CARA Category 3 and NEMBA Category 1b) were recorded at single locations in this community. Refer to APPENDIX B for a list of flora recorded in this community.

### Sensitivity Aspects

Localised areas of this community have been disturbed, mostly by earth works associated with mining activities. This notwithstanding, the general ecological integrity of *Euclea undulata* Thicket is rated high.

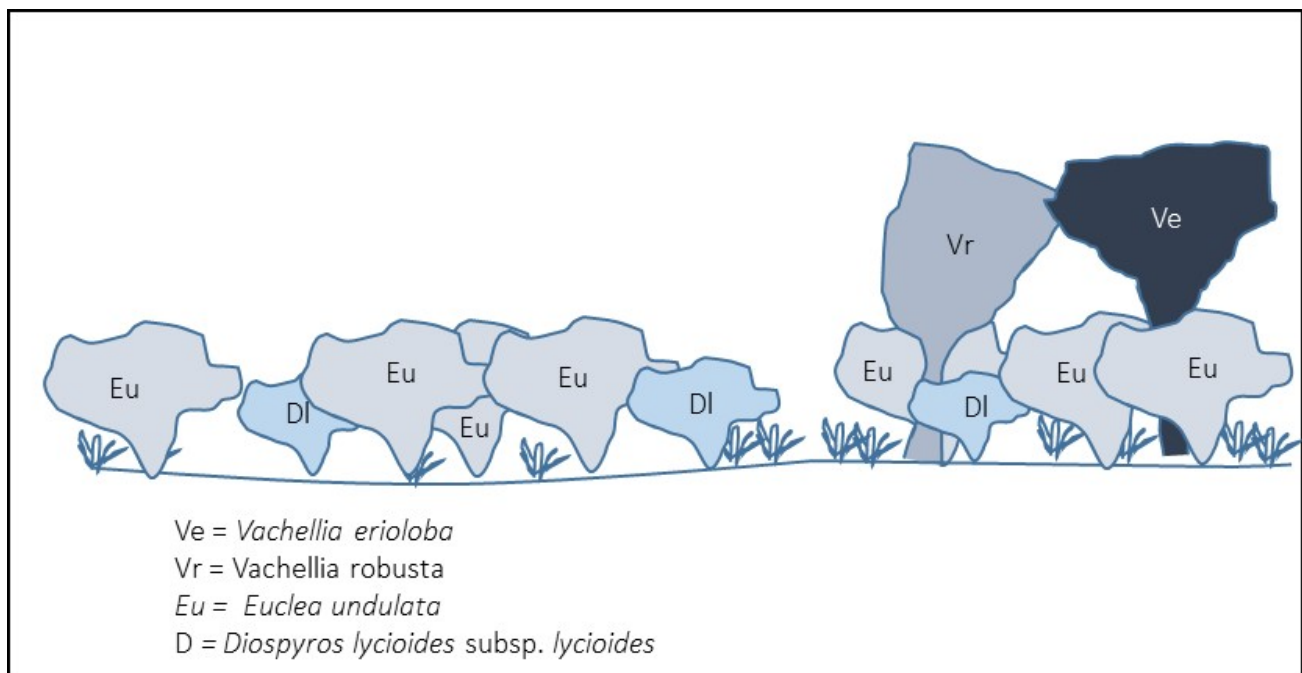
In the context of the study area, this vegetation community provides an important form of densely wooded thicket that increases the heterogeneity of the study area, and provides important refuge habitat for fauna, particularly habitat specialists. Two protected trees were recorded in areas of *Euclea undulata* Thicket, namely *Combretum imberbe* and *Vachellia erioloba* (National Forests Act, 1998). Accordingly, the conservation importance of this vegetation community is rated high.



Figure 21: Closed area of *Euclea undulata* thicket



Figure 22: *Euclea undulata* thicket



**Figure 23: Schematic structural representation of typical *Euclea undulata* thicket**

#### 5.4.2 Depressions/Pans and Borrow Pits

This section provides a brief summary of the natural pans and other wetland-type features in the study area, and is based on the GroundTruth (2018) draft report, which contains more detail. The location of pans and artificial water holes / borrow pits within the study area are shown in Figure 24 (pans not in the study area for the terrestrial ecology assessment are not shown):

- Natural pans in the study area are rainfall dependent, yet most are connected via a dendritic drainage network (i.e. preferential flow paths, not actual streams) (GroundTruth, 2018);
- Most pans are bare mud dominated features, and did not support wetland vegetation. Seasonal vegetation, however, was recorded in the wetter areas of the large pans (GroundTruth, 2018);
- The pans were rated as being in 'good condition' (B Category) (GroundTruth, 2018);
- Vegetated pans were observed to be favoured foraging sites for herbivores during the dry season field visit (Pers. Obs); and
- The features numbered 12 and 13 in Figure 24 are former borrow pits that hold water. It is understood that no. 13 is licensed under Section 21 of the mine's WUL.



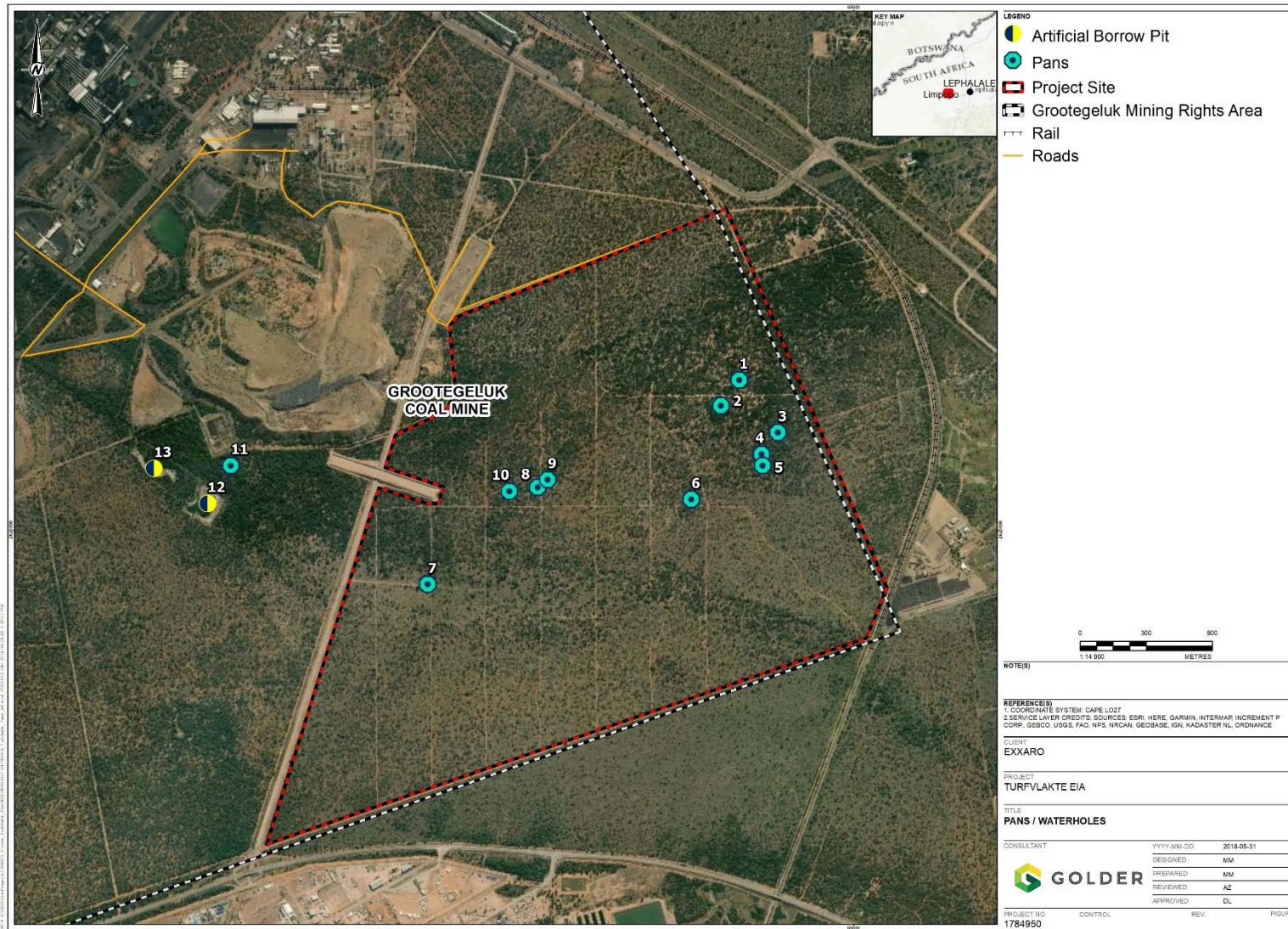


Figure 24: Pans/waterholes in the study area (No's. 7, 11, 12 & 13 are artificial and/or receive supplementary water)

### 5.4.3 Floral Species of Conservation Importance

#### 5.4.3.1 Red List and Protected Flora

Nine floral species of conservation importance were recorded in the study area during the field programme – refer to Table 2, last column. These comprise mostly protected trees, with *Combretum imberbe* (Figure 25) and *Vachellia erioloba* (Figure 26) particularly abundant throughout the study area, and *Spirostachys africana* (also shown in Figure 25) dominant in the *Spirostachys africana* - *Vachellia grandicornuta* Woodland community.

*Schinziophyton rautanenii* (Manketti trees) are known to occur in the bushveld surrounding Grootegeluk Coal Mine (see NSS, 2011). This species was not recorded in the study area during the field visit, and although it is not listed as threatened or protected, its South African range is small and restricted to the Lephalale region of Limpopo Province. It should thus be considered a sensitive species and managed accordingly.

*Boscia foetida* trees were also noted to be common in the study area. These however, were determined to be *Boscia foetida* subsp. *rehmanniana*, not *Boscia foetida* subsp. *minima*. The latter subspecies, which is listed as a protected species in Limpopo Province, is a shrublet attaining a maximum height of only 30 cm (Coates Palgrave 2002). The specimens recorded in the study area are larger, growing to the size of small trees.

**Table 2: Flora of conservation importance recorded or potentially occurring in the local study area**

| Species (Scientific Name)                               | Red List Status Regional Status (SANBI 2017) | Protected Tree Species (National Forest Act 1998) | Limpopo Province - Protected Species (2003) | Observations-2018 Field Programme |
|---|--|---|---|-----------------------------------|
| <i>Acalypha caperonioides</i> var. <i>caperonioides</i> | Data Deficient – Taxonomic Problems          | -   | -   | -                                 |
| <i>Adansonia digitata</i>                               | -  | Protected   | Protected                                   | -                                 |
| <i>Adenium oleifolium</i>                               | -  | -   | Protected                                   | -                                 |
| <i>Aloe</i> cf <i>zebrina</i>                           | -  | -   | Protected                                   | -                                 |
| <i>Boscia albitrunca</i>                                | -  | Protected   | -   | Recorded                          |
| <i>Combretum imberbe</i>                                | -  | Protected   | -   | Recorded                          |
| <i>Corchorus psammophilus</i>                           | Vulnerable                                   | -   | -   | -                                 |
| <i>Elaeodendron transvaalense</i>                       | Near Threatened                              | Protected   |   | Recorded                          |
| <i>Eulalia aurea</i>                                    | Near Threatened                              | -   | -   | -                                 |
| <i>Euphorbia waterbergensis</i>                         | Rare   | -   | -   | -                                 |
| <i>Schinziophyton rautanenii</i>                        | -  | -   | -   | -                                 |
| <i>Sclerocarya birrea</i> subsp. <i>caffra</i>          | -  | Protected   | -   | Recorded                          |



| Species (Scientific Name)                      | Red List Status Regional Status (SANBI 2017) | Protected Tree Species (National Forest Act 1998) | Limpopo Province - Protected Species (2003) | Observations-2018 Field Programme |
|--|--|---|---|-----------------------------------|
| <i>Securidaca longepedunculata</i> (Figure 27) | -  | Protected   | -   | Recorded                          |
| <i>Spirostachys africana</i>                   | -  | -   | Protected                                   | Recorded                          |
| <i>Stapelia gigantea</i>                       | -  | -   | Protected                                   | -                                 |
| <i>Vachellia erioloba</i>                      | -  | Protected   | -   | Recorded                          |



Figure 25: *Combretum imberbe* (Leadwood) (left) and *Spirostachys africana* (Tamboti) (right)



Figure 26: *Vachellia erioloba* (Camelthorn)



Figure 27: *Securidaca longepedunculata* (Violet-tree) in flower

### 5.4.3.2 Medicinal Flora

Thirteen floral species recorded in the study area have medicinal/traditional value. These are listed, along with a brief description of their medicinal and traditional utility, in Table 3.

**Table 3: Medicinal floral species recorded in the study area**

| Floral Species   | Traditional Uses   |
|--|--|
| <i>Asparagus larycinus</i>                                 | Rhizomes and fleshy roots are used for a variety of ailments including tuberculosis, kidney complaints and rheumatism.                   |
| <i>Datura strumarium</i>                                   | Commonly used to relive asthma and reduce pain. Infusions area also used as an aphrodisiac.  |
| <i>Dichrostachys cinerea</i>                               | Various parts of this plant are used to treat body pain, elephantiasis, syphilis and leprosy, amongst others.                            |
| <i>Elaeodendron transvaalense</i>                          | Bark infusion is taken to clean the stomach and to treat intestinal cramps and diarrhoea.  |
| <i>Elephantorrhiza burkei</i>                              | Underground rhizomes used to treat diarrhoea, dysentery other stomach disorders and haemorrhoids.  |
| <i>Euclea undulata</i>                                     | Root infusions used as a remedy for heart diseases and headache and toothache.   |
| <i>Gomphocarpus fruticosus</i>                             | Crushed leaves used to treat headaches, while roots are reported to relive stomach cramps and general body ache.                         |
| <i>Ricinus communis</i>                                    | Leaf infusions are used as a purgative medicine.   |
| <i>Sansevieria aethiopica</i>                              | Used to treat ear infection, earache and toothache. Also used as a remedy to treat diarrhoea.  |
| <i>Sclerocarya birrea</i>                                  | Various stomach and digestive ailments are treated with bark. The fruit of this tree is also widely eaten and used to produce beverages. |
| <i>Securidaca longepedunculata</i>                         | Chewed roots relieve toothache, while decoctions can be used to alleviate chest issues.  |
| <i>Terminalia sericea</i>                                  | Root decoctions are used as a remedy for stomach complaints, diarrhoea and pneumonia, as well as applied as an eye lotion.               |
| <i>Ziziphus mucronata</i>                                  | Bark and leaves are used as an expectorant in coughs and chest ailments, while roots extracts are used to treat diarrhoea and dysentery. |
| Source: Uses as described by Van Wyk <i>et al.</i> (2009). |  |

#### 5.4.4 Listed Alien Invasive Flora

Seven CARA and NEMBA listed alien invasive species were recorded in the study area during the wet-season field visit (Table 4). These were not abundant and were mainly confined to scattered individual plants growing at localised sites where disturbance had occurred.

**Table 4: CARA and NEMBA listed alien invasive species recorded in the study area**

| Scientific Name                      | Common Names<br>(English/Afrikaans) | CARA (1983) | NEMBA (2004) |
|--------------------------------------|-------------------------------------|-------------|--------------|
| <i>Cereus jamacaru</i> (Figure 28)   | Queen of the night/nagblom          | 1           | 1b           |
| <i>Datura stramonium</i>             | Common Thorn-apple/Olieboom         | 1           | 1b           |
| <i>Flaveria bidentis</i> (Figure 29) | Smelter's Bush                      | -           | 1b           |
| <i>Melia azedarach</i>               | Syringa/Sering                      | 3           | 1b           |
| <i>Opuntia ficus-indica</i>          | Sweet Prickly Pear                  | 1           | 1b           |
| <i>Opuntia cf. humifusa</i>          | Large-flowered Prickly Pear         | 1           | 1b           |
| <i>Ricinus communis</i>              | Castor-oil Plant/Kasterolieboom     | 2           | 1b           |



**Figure 28: *Cereus jamacaru* (Queen of the night)**



**Figure 29: *Flaveria bidentis* (Smelters bush)**

## 5.5 Fauna Assessment

### 5.5.1 Mammals

In total, 25 mammal species comprising ten managed species and 16 free-roaming species were recorded in the study area during the 2018 field programme (25 and 18 taxa recorded during the wet and dry season field surveys, respectively - refer to Table 5).

Managed species refers to those taxa that form part of actively bred and managed 'game' populations in the study area, and include, *inter alia*; Sable Antelope (*Hippotragus niger*), Impala (*Aepyceros melampus*), Gemsbok (*Oryx gazelle*), Waterbuck (*Kobus ellipsiprymnus*), Giraffe (*Giraffa camelopardalis*) and Burchell's Zebra (*Equus quagga*).

Free-roaming mammals are those that form part of self-sustaining, natural populations. These species are generally not restricted by farm boundaries and are able to move across the landscape in accordance with their life-cycle requirements. In the study area such taxa comprise small ungulates like the Steenbok (*Raphicerus campestris*) and Warthog (*Phacochoerus africanus*), but also the large Greater Kudu (*Tragelaphus strepsiceros*), as well as many smaller mammals such as, *inter alia*, Tree Squirrel (*Paraxerus capapi*), Scrub Hare (*Lepus saxatilis*), Vervet Monkey (*Ceropithecus pygerythrus*) and Banded Mongoose (*Mungos mungo*) - see Figure 30 to Figure 35 for images of mammals photographed in the study area during the field visit.

In a previous assessment of the greater Manketti Game Reserve (area of approx. 22 000 ha) a total of 48 mammal species were documented (see NSS, 2011), while the historical distribution maps in Monadjem *et al.* (2001) and Stuart and Stuart (2007) indicate that up to 85 mammal species potentially occur in the study area (APPENDIX C), with the majority of these being small taxa (e.g. rodents). Based on these sources, and an appreciation of the extent and condition of available natural habitat in the study area, the expected mammal species richness for the study area is considered to be higher than the 25 recorded during the field programme.

**Table 5: Mammals recorded in the study area during the field programme**

| Family  | Scientific Name                 | Common Name    | 2018 Field Programme |                   |
|---------|---------------------------------|----------------|----------------------|-------------------|
|         |                                 |                | Wet Season Survey    | Dry Season Survey |
| Bovidae | <i>Hippotragus niger</i>        | Sable Antelope | X                    | X                 |
|         | <i>Kobus ellipsiprymnus</i>     | Waterbuck      | X                    | X                 |
|         | <i>Aepyceros melampus</i>       | Impala         | X                    | X                 |
|         | <i>Tragelaphus strepsiceros</i> | Greater Kudu   | X                    | X                 |
|         | <i>Raphicerus campestris</i>    | Steenbok       | X                    |                   |
|         | <i>Tragelaphus scriptus</i>     | Bushbuck       | X                    | X                 |
|         | <i>Oryx gazella</i>             | Gemsbok        | X                    | X                 |
|         | <i>Sylvicapra grimmia</i>       | Grey Duiker    | X                    | X                 |
|         | <i>Tragelaphus angasii</i>      | Nyala          | X                    | X                 |



| Family          | Scientific Name                    | Common Name            | 2018 Field Programme |                   |
|-----------------|------------------------------------|------------------------|----------------------|-------------------|
|                 |                                    |                        | Wet Season Survey    | Dry Season Survey |
| Canidae         | <i>Canis mesomelas</i>             | Black-back Jackal      | X                    | X                 |
| Cercopithecidae | <i>Cercopithecus pygerythrus</i>   | Vervet Monkey          | X                    | X                 |
|                 | <i>Papio cynocephalus urisinus</i> | Chacma Baboon          | X                    | X                 |
| Equidae         | <i>Equus quagga</i>                | Plains Zebra           | X                    |                   |
| Felidae         | <i>Felis silvestris lybica</i>     | African Wild Cat       | X                    |                   |
| Galagidae       | <i>Galago moholi</i>               | Southern Lesser Galago | X                    |                   |
| Giraffidae      | <i>Giraffa camelopardalis</i>      | Giraffe                | X                    | X                 |
| Herpestidae     | <i>Mungos mungo</i>                | Banded Mongoose        | X                    | X                 |
|                 | <i>Galerella sanguinea</i>         | Slender Mongoose       | X                    |                   |
|                 | <i>Atilax paludinosus</i>          | Water Mongoose         | X                    |                   |
| Hystricidae     | <i>Hystrix africaeustralis</i>     | Porcupine              | X                    | X                 |
| Leporidae       | <i>Lepus saxatilis</i>             | Scrub Hare             | X                    | X                 |
| Muridae         | <i>Tatera brantsii</i>             | Highveld gerbil        | X                    | X                 |
| Rhinocerotidae  | <i>Ceratotherium simum</i>         | White Rhino            | X                    |                   |
| Sciuridae       | <i>Xerus inauris</i>               | Tree Squirrel          | X                    | X                 |
| Suidae          | <i>Phocochoerus africanus</i>      | Warthog                | X                    | X                 |





Figure 30: Black-back Jackal (*Canis mesomelas*)



Figure 31: Porcupine (*Hystrix africaustralis*)



Figure 32: Giraffe (*Giraffa camelopardalis*)



Figure 33: Sable Antelope (*Hippotragus niger*)



Figure 34: Steenbok (*Raphicerus campestris*)



Figure 35: Greater Kudu (*Tragelaphus strepsiceros*)

### Mammals of Conservation Importance

Despite being abundant across its range, the Steenbok (*Raphicerus campestris*) is listed as protected under the Limpopo Environmental Management Act, (2003). This species was observed on several occasions in the study area.

A White Rhino (*Ceratotherium simum*) midden and tracks were also recorded close to the proposed haul road location, to the west of the conveyor corridor during the wet season field visit. This species is listed as Near Threatened on the national Red List, and protected and specially protected on the NEMBA ToPS List (2013) and Limpopo Environmental Management Act (2003), respectively.

An additional 20 species of conservation importance potential occur in the study area based on previous studies and known distribution records. These are listed in Table 6, along with their national and provincial conservation statuses. A probability of occurrence for species that were not recorded during the 2018 wet-season field survey is also provided.

**Table 6: Mammals of conservation importance recorded or potentially occurring in the study area**

| Family      | Scientific Name              | Common Name            | Conservation Status             |                        |                                  | Probability of Occurrence |
|-------------|------------------------------|------------------------|---------------------------------|------------------------|----------------------------------|---------------------------|
|             |                              |                        | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |                           |
| Bovidae     | <i>Raphicerus campestris</i> | Steenbok               | -                               | -                      | Protected                        | Recorded                  |
| Canidae     | <i>Lycaon pictus</i>         | African Wild Dog       | Endangered                      | Endangered             | -                                | Unlikely                  |
|             | <i>Otocyo megalotis</i>      | Bat-eared Fox          | -                               | Protected              | Protected                        | Possible                  |
| Erinaceidae | <i>Atelerix frontalis</i>    | South African Hedgehog | Near Threatened                 | -                      | Protected                        | Possible                  |
| Felidae     | <i>Acinonyx jubatus</i>      | Cheetah                | Vulnerable                      | Vulnerable             | Protected                        | Unlikely                  |
|             | <i>Leptailurus serval</i>    | Serval                 | Near Threatened                 | Protected              | Protected                        | Possible                  |
|             | <i>Panthera pardus</i>       | Leopard                | Vulnerable                      | Protected              | Protected                        | Possible                  |
| Hyaenidae   | <i>Hyaena brunnea</i>        | Brown Hyaena           | Near Threatened                 | Protected              | Protected                        | Probable                  |
|             | <i>Proteles cristatus</i>    | Aardwolf               | -                               | -                      | Protected                        | Possible                  |

| Family           | Scientific Name                  | Common Name                   | Conservation Status             |                        |                                  | Probability of Occurrence |
|------------------|----------------------------------|-------------------------------|---------------------------------|------------------------|----------------------------------|---------------------------|
|                  |                                  |                               | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |                           |
| Leporidae        | <i>Pronolagus randensis</i>      | Jameson's Red Rock Rabbit     | -                               | -                      | Protected                        | Unlikely                  |
| Manidae          | <i>Manis temminckii</i>          | Pangolin                      | Vulnerable                      | Vulnerable             | Specially protected              | Possible                  |
| Muridae          | <i>Dasymys incommutus</i>        | Water Rat                     | Near Threatened                 | -                      | -                                | Unlikely                  |
| Mustelidae       | <i>Mellivora capensis</i>        | Honey Badger                  | -                               | -                      | Protected                        | Probable                  |
|                  | <i>Poecilogale albinucha</i>     | African Striped Weasel        | Near Threatened                 |                        |                                  | Unlikely                  |
| Orycteropodidae  | <i>Orycteropus afer</i>          | Aardvark                      | -                               | Protected              | Specially protected              | Probable                  |
| Rhinocerotidae   | <i>Ceratotherium simum</i>       | White Rhino                   | Near Threatened                 | Protected              | Specially protected              | Recorded                  |
| Rhinolophidae    | <i>Rhinolophus clivosus</i>      | Geoffroy's Horseshoe Bat      | Near Threatened                 | -                      | -                                | Possible                  |
|                  | <i>Rhinolophus darlingi</i>      | Darling's Horseshoe Bat       | Near Threatened                 | -                      | -                                | Possible                  |
|                  | <i>Rhinolophus hildebrandtii</i> | Hildebrandt's Horseshoe Bat   | Near Threatened                 | -                      | -                                | Possible                  |
| Vespertilionidae | <i>Miniopterus natalensis</i>    | Schreiber's Long-fingered Bat | -                               | -                      | -                                | Probable                  |
| Viverridae       | <i>Civettictis civetta</i>       | African Civet                 | -                               | -                      | Protected                        | Probable                  |

Source: Distributions based on range and habitat preferences presented in Stuart and Stuart (2007) and Monadjem *et al.* (2001)

## 5.5.2 Birds

Owing to the abundance and diversity of natural habitat, northern Limpopo Province has a rich bird assemblage. This is reflected in the designation of the entire Waterberg plateau as an Important Bird Area (IBA) (*sensu*. BirdLife South Africa, 2015).

A total of 89 bird species were documented in the study area during the 2018 field programme. During the wet season survey 79 species were recorded, while 53 species were observed during the dry season.

This represents a small proportion of the 275 species that have previously been documented in the pentads encompassing and surrounding the study area (albeit the pentad area is larger and more heterogeneous) by the ADU - SABAP2 (2011) (list is presented in APPENDIX D).

Recorded birds include many common bushveld species, such as Crested Francolin (*Dendroperdix sephaena*), Natal Spurfowl (*Pternistis natalensis*), Cape Turtle Dove (*Streptopelia campicola*), Common Ostrich (*Struthio camelus*) (Figure 36), Southern Red-billed Hornbill (*Tockus erythrorhynchus*) (Figure 37), Southern Yellow-billed Hornbill (*Tockus leucomelas*), Rattling Cisticola (*Cisticola chiniana*), Red-backed Shrike (*Lanius collurio*) and Black-backed Puffback (*Dryoscopus alba*), amongst others. The absence of natural on-site water bodies is reflected in a few aquatic bird being observed, and surprisingly, very few raptors were recorded, despite them being well represented in the SABAP2 data.

White-backed Vulture (*Gyps africanus*) were observed flying over the study area. This species is of conservation importance, and although no vulture nests were observed in the study area, its presence highlights the importance of natural habitat across the broader regional landscape for the conservation of White-backed Vulture and several other species.

### Birds of Conservation Importance

Records of the ADU - SABAP2 (2011) indicate that 14 bird species of conservation importance potentially occur in the study area - Table 7. The presence of a number of these may be transitory and dependent on factors such as stochastic resource availability (e.g. mammal carcasses for vultures).

**Table 7: Birds of conservation importance recorded and potentially occurring in the study area**

| Family       | Scientific Name              | Common Name          | Conservation Status             |                        |                                  | Probability of Occurrence |
|--------------|------------------------------|----------------------|---------------------------------|------------------------|----------------------------------|---------------------------|
|              |                              |                      | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |                           |
| Accipitridae | <i>Polemaetus bellicosus</i> | Martial Eagle        | Endangered                      | Vulnerable             | Specially Protected              | Possible                  |
|              | <i>Aquila verreauxii</i>     | Verreaux's Eagle     | Vulnerable                      | -                      | Protected                        | Possible                  |
|              | <i>Aquila rapax</i>          | Tawny Eagle          | Endangered                      | Vulnerable             | Protected                        | Probable                  |
|              | <i>Gyps africanus</i>        | White-backed Vulture | Critically Endangered           | Protected              | Protected                        | Recorded (wet season)     |
|              | <i>Gyps coprotheres</i>      | Cape Vulture         | Endangered                      | Vulnerable             | Specially Protected              | Probable                  |



| Family        | Scientific Name                 | Common Name          | Conservation Status             |                        |                                  | Probability of Occurrence |
|---------------|---------------------------------|----------------------|---------------------------------|------------------------|----------------------------------|---------------------------|
|               |                                 |                      | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |                           |
|               | <i>Terathopius ecaudatus</i>    | Bateleur             | Endangered                      | Vulnerable             | Specially Protected              | Probable                  |
|               | <i>Torgos tracheliotus</i>      | Lappet-faced Vulture | Endangered                      | Vulnerable             | Protected                        | Probable                  |
| Ciconiidae    | <i>Ciconia abdimii</i>          | Abdim's Stork        | Near Threatened                 | -                      | Protected                        | Unlikely                  |
|               | <i>Ciconia nigra</i>            | Black Stork          | Vulnerable                      | -                      | Protected                        | Unlikely                  |
|               | <i>Leptoptilos crumeniferus</i> | Marabou Stork        | Near Threatened                 | -                      | Protected                        | Possible                  |
|               | <i>Mycteria ibis</i>            | Yellow-billed Stork  | Endangered                      | -                      | Protected                        | Possible                  |
| Coraciidae    | <i>Coracias garrulus</i>        | European Roller      | Near Threatened                 | -                      | Protected                        | Probable                  |
| Otididae      | <i>Ardeotis kori</i>            | Kori Bustard         | Near Threatened                 | Protected              | Specially protected              | Probable                  |
| Sagittariidae | <i>Sagittarius serpentarius</i> | Secretarybird        | Vulnerable                      | -                      | Protected                        | Probable                  |

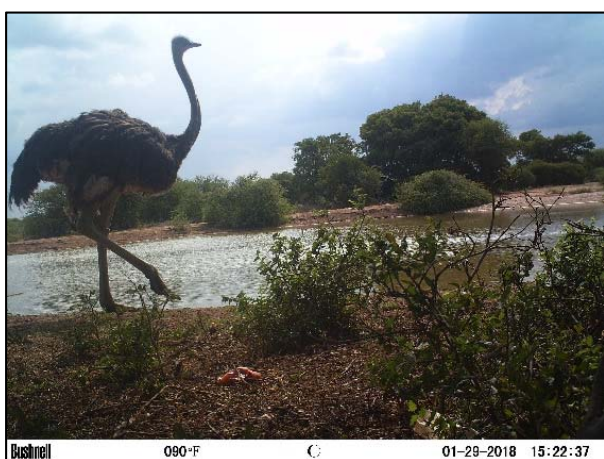


Figure 36: Common Ostrich (*Struthio camelus*)

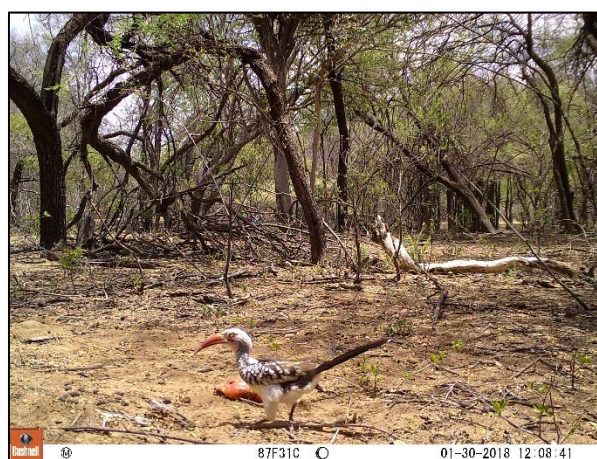


Figure 37: Southern Red-billed Hornbill (*Tockus erythrorhynchus*)



### 5.5.3 Herpetofauna (Reptiles and Amphibians)

In total, six reptiles and four amphibian species were observed in the study area during the 2018 field programme:

- Five reptiles were recorded during the wet season field visit, while only one additional taxon (Southern African Python *Python natalensis*) was recorded during the dry season field visit; and
- Four amphibian species were recorded during the wet season field visit, with only the Eastern Olive Toad (*Amietophrynus garmani*) subsequently re-recorded for the dry season field visit.

Recorded reptiles include Southern African Python (*Python natalensis*)<sup>5</sup>, Southern Tree Agama (*Acanthocercus atricollis atricollis*), Common Rough-scaled Lizard (*Meroles squamulosa*), Southern Rock monitor (*Varanus albigularis albigularis*), Leopard Tortoise (*Stigmochelys pardalis*) (Figure 38), and the Marsh Terrapin (*Pelomedusa subrufa*) (Figure 39), while the recorded amphibians are Eastern Olive Toad (*Amietophrynus garmani*), Red Toad (*Schismaderma carens*) (Figure 40), Sand Frog (*Tomopterna cf. tandyi*) (Figure 41) and Foam Nest Frog (*Chiromantis xerampelina*).

A combination of relatively high summer rainfall, coupled with warm temperatures and high humidity promote a high degree of reptile and amphibian diversity in southern Africa's savannas (Alexander and Marais, 2010; du Preez and Carruthers, 2009). The distribution maps presented in Bates *et al.* (2014) and ReptileMAP indicate that approximately 81 reptile species have been recorded in the Lephalale region, while a review of du Preez and Carruthers (2009) and Minter *et al.* (2004) suggests that up to 25 amphibians are potentially present – these are listed in APPENDIX E.

**Table 8: Herpetofauna recorded in the study area during the 2018 field programme**

| Family          | Scientific Name                            | Common Name                | 2018 Field Programme |                   |
|-----------------|--|----------------------------|----------------------|-------------------|
|                 |  |                            | Wet Season Survey    | Dry Season Survey |
| <b>Reptiles</b> |  |                            |                      |                   |
| Agamidae        | <i>Acanthocercus atricollis atricollis</i> | Southern Tree Agama        | X                    |                   |
| Lacertidae      | <i>Meroles squamulosa</i>                  | Common Rough-scaled Lizard | X                    |                   |
| Pelomedusidae   | <i>Pelomedusa subrufa</i>                  | Marsh Terrapin             | X                    |                   |
| Pythonidae      | <i>Python natalensis</i>                   | Southern African Python    |                      | X <sup>5</sup>    |
| Testudinidae    | <i>Stigmochelys pardalis</i>               | Leopard Tortoise           | X                    |                   |
| Varanidae       | <i>Varanus albigularis albigularis</i>     | Rock Monitor               | X                    |                   |

<sup>5</sup> Anecdotal report of a Python at Manketti Lodge during field visit.

| Family            | Scientific Name                | Common Name        | 2018 Field Programme |                   |
|-------------------|--------------------------------|--------------------|----------------------|-------------------|
|                   |                                |                    | Wet Season Survey    | Dry Season Survey |
| <b>Amphibians</b> |                                |                    |                      |                   |
| Bufonidae         | <i>Amietophrynus garmani</i>   | Eastern Olive Toad | X                    | X                 |
|                   | <i>Schisaderma carens</i>      | Red Toad           | X                    |                   |
| Pyxicephalidae    | <i>Tomopterna cf tandyi</i>    | Tandy's Sand Frog  | X                    |                   |
| Rhacophoridae     | <i>Chiromantis xerampelina</i> | Foam Nest Frog     | X                    |                   |

### Herpetofauna of Conservation Importance

Seven reptile species potentially occurring in the study area are of conservation importance - one is Red Listed, two are protected under the NEMBA ToPS List (2013), while the others are endemic or near endemic (refer to Table 9).

Of amphibians potentially occurring in the study area, the Giant Bullfrog (*Pyxicephalus adspersus*) is of conservation importance. This species is listed as Protected according to the Limpopo Environmental Management Act (2003).

Giant Bullfrogs remain buried for much of the year in grassland and savanna areas, and emerge briefly after rain to breed in shallow temporary streams and pans (du Preez and Carruthers, 2009; Minter *et al.*, 2004). This species has previously been recorded in the 2327DA QDS according to the ADU - Virtual Museum (2015) and NSS, (2011) recorded it in their scan of the Manketti Game Reserve. It is therefore probable that it is present in the shallow depressions/pans that are scattered throughout the study area.

**Table 9: Reptiles of conservation importance potentially occurring in the study area**

| Family     | Scientific Name             | Common Name             | Conservation Status             |                        |   |                | Probability of Occurrence |
|------------|-----------------------------|-------------------------|---------------------------------|------------------------|---|----------------|---------------------------|
|            |                             |                         | Red List (2014) Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |                           |
| Cordylidae | <i>Platysaurus guttatus</i> | Dwarf Flat Lizard       | -                               | -                      | Protected                                   | Endemic        | Unlikely                  |
|            | <i>Platysaurus minor</i>    | Waterberg Flat Lizard   | -                               | -                      | Protected                                   | Endemic        | Unlikely                  |
|            | <i>Smaug breyeri</i>        | Waterberg Dragon Lizard | -                               | -                      | Protected                                   | Endemic        | Possible                  |

| Family       | Scientific Name              | Common Name             | Conservation Status             |                        |   |                | Probability of Occurrence |
|--------------|------------------------------|-------------------------|---------------------------------|------------------------|---|----------------|---------------------------|
|              |                              |                         | Red List (2014) Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |                           |
|              | <i>Smaug vandami</i>         | Van Dam's Dragon Lizard | -                               | -                      | Protected                                   | Endemic        | Possible                  |
| Crocodylidae | <i>Crocodylus niloticus</i>  | Nile Crocodile          | Vulnerable                      | Vulnerable             | Specially Protected                         | -              | Unlikely                  |
| Gekkonidae   | <i>Pachydactylus affinis</i> | Transvaal Gecko         | -                               | -                      | Protected                                   | Endemic        | Probable                  |
| Pythonidae   | <i>Python natalensis</i>     | Southern African Python | -                               | Protected              | Protected                                   | -              | Recorded                  |

Note: All reptiles, except *Varanus* spp., and non-listed snakes, are considered protected under the Limpopo Environmental Management Act (2003).



Figure 38: Leopard Tortoise (*Stigmochelys pardalis*)



Figure 39: Marsh Terrapin (*Pelomedusa subrufa*)

Figure 40: Red Toad (*Schismaderma carens*)Figure 41: Sand Frog (*Tomopterna cf. tandyi*)

### 5.5.4 Arthropods

Arthropods recorded in the study area as a result of targeted sampling are listed in Table 10. One recorded species is of conservation importance, namely the South African Horned Baboon Spider (*Ceratogyrus darlingi*) (see Figure 42). Only a single silk-lined burrow (Figure 43) was observed during the field survey; however considering the suitability of habitat, it is expected that this species, as well as Golden-brown Baboon Spider (*Augacephalus junodi*) (previously recorded at Grootegeluk Coal Mine - see Exxaro, 2014), are probably fairly abundant in the study area.

Based on available literature, six other taxa from the Families Theraphosidae and Scorpionidae may potentially occur in the study area (listed in Table 11). These should also be considered of conservation value.

**Table 10: Targeted arthropod taxa recorded in the study area**

| Family            | Scientific Name                 | Common Name                        |
|-------------------|---------------------------------|------------------------------------|
| Theraphosidae     | <i>Ceratogyrus darlingi</i>     | South African Horned Baboon Spider |
| Carabidae         | <i>Thermophilium homoplutum</i> | Two-spotted Ground Beetle          |
| Heteronemiidae    | <i>Marensis rufolineatus</i>    | Grass Stick Insect                 |
| Scarabaeidae      | <i>Pachylomerus femoralis</i>   | Flattened Giant Dung Beetle        |
| Scarabaeidae      | <i>Anachalos convexus</i>       | Plum Dung Beetle                   |
| Formicidae        | <i>Pachycondyla tarsata</i>     | African Stink Ant                  |
| Formicidae        | <i>Anoplolepis custodeins</i>   | Pugnacious Ant                     |
| Bothuridae        | <i>Parabuthus transvaalicus</i> | Transvaal Fat-tailed Scorpion      |
| Solifugae (order) | -                               | Red Roman/Sun Spider               |
| Salticidae        | <i>Brancus muticus</i>          | Jumping spider sp.                 |
| Termitidae        | <i>Odontotermes badius</i>      | Fungus-growing Termite             |

| Family        | Scientific Name              | Common Name              |
|---------------|------------------------------|--------------------------|
| Tenebrionidae | <i>Gonocephalum tibialis</i> | Armoured Darkling Beetle |
| Reduviidae    | -                            | Assassin Bug             |

**Table 11: Arthropods of conservation value recorded and potentially occurring in the study area**

| Class: Arachnida   | Scientific Name  | Common Name                             |
|--|--|---|
| Infra Order:<br>Mygalomorphae<br>Family: Theraphosidae<br>(Baboon Spiders) | <i>Augacephalus breyeri</i>                                  | Hectorspruit Golden Brown Baboon Spider |
|  | <i>Augacephalus junodi</i> (recorded Exxaro, 2014)           | Golden-brown Baboon Spider              |
|  | <i>Brachionopus pretoriae</i>                                | Baboon Spider species                   |
|  | <i>Ceratogyrus darling</i> (Recorded 2018 wet-season survey) | South African Horned Baboon Spider      |
|  | <i>Idiothele nigrofulva</i>                                  | Baboon Spider species                   |
| Order: Scorpionides<br>Family: Scorpionidae<br>(Burrowing Scorpions)       | <i>Opisththalmus glabrinfrons</i>                            | Yellow-legged Creeping Scorpion         |
|  | <i>Opisththalmus carinatus</i>                               | Robust Burrowing Scorpion               |
|  | <i>Opisththalmus wahlbergii</i>                              | Wahlberg's Burrowing Scorpion           |
| Source: Leeming (2003) and Dippenaar-Schoeman (2014).                      |  |   |





Figure 42: South African Horned Baboon Spider (*Ceratogyrus darlingi*) photographed during the field survey



Figure 43: Silk-lined Baboon spider burrow recorded in the study area



Figure 44: Solifuge (Order Solifugae) caught in a pitfall trap



Figure 45: Two-spotted Ground Beetle (*Thermophilium homoplatum*) caught in a pitfall trap

## 5.6 Key Ecological Processes

### 5.6.1 Linkages and Corridors

At a local scale, the landscape surrounding the study area is fragmented, and dominated by large areas of transformation and numerous linear developments (e.g. power lines, railway lines, roads, conveyors). Beyond this however, the broader landscape is characterised by extensive areas of untransformed natural habitat. These areas are partitioned by numerous fences and gravel roads, yet the movement and dispersal of unmanaged free-roaming wildlife populations across the landscape is probably only moderately restricted. Overall habitat connectivity for free-roaming fauna is therefore considered to be relatively high.

## 5.6.2 Processes and Drivers of Change

### 5.6.2.1 Overgrazing

Overgrazing is a common cause of dryland degradation, leading to one or several recognised syndromes (*sensu* Scholes, 2009). It occurs when grazing herbivores (both wildlife and domestic) are kept at excessive stocking rates and/or are able to concentrate their grazing to a limited foraging area without suitable rest periods. A common syndrome that can be linked to overgrazing, at least in part, is a change in plant species composition, that manifests as a combination of bush encroachment, a reduction in palatable grasses, and a reduction in grass productivity (Scholes, 2009). It is likely that historic overgrazing has affected the composition of vegetation in the study area.

### 5.6.2.2 Fire

We note that fire is probably not a regular occurrence in the study area, and therefore not a prominent driver of change. However, fire is a key determinant of savanna ecosystem dynamics in general - driving spatial and temporal heterogeneity across the landscape (Du Toit *et al.*, 2003). We therefore briefly discussed this here.

Fire is considered a natural, albeit often human initiated, disturbance agent in both savanna and grassland ecosystems across Africa. Through the large-scale and periodic removal of plant material, fire influences tree-grass ratios and plant species mixes (fire tolerant vs fire intolerant species) and therefore plays a key role determining vegetation structure, composition and function (Du Toit *et al.*, 2003).

### 5.6.2.3 Water Availability

Water availability, as a function of the interaction between soil condition/type and rainfall, affects plant primary productivity and nutrient mineralisation, and thus influences vegetation dynamics (Scholes and Walker, 1993).

The artificial provision of supplementary drinking water for wildlife can also influence the distribution and foraging patterns of grazing and browsing herbivores. Differing levels of herbivory can lead to local and radiating changes in soil properties and vegetation composition and structure (refer to section 5.6.2.1). In severe cases of intense and concentrated herbivory, considerable habitat degradation can occur around water points. This phenomenon is known as the 'piosphere effect' (*sensu*. Andrews, 1998).

## 6.0 ECOLOGICAL IMPACT ASSESSMENT

### 6.1 Impact Assessment Methodology

The significance of each identified impact was determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

| Occurrence                |                        | Severity               |                                |
|---------------------------|------------------------|------------------------|--------------------------------|
| Probability of occurrence | Duration of occurrence | Scale/extent of impact | Magnitude (severity) of impact |

To assess the significance of different impacts the following four ranking scales were used for each factor:

| Magnitude             | Duration  |
|-----------------------|---|
| 10- Very high/unknown | 5- Permanent (>10 years)  |
| 8- High               | 4- Long term (7 - 10 years, impact ceases after site closure has been obtained) |

| Magnitude        | Duration  |
|------------------|---|
| 6- Moderate      | 3- Medium-term (3 months - 7 years, impact ceases after the operational life of the activity) |
| 4- Low           | 2- Short-term (0 - 3 months, impact ceases after the construction phase)                      |
| 2- Minor         | 1- Immediate  |
| Scale            | Probability   |
| 5- International | 5- Definite/Unknown   |
| 4- National      | 4- Highly Probable  |
| 3- Regional      | 3- Medium Probability   |
| 2- Local         | 2- Low Probability  |
| 1- Site Only     | 1- Improbable   |
| 0- None          | 0- None   |

The significance of the impact was determined using the following formula:

$$\text{SP (significance points)} = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value is 100 significance points (SP). The impact significance was then rated as follows:

| Points     | Significance                        | Description  |
|------------|-------------------------------------|--|
| SP>60      | High environmental significance     | An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.                 |
| SP 30 - 60 | Moderate environmental significance | An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated. |
| SP<30      | Low environmental significance      | Impacts with little real effect and which will not have an influence on or require modification of the project design.                               |
| +          | Positive impact                     | An impact that is likely to result in positive consequences/effects.   |

For the methodology outlined above, the following definitions were used:

- Magnitude** is a measure of the degree of change in a measurement or analysis (e.g., the area of pasture, or the concentration of a metal in water compared to the water quality guideline value for the metal), and is classified as none/negligible, low, moderate or high.

The categorization of the impact magnitude may be based on a set of criteria (e.g. health risk levels, ecological concepts and/or professional judgment) pertinent to each of the discipline areas and key questions analysed. The specialist study must attempt to quantify the magnitude and outline the rationale used. Appropriate, widely-recognised standards are to be used as a measure of the level of impact;

- **Scale/Geographic** extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international;
- **Duration** refers to the length of time over which an environmental impact may occur: i.e. immediate/transient, short-term (0 to 7 years), medium term (8 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project), or permanent; and
- **Probability** of occurrence is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40% to 60% chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur).

## 6.2 Development of Mitigation Measures

A common approach to developing mitigation measures for critical impacts is to specify a range of targets with a predetermined acceptable range and an associated monitoring and evaluation plan. To ensure successful implementation, mitigation measures should be unambiguous statements of actions and requirements that are practical to execute. The following summarise the different approaches that may be used in prescribing and designing mitigation measures:

- **Avoidance:** mitigation by not carrying out the proposed action on the specific site, but rather on a more suitable site;
- **Minimization:** mitigation by scaling down the magnitude of a development, reorienting the layout of the project or employing technology to limit the undesirable environmental impact. It also includes taking ongoing maintenance steps during the course of the action;
- **Rehabilitation:** mitigation through the rehabilitation/restoration of environments affected by the action; and
- **Compensation:** mitigation through the creation, enhancement or acquisition of similar environments to those affected by the action.

## 6.3 Identification of Potential Impacts

Several potential negative impacts on terrestrial ecology have been identified for the proposed project. These are:

- Habitat loss and degradation;
- Habitat fragmentation;
- Establishment and spread of alien invasive species;
- Mortality and disturbance of fauna;
- Loss and disturbance of *fauna* of conservation importance; and
- Loss and disturbance of *flora* of conservation importance.

## 6.4 Characterisation and Rating of Impact Significance

Based on the ecology of the study area and surrounding landscape, the character and significance of each identified impact was assessed for the construction, operational and closure phases. The results of the assessment are described in sections 6.4.1 to 6.4.6, with the rating calculations presented in Table 13.

### 6.4.1 Habitat Loss and Degradation

#### *Impact Character*

Habitat loss refers to the direct removal of natural habitat. In terrestrial ecosystems, this occurs primarily through the clearing of indigenous vegetation coupled with earth works. The immediate impact is the destruction of individual plants and some faunal species within the development footprint. If remaining habitat is insufficient in size and heterogeneity to sustain ecological processes, a breakdown or impairment of ecosystem integrity and functioning at broader ecological scales can occur, leading to further losses of biodiversity – also see section 6.4.2: Habitat Fragmentation.

Habitat loss can also refer to habitat degradation. In this instance, although habitat is present, it has been disturbed to the extent that compositionally and structurally it is markedly dissimilar from reference conditions. In extreme cases of habitat degradation, the mix of functional species-types is altered and ecosystem functioning is impaired as a result (*sensu* Scholes, 2009).

#### *Impact in Relation to Proposed Project*

Direct habitat loss constitutes the foremost impact of the proposed project, with approximately 265 ha of natural vegetation likely to be completely transformed (refer to Figure 46). This will occur as a result of construction phase vegetation clearing for, *inter alia*, haul roads, open pits, stockpiles and other associated facilities.

Table 12 provides a projected breakdown of the approximate area (ha) of each habitat community that will be cleared during the proposed project. We also anticipate that the small patches of vegetation that remain between or adjacent to transformation footprints will be subjected to edge-effect disturbances, such as alien invasive species establishment. The ecological integrity and conservation importance of all five identified vegetation communities is high. Accordingly, the significance of habitat loss is rated high before mitigation.

Due to the nature of the proposed mining activities, habitat loss is difficult to avoid or significantly mitigate during the construction and operational phases. Moreover, even with successful rehabilitation during the closure phase, the resulting habitat will be secondary and markedly dissimilar from reference conditions. Moreover, the residual impacts of facilities such as the open pits and dumps/stockpiles will remain high. This impact is therefore also rated of **high** significance after mitigation.

**Table 12: Approximate clearing extent for each vegetation community**

| Vegetation Community   | Total Area (ha) | Approx. loss (ha) | Proportion (%) of Community Lost |
|--|-----------------|-------------------|----------------------------------|
| Short Open <i>Vachellia tortilis</i> Bushveld                            | 254             | 150               | 59                               |
| Tall <i>Senegalia nigrescens</i> Bushveld                                | 109             | 44                | 40                               |
| Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i> Bushveld | 101             | 18                | 18                               |



| Vegetation Community   | Total Area (ha) | Approx. loss (ha) | Proportion (%) of Community Lost |
|--|-----------------|-------------------|----------------------------------|
| <i>Spirostachys africana</i> - <i>Vachellia grandicornuta</i> Woodland | 68              | 41                | 60                               |
| <i>Euclea undulata</i> Thicket   | 76              | 12                | 15                               |
| Transformed land   | 6               | 0                 | 0                                |
| <b>Total</b>   | <b>615</b>      | <b>265</b>        | <b>43</b>                        |

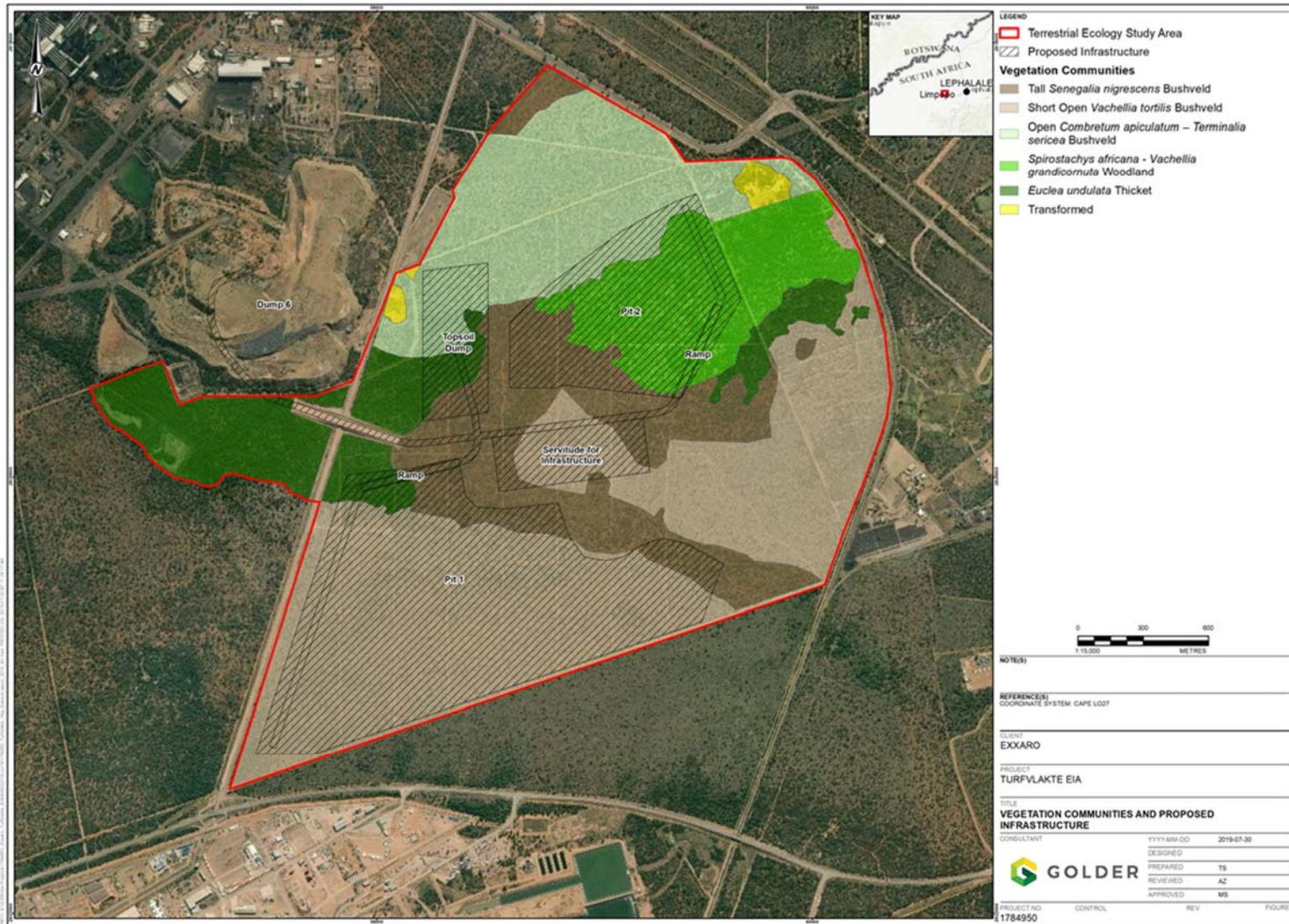


Figure 46: Overlay of proposed project infrastructure and vegetation communities

## 6.4.2 Habitat Fragmentation

### *Impact Character*

Habitat fragmentation is caused when vegetation loss/disturbance results in the partitioning of habitat into smaller, discontinuous patches. This leads to altered habitat configuration that typically manifests as an increase in patch number and isolation, yet a decrease in overall patch size (Fahrig, 2003). These alterations change the ecological properties of remaining patches and can affect various ecological processes, such as flora propagule dispersal and fauna movement and migration (Fahrig, 2003).

### *Impact in relation to proposed project*

The study area constitutes an area of natural habitat surrounded by large, transformed sites (Grootegeeluk Coal Mine, and the Matimba and Medupi Power Stations). It thus plays a role in maintaining local-scale habitat connectivity on an east-west axis. Habitat fragmentation caused by infrastructure development is thus likely to impede local fauna movement and affect other local-scale ecological processes. This impact is therefore rated an impact of high significance before mitigation.

Successful rehabilitation during the closure phase can, however, create areas of secondary and supporting (corridor) habitat that may restore some landscape connectivity and function that was lost due to fragmentation. This impact is therefore rated **moderate** after mitigation.

## 6.4.3 Establishment and Spread of Alien Invasive Species

### *Impact Character*

Disturbances caused by vegetation clearing and earth works can create conditions conducive to the establishment and rapid colonisation of alien invasive species. If left uncontrolled, alien species can spread exponentially, suppressing or replacing indigenous vegetation. This may lead to a breakdown in ecosystem functioning and a loss of biodiversity.

### *Impact in Relation to Proposed Project*

Seven alien invasive plant species were recorded in the study area during the field programme. Disturbance to natural vegetation may facilitate the spread of these, as well as several other invasive species that are known to occur in the area. This impact will be present throughout the life of the project but can be successfully mitigated through all phases by proactive management and rehabilitation.

The establishment and spread of alien invasive species is rated as having moderate impact prior to mitigation but can be reduced to **low** significance after mitigation.

#### 6.4.4 Mortality and Disturbance of Fauna

##### *Impact Character*

Large-scale development projects in wildlife-rich savanna areas may negatively affected fauna, as follows:

- Most large or mobile fauna will move-off to avoid disturbances caused by construction activities. However, smaller and less mobile species may be trapped, injured and killed during vegetation clearing and earth works. Fauna that are of particular concern in this regard include:
  - Fossorial<sup>6</sup> mammals (e.g. moles, rodents);
  - Nesting birds; ground and tree nests; and
  - Reptiles and amphibians.

Other common causes of fauna injury, death or disturbance during all project phases include:

- Vehicle-wildlife collisions along haul and access roads;
- Hunting, snaring and poisoning of larger fauna by mine workers and contractors;
- Fauna becoming trapped/caught in mine infrastructure, such as fences, excavations and storage dams;
- Blasting, vibrations and noise (sensory disturbances) can negatively affect fauna, particularly nesting and roosting birds; and
- Artificial lights can disrupt nocturnal species, such as bats, which can cause changes in community characteristics.

##### *Impact in Relation to Proposed Project*

The study area has a rich faunal assemblage, and it is anticipated that vegetation clearing and earth works during construction may cause injury or death to several less mobile taxa (e.g. tortoises, nesting birds). Moreover, fauna may also be killed or injured during the operation phase through, *inter alia*, vehicle collisions.

A number of operational activities may also cause disturbances, including blasting, noise and artificial lighting. We note however, that the the current levels of such disturbances in the immediate vicinity is high on account of the operations of Grootegeluk Mine, Matimba and Medupi.

This impact is rated moderate prior to mitigation but can be reduced to a **low** significance with proactive long term management.

#### 6.4.5 Loss and Disturbance of Fauna of Conservation Importance

##### *Impact Character*

During all phases of the proposed project, but particularly during the construction phase, fauna of conservation importance may be killed or disturbed, either through the loss of viable habitat or through direct impacts, as discussed in section 6.4.4.

<sup>6</sup> Organism adapted to digging and life underground.

### **Impact in Relation to Proposed Project**

Aestivating and burrowing taxa such as Giant Bullfrog (*Pyxicephalus adspersus*) and Baboon spiders (Family Theraphosidae) are particularly vulnerable to construction activities. This impact is rated moderate before mitigation but can be reduced to **low** significance with mitigation.

#### **6.4.6 Loss and Disturbance of Flora of Conservation Importance**

##### **Impact Character**

During vegetation clearing and earth works, flora of conservation importance may be cleared/removed or damaged.

### **Impact in Relation to Proposed Project**

Nine floral species of conservation importance were recorded during the field programme. Of these, three protected tree species are particularly abundant throughout the study area, viz.:

- *Vachellia erioloba* is abundant in all vegetation communities, except the *Spirostachys africana* - *Vachellia grandicornuta* Woodland;
- *Combretum imberbe* is abundant in the Short Open *Vachellia tortilis* Bushveld and Tall *Senegalia nigrescens* Bushveld communities; and
- *Spirostachys africana* is a co-dominant species in *Spirostachys africana* - *Vachellia grandicornuta* Woodland, but rarely occurred outside this vegetation community.

All plants of conservation importance occurring within proposed development footprints will be cleared during the construction phase. This impact is rated high before mitigation. The application of mitigation reduces the rating score of this impact, however it remains of **moderate** significance.



**Table 13: Rating of impact significance**

| IMPACTS ON THE TERRESTRIAL ECOSYSTEMS   |                   |           |          |       |             |                    |                            |
|---|-------------------|-----------|----------|-------|-------------|--------------------|----------------------------|
| Risk  | Management        | Magnitude | Duration | Scale | Probability | Significance Point | Environmental Significance |
| <b>CONSTRUCTION PHASE</b>   |                   |           |          |       |             |                    |                            |
| Habitat loss and degradation  | Before Mitigation | 8         | 5        | 2     | 5           | 75                 | HIGH                       |
|   | After Mitigation  | 8         | 4        | 1     | 5           | 65                 | HIGH                       |
| Habitat fragmentation   | Before Mitigation | 8         | 5        | 2     | 5           | 75                 | HIGH                       |
|   | After Mitigation  | 6         | 4        | 1     | 5           | 55                 | MODERATE                   |
| Establishment and spread of alien invasive species                                | Before Mitigation | 8         | 5        | 2     | 4           | 60                 | MODERATE                   |
|   | After Mitigation  | 4         | 3        | 1     | 2           | 16                 | LOW                        |
| Mortality and disturbance of fauna, incl. <i>fauna</i> of conservation importance | Before Mitigation | 8         | 2        | 2     | 4           | 48                 | MODERATE                   |
|   | After Mitigation  | 4         | 2        | 1     | 2           | 14                 | LOW                        |
| Loss and disturbance of <i>flora</i> of conservation importance                   | Before Mitigation | 10        | 2        | 1     | 5           | 65                 | HIGH                       |
|   | After Mitigation  | 6         | 2        | 1     | 5           | 45                 | MODERATE                   |

| IMPACTS ON THE TERRESTRIAL ECOSYSTEMS   |                   |   |   |   |   |    |          |
|---|-------------------|---|---|---|---|----|----------|
| OPERATIONAL PHASE   |                   |   |   |   |   |    |          |
| Establishment and spread of alien invasive species                                | Before Mitigation | 8 | 5 | 2 | 4 | 60 | MODERATE |
|   | After Mitigation  | 4 | 3 | 1 | 2 | 16 | LOW      |
| Mortality and disturbance of fauna, incl. <i>fauna</i> of conservation importance | Before Mitigation | 8 | 2 | 2 | 4 | 48 | MODERATE |
|   | After Mitigation  | 4 | 2 | 1 | 2 | 14 | LOW      |
| CLOSURE PHASE   |                   |   |   |   |   |    |          |
| Establishment and spread of alien invasive species                                | Before Mitigation | 8 | 5 | 2 | 4 | 60 | MODERATE |
|   | After Mitigation  | 4 | 3 | 1 | 2 | 16 | LOW      |

## 6.5 Cumulative Impacts

Natural habitat in the study area forms part of a larger savanna habitat network that stretches across northern Limpopo Province. This habitat network is of regional conservation value, particularly with regard to large predator and raptor communities. The EWT (2014), for instance, indicated that 7% of Cheetah (*Acinonyx jubatus*) comprising the Waterberg Cluster are free-roaming animals, while a significant proportion of Limpopo Province's Wild Dog (*Lycaon pictus*) population is also free-roaming. The continued persistence of these populations is dependent on animals being able to move and access resources at landscape- and even regional-scales. Maintaining broad-scale, as well as local-scale ecosystem integrity and connectivity is therefore critically important.

Hansen and DeFries (2007) note that because the spatial domains of many ecological processes operate at broad-scales, land use changes in a portion of an ecosystem can cause a rescaling of the ecosystem as a whole and result in changes in overall functioning and biodiversity. Accordingly, development projects that cause habitat transformation and degradation may have negative ecological impacts that extend well beyond the envisaged project boundary.

The Waterberg District Environmental Management Framework (ref. Environomics *et al.*, 2010) forecasts increasing development throughout the Ellisras Coalfield area. The potential cumulative impact of this proposed project, coupled with existing developments and envisaged future mining- and non-mining related developments in the region, may have negative consequences on regional-scale habitat integrity, functioning and connectivity. This has the potential to negatively impact the population dynamics and conservation of threatened wildlife, such as free-roaming wild dog and cheetah, as well as vultures.

## 7.0 RECOMMENDED ECOLOGICAL MITIGATION MEASURES

Proposed mitigation measures for reducing the significance of potential ecological impacts are detailed in Table 14. It is recommended that these are included in the proposed project's environmental management programme (EMP).

**Table 14: Recommended ecological mitigation measures**

| Potential Impacts             | Mitigation Measures  |
|-------------------------------|--|
| Habitat loss and degradation. | <p><b>Minimisation</b></p> <ul style="list-style-type: none"> <li>■ Vegetation clearing should be restricted to the proposed development footprints <u>only</u>, with no clearing permitted outside of these areas; and</li> <li>■ Areas to be cleared should be clearly demarcated to prevent unnecessary clearing outside of these sites.</li> </ul> <p><b>Rehabilitation</b></p> <ul style="list-style-type: none"> <li>■ Removed topsoil should be stockpiled and used to rehabilitate disturbed areas; and</li> <li>■ A suitable rehabilitation programme should be developed and implemented in all disturbed areas. The programme should include: <ul style="list-style-type: none"> <li>■ Concurrent rehabilitation, if possible;</li> <li>■ Stabilisation and active revegetation of all disturbed areas using locally-occurring indigenous grass and tree species; and</li> <li>■ Protected tree species should be included in the mix of revegetation species.</li> </ul> </li> </ul> |

| Potential Impacts                                   | Mitigation Measures  |
|---|--|
| Habitat fragmentation.                              | <i>See proposed mitigation measures for 'Habitat loss and degradation.'</i>  |
| Establishment and spread of alien invasive species. | <p><b>Minimisation</b></p> <ul style="list-style-type: none"> <li>■ An alien invasive species control programme must be developed and implemented on-site during all phases of the proposed project. It is recommended that the programme include: <ul style="list-style-type: none"> <li>■ A combined approach using both chemical and mechanical control methods;</li> <li>■ Periodic follow-up treatments, informed by regular monitoring; and</li> <li>■ Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas.</li> </ul> </li> </ul> <p><b>Rehabilitation</b></p> <ul style="list-style-type: none"> <li>■ Rehabilitate all sites that are disturbed by construction phase activities, as per the rehabilitation programme; and</li> <li>■ Rehabilitate all disturbed footprints during the closure and rehabilitation phases, as per the rehabilitation programme.</li> </ul>  |
| Mortality and disturbance of fauna.                 | <p><b>Avoidance and Minimisation</b></p> <p><u>Death/injury during vegetation clearing and earth works</u></p> <ul style="list-style-type: none"> <li>■ Prior to construction: <ul style="list-style-type: none"> <li>■ Large mammals (e.g. antelope, zebra and giraffe) should be actively relocated to unaffected portions of the Manketti Nature Reserve or elsewhere; and</li> <li>■ Temporary corridors should be created by strategically removing fence portions to allow smaller mammals to disperse from Turfvlaakte to the adjacent Manketti Game Reserve during construction.</li> </ul> </li> <li>■ An ECO should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions. The ECO should be trained in <i>inter alia</i>, snake handling; and</li> <li>■ As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas, such as open trenches and voids.</li> </ul> <p><u>Vehicle-wildlife collisions</u></p> <ul style="list-style-type: none"> <li>■ A low speed limit (recommended 20 - 40 km/h) should be enforced on site to reduce wildlife-collisions.</li> </ul> <p><u>Hunting, snaring and poisoning</u></p> <ul style="list-style-type: none"> <li>■ The handling, poisoning and killing of on-site fauna by mine workers and contractors must be strictly prohibited; and</li> <li>■ Employees and contractors should be made aware of the presence of, and rules regarding, fauna through suitable induction training and on-site signage.</li> </ul> <p><u>Noise, vibrations and lights</u></p> <ul style="list-style-type: none"> <li>■ General noise abatement equipment should be fitted to machinery and vehicles;</li> </ul> |

| Potential Impacts   | Mitigation Measures   |
|---|---|
|   | <ul style="list-style-type: none"> <li>■ Noise shields, including earth berms, should be constructed around sites of noise origin;</li> <li>■ Dust suppression using water bowsers should be undertaken on all mine's roads and other sites where dust entrainment occurs; and</li> <li>■ Plan the lighting requirements of facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. Possible options include: <ul style="list-style-type: none"> <li>■ Zoning of areas of high and low lighting requirements;</li> <li>■ Using motion-activated lights as opposed to permanent lights; and</li> <li>■ Reducing height and angle of lights.</li> </ul> </li> </ul>  |
| Loss and disturbance of <i>fauna</i> of conservation importance | <p><b>Avoidance</b></p> <ul style="list-style-type: none"> <li>■ See proposed mitigation measures for 'Mortality and disturbance of fauna';</li> <li>■ The ECO should be present during any disturbance (earth works) of pans/depressions to monitor for the presence of Giant Bullfrog. If this species is detected, construction activities should cease until an appropriate and approved management plan is developed;</li> <li>■ Prior to construction, a grid survey for Baboon spider nests should be conducted, and any taxa encountered should be relocated to adjacent undeveloped, natural areas; and</li> <li>■ Suitably qualified/trained experts should be appointed to undertake the necessary rescue and relocation operations.</li> </ul>  |
| Loss and disturbance of <i>flora</i> of conservation importance | <p><b>Minimisation</b></p> <ul style="list-style-type: none"> <li>■ Prior to construction, all areas designated for vegetation clearing should be clearly marked and surveyed for flora of conservation importance by a trained botanist;</li> <li>■ Based on the results of the survey, rescue/destruction permits must be obtained from the relevant authority before vegetation clearing commences: <ul style="list-style-type: none"> <li>■ A permit to clear <i>Boscia albitrunca</i>, <i>Combretum imberbe</i>, <i>Elaeodendron transvaalense</i>, <i>Sclerocarya birrea</i> subsp. <i>caffra</i>, <i>Securidaca longepedunculata</i> and <i>Vachellia erioloba</i> should be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF);</li> <li>■ A permit to clear <i>Spirostachys africana</i> should be obtained from the Limpopo Department of Economic Development, Environment and Tourism (LEDET);</li> <li>■ As far as possible and practical, smaller herbaceous plants of conservation concern should be rescued and relocated to adjacent undisturbed areas. Relocation permits for herbaceous plants will need to be obtained from the LEDET; and</li> </ul> </li> </ul> |



| Potential Impacts | Mitigation Measures  |
|-------------------|--|
|                   | <ul style="list-style-type: none"> <li>■ As far as possible, cleared protected trees should be used rather than allowed to stand and decompose. The following potential uses are listed as examples:                             <ul style="list-style-type: none"> <li>■ The wood of <i>Spirostachys africana</i> (Tamboti) is highly noxious and not suitable for use as a fuel (i.e. firewood). However, the timber is highly sought after by furniture makers. Exxaro should investigate supplying cleared Tamboti trees to a timber merchant as an alternative to disposal; and</li> <li>■ The wood of <i>Vachellia erioloba</i> (Camel Thorn) is hard and is a valuable source of fuel (firewood and charcoal). Exxaro should investigate supplying cleared Camel Thorn trees to local communities as an alternative energy source.</li> </ul> </li> </ul> <p><b>Rehabilitation</b></p> <ul style="list-style-type: none"> <li>■ Protected trees should be included in the mix of revegetation species used during rehabilitation:                             <ul style="list-style-type: none"> <li>■ Exxaro should investigate developing an on-site nursery to manage the propagation and growing of protected trees;</li> <li>■ Where possible, it is recommended that seeds should be collected from protected trees, growing on local Exxaro owned properties, such as in Manketti Game Reserve; and</li> <li>■ Propagation should be optimally timed to ensure that trees are the correct size and maturity to survive outplanting during rehabilitation.</li> </ul> </li> </ul> |

## 8.0 CONCLUSIONS

The Turfvlakte study area forms part of the larger Manketti Nature Reserve, which surrounds Grootegeeluk Coal Mine, and is managed as a conservation area. It comprises natural bushveld habitat typical of the region and is inhabited by numerous wildlife species.

Five vegetation communities were identified in the study area. All have been minimally disturbed and are considered to have high ecological integrity and associated conservation importance. The study area provides important habitat for a variety of faunal taxa, including both free-roaming and managed wildlife populations. Several floral species of conservation importance were recorded on-site, including protected tree species that are both widespread and abundant. The study area thus has important biodiversity features and moreover, contributes to landscape-scale ecological processes and functioning.

It is anticipated that the proposed Turfvlakte mining activities will have significant negative impacts on the terrestrial ecology of the planned disturbance footprints. Most potential impacts relate directly or indirectly to vegetation clearing and earth works during the construction phase. The residual impacts of habitat loss and the concomitant destruction of protected trees are rated of high- and moderate significance, respectively.

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## Signature Page

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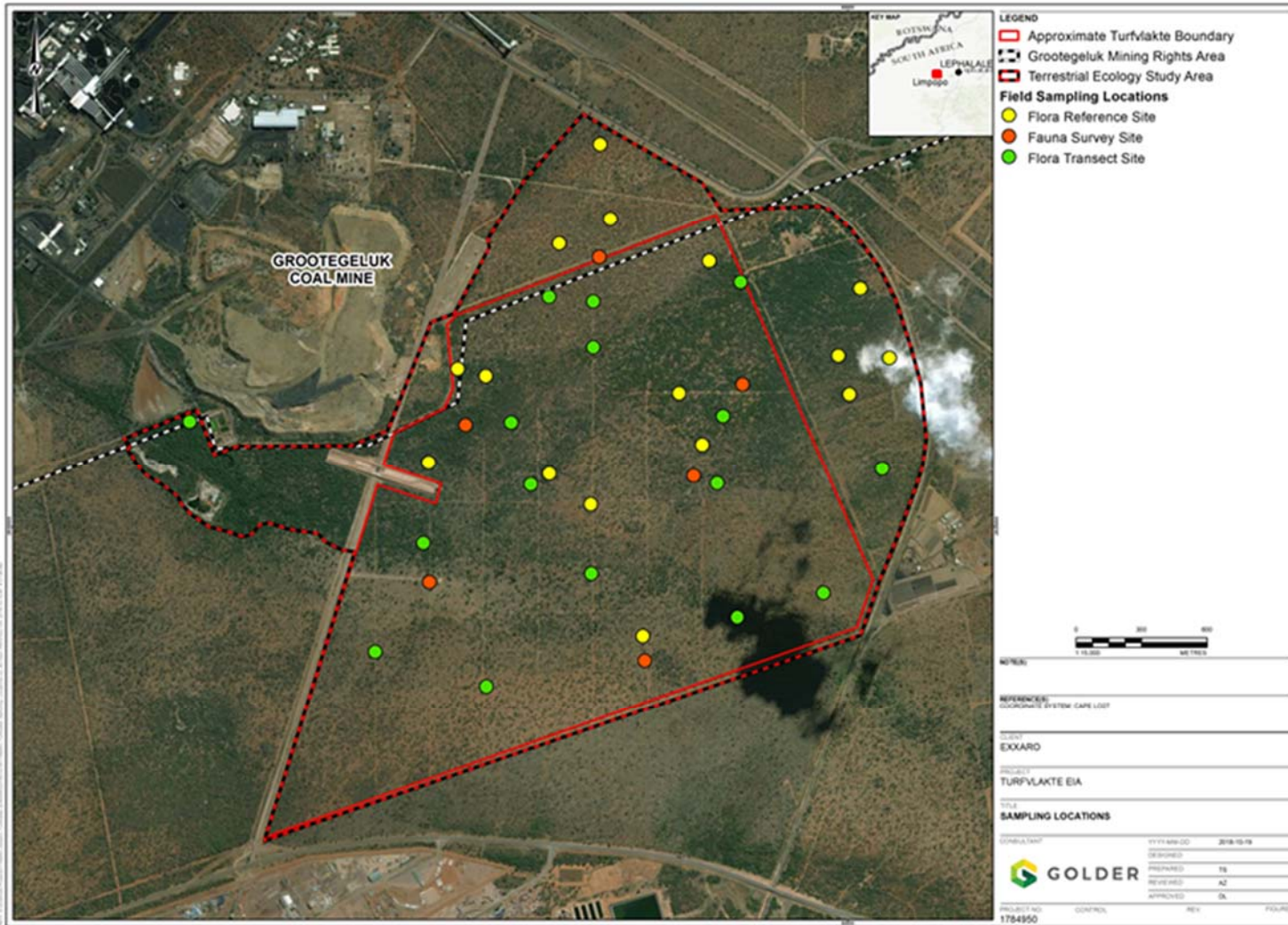
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**APPENDIX A**

**Location of Flora and Fauna  
Sampling Points**



**APPENDIX B**

List of Flora Species Recorded in  
the Study Area during the Field  
Programme (Table 1)

and

The BODATSA Flora List for the  
2327DA QDC (Table 2)

**Table 1: Plants recorded in the study area during the field programme**

| Family        | Species Name   | Tall <i>Senegalia nigrescens</i><br>Bushveld | Short Open<br><i>Vachellia tortilis</i><br>Bushveld | Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i><br>Bushveld | <i>Spirostachys africana</i> -<br><i>Vachellia grandicornuta</i><br>Woodland | <i>Euclea undulata</i><br>Thicket | Transformed /<br>Disturbed Mining<br>Area |
|---------------|--|--|---|---|--|-----------------------------------|---|
| Acanthaceae   | <i>Barleria</i> sp. 1                                    |  | x   |   |  |                                   |   |
| Acanthaceae   | <i>Blepharis subvolubilis</i> subsp. <i>subvolubilis</i> |  | x   | x   |  |                                   |   |
| Amaranthaceae | <i>Alternanthera pungens</i> *                           | x  | x   |   |  |                                   | x   |
| Amaranthaceae | <i>Hermbstaedtia odorata</i> var. <i>albi-rosea</i>      |  | x   |   |  |                                   |   |
| Amaranthaceae | <i>Kyphocarpa angustifolia</i>                           | x  | x   |   |  |                                   |   |
| Amaranthaceae | <i>Pupalia lappacea</i>                                  | x  | x   |   |  | x                                 |   |
| Anacardiaceae | <i>Sclerocarya birrea</i> subsp. <i>caffra</i>           |  |   | x   |  |                                   | x   |
| Anacardiaceae | <i>Searsia lancea</i>                                    |  |   |   |  | x                                 | x   |
| Anacardiaceae | <i>Searsia leptodictya</i>                               |  |   |   |  | x                                 |   |
| Anacardiaceae | <i>Searsia tenuinervis</i>                               |  |   |   |  | x                                 |   |
| Apocynaceae   | <i>Carissa bispinosa</i>                                 |  |   |   | x  |                                   |   |
| Apocynaceae   | <i>Gomphocarpus fruticosus</i>                           | x  |   |   |  |                                   |   |
| Apocynaceae   | <i>Stapelia gigantea</i>                                 | x  |   |   |  |                                   |   |
| Asparagaceae  | <i>Asparagus laricinus</i>                               | x  |   | x   | x  |                                   | x   |

| Family        | Species Name   | Tall <i>Senegalia nigrescens</i><br>Bushveld | Short Open<br><i>Vachellia tortilis</i><br>Bushveld | Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i><br>Bushveld | <i>Spirostachys africana</i> -<br><i>Vachellia grandicornuta</i><br>Woodland | <i>Euclea undulata</i><br>Thicket | Transformed /<br>Disturbed Mining<br>Area |
|---------------|--|--|---|---|--|-----------------------------------|---|
| Asphodelaceae | <i>Aloe cf zebrina</i>                                 | x  |   |   |  |                                   |   |
| Asteraceae    | <i>Flaveria bidentis</i> *                             | x  |   |   |  |                                   | x   |
| Asteraceae    | <i>Helichrysum argyrosphaerum</i>                      |  | x   |   |  |                                   |   |
| Asteraceae    | <i>Laggera decurrens</i>                               |  | x   |   |  |                                   |   |
| Asteraceae    | <i>Verbesina encelioides</i> var. <i>encelioides</i> * | x  |   |   |  |                                   | x   |
| Asteraceae    | <i>Vernonia fastigiata</i>                             |  |   | x   |  |                                   |   |
| Bignoniaceae  | <i>Rhigozum brevispinosum</i>                          |  | x   |   |  | x                                 | x   |
| Boraginaceae  | <i>Ehretia rigida</i>                                  |  |   |   |  | x                                 |   |
| Boraginaceae  | <i>Heliotropium lineare</i>                            | x  | x   | x   |  |                                   |   |
| Boraginaceae  | <i>Heliotropium ovalifolium</i>                        |  | x   |   |  | x                                 |   |
| Burseraceae   | <i>Commiphora africana</i>                             |  |   | x   |  |                                   |   |
| Burseraceae   | <i>Commiphora pyracanthoides</i>                       | x  | x   |   |  |                                   |   |
| Burseraceae   | <i>Commiphora schimperi</i>                            |  |   |   | x  |                                   |   |
| Byttneriaceae | <i>Waltheria indica</i>                                | x  | x   | x   |  |                                   | x   |
| Cactaceae     | <i>Cereus jamacaru</i> *                               |  |   |   |  | x                                 |   |



| Family         | Species Name                                       | Tall <i>Senegalia nigrescens</i> Bushveld | Short Open <i>Vachellia tortilis</i> Bushveld | Open <i>Combretum apiculatum</i> – <i>Terminalia sericea</i> Bushveld | <i>Spirostachys africana</i> - <i>Vachellia grandicornuta</i> Woodland | <i>Euclea undulata</i> Thicket | Transformed / Disturbed Mining Area |
|----------------|--|---|---|---|--|--------------------------------|-------------------------------------|
| Cactaceae      | <i>Opuntia ficus indica</i> *                      |   |   |   | x  |                                |                                     |
| Cactaceae      | <i>Opuntia cf humifusa</i> *                       | x   |   |   |  |                                |                                     |
| Capparaceae    | <i>Boscia albitrunca</i>                           | x   | x   |   |  |                                |                                     |
| Capparaceae    | <i>Boscia foetida</i> subsp. <i>rehmanniana</i>    | x   | x   | x   | x  | x                              |                                     |
| Celastraceae   | <i>Elaeodendron transvaalensis</i>                 |   |   |   | x  |                                |                                     |
| Combretaceae   | <i>Combretum apiculatum</i>                        |   | x   | x   |  |                                |                                     |
| Combretaceae   | <i>Combretum hereroense</i>                        |   |   | x   | x  | x                              | x                                   |
| Combretaceae   | <i>Combretum imberbe</i>                           | x   | x   |   |  | x                              | x                                   |
| Combretaceae   | <i>Combretum zeyheri</i>                           |   |   | x   |  |                                |                                     |
| Combretaceae   | <i>Terminalia sericea</i>                          |   | x   | x   |  |                                | x                                   |
| Convolvulaceae | <i>Ipomoea cf magnusiana</i>                       |   | x   |   |  |                                |                                     |
| Crassulaceae   | <i>Kalanchoe brachyloba</i>                        | x   |   |   | x  | x                              |                                     |
| Crassulaceae   | <i>Kalanchoe rotundifolia</i>                      |   |   |   | x  |                                |                                     |
| Dracaenaceae   | <i>Sansevieria aethiopica</i>                      | x   |   |   | x  |                                |                                     |
| Ebenaceae      | <i>Diospyros lycioides</i> subsp. <i>lycioides</i> |   |   |   |  | x                              |                                     |

| Family        | Species Name                      | Tall <i>Senegalia nigrescens</i> Bushveld | Short Open <i>Vachellia tortilis</i> Bushveld | Open <i>Combretum apiculatum</i> – <i>Terminalia sericea</i> Bushveld | <i>Spirostachys africana</i> - <i>Vachellia grandicornuta</i> Woodland | <i>Euclea undulata</i> Thicket | Transformed / Disturbed Mining Area |
|---------------|-----------------------------------|---|---|---|--|--------------------------------|-------------------------------------|
| Ebenaceae     | <i>Euclea undulata</i>            | x   |   | x   | x  | x                              | x                                   |
| Euphorbiaceae | <i>Ricinus communis</i> *         |   |   |   |  |                                | x                                   |
| Euphorbiaceae | <i>Spirostachys africana</i>      |   |   | x   | x  | x                              |                                     |
| Fabaceae      | <i>Bolusanthus speciosa</i>       | x   |   |   |  |                                |                                     |
| Fabaceae      | <i>Burkea africana</i>            |   |   | x   |  |                                |                                     |
| Fabaceae      | <i>Dichrostachys cinerea</i>      | x   | x   | x   | x  | x                              | x                                   |
| Fabaceae      | <i>Elephantorrhiza burkei</i>     |   |   | x   |  |                                |                                     |
| Fabaceae      | <i>Indigofera cf heterotricha</i> |   | x   |   |  |                                | x                                   |
| Fabaceae      | <i>Peltophorum africanum</i>      | x   | x   | x   |  | x                              | x                                   |
| Fabaceae      | <i>Schotia brachypetala</i>       |   |   |   | x  |                                |                                     |
| Fabaceae      | <i>Senegalia burkei</i>           |   |   |   |  | x                              |                                     |
| Fabaceae      | <i>Senegalia erubescens</i>       | x   | x   | x   |  |                                | x                                   |
| Fabaceae      | <i>Senegalia fleckii</i>          |   | x   | x   |  |                                |                                     |
| Fabaceae      | <i>Senegalia mellifera</i>        |   |   |   | x  | x                              | x                                   |
| Fabaceae      | <i>Senegalia nigrescens</i>       | x   | x   | x   | x  |                                |                                     |

| Family        | Species Name                                       | Tall <i>Senegalia nigrescens</i><br>Bushveld | Short Open<br><i>Vachellia tortilis</i><br>Bushveld | Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i><br>Bushveld | <i>Spirostachys africana</i> -<br><i>Vachellia grandicornuta</i><br>Woodland | <i>Euclea undulata</i><br>Thicket | Transformed /<br>Disturbed Mining<br>Area |
|---------------|--|--|---|---|--|-----------------------------------|---|
| Fabaceae      | <i>Vachellia erioloba</i>                          | x  | x   | x   | x  | x                                 | x   |
| Fabaceae      | <i>Vachellia grandicornuta</i>                     | x  | x   |   | x  |                                   |   |
| Fabaceae      | <i>Vachellia karroo</i>                            |  | x   |   |  | x                                 |   |
| Fabaceae      | <i>Vachellia nilotica</i>                          |  |   |   | x  | x                                 | x   |
| Fabaceae      | <i>Vachellia robusta</i>                           | x  | x   |   |  | x                                 | x   |
| Fabaceae      | <i>Vachellia tortilis</i>                          | x  | x   |   |  | x                                 | x   |
| Fabaceae      | <i>Vachellia xanthophloea</i>                      |  |   |   |  |                                   | x   |
| Hyacinthaceae | <i>Ledebouria marginata</i>                        | x  | x   |   |  |                                   |   |
| Lamiaceae     | <i>Ocimum americanum</i> var. <i>americanum</i>    |  |   |   |  |                                   | x   |
| Loganiaceae   | <i>Strychnos madagascariensis</i>                  |  |   | x   |  |                                   |   |
| Loganiaceae   | <i>Strychnos spinosa</i>                           |  |   | x   |  |                                   |   |
| Malvaceae     | <i>Cienfuegosia digitata</i>                       | x  | x   |   |  |                                   |   |
| Malvaceae     | <i>Gossypium herbaceum</i> subsp. <i>africanum</i> | x  |   |   |  |                                   | x   |
| Malvaceae     | <i>Grewia bicolor</i>                              | x  | x   | x   | x  | x                                 | x   |
| Malvaceae     | <i>Grewia cf retinervis</i>                        |  |   | xx  |  | x                                 |   |

| Family         | Species Name                                    | Tall <i>Senegalia nigrescens</i> Bushveld | Short Open <i>Vachellia tortilis</i> Bushveld | Open <i>Combretum apiculatum</i> – <i>Terminalia sericea</i> Bushveld | <i>Spirostachys africana</i> - <i>Vachellia grandicornuta</i> Woodland | <i>Euclea undulata</i> Thicket | Transformed / Disturbed Mining Area |
|----------------|---|---|---|---|--|--------------------------------|-------------------------------------|
| Malvaceae      | <i>Grewia flava</i>                             | x   | x   | x   | x  | x                              | x                                   |
| Malvaceae      | <i>Grewia flavescens</i>                        | x   | x   | x   | x  | x                              | x                                   |
| Malvaceae      | <i>Grewia monticola</i>                         | x   | x   | x   |  |                                |                                     |
| Malvaceae      | <i>Grewia sp.</i>                               |   |   |   |  |                                |                                     |
| Malvaceae      | <i>Melhania acuminata</i> var. <i>acuminata</i> | x   | x   |   |  | x                              | x                                   |
| Malvaceae      | <i>Melhania rehmannii</i>                       | x   | x   |   |  |                                |                                     |
| Malvaceae      | <i>Sida cordifolia</i>                          |   |   | x   |  |                                |                                     |
| Malvaceae      | <i>Sida ovata</i>                               | x   | x   |   |  |                                | x                                   |
| Meliaceae      | <i>Melia azedarach</i> *                        |   |   |   |  | x                              |                                     |
| Ochnaceae      | <i>Ochna natalitia</i>                          |   |   | x   |  |                                |                                     |
| Olacaceae      | <i>Ximenia americana</i>                        | x   |   |   | x  | x                              |                                     |
| Olacaceae      | <i>Ximenia caffra</i>                           |   |   | x   |  |                                |                                     |
| Papilionoidae  | <i>Philenoptera violacea</i>                    |   |   |   |  |                                | x                                   |
| Phyllanthaceae | <i>Flueggea virosa</i>                          |   | x   |   |  | x                              |                                     |
| Poaceae        | <i>Aristida adscensionis</i>                    | x   | x   | x   |  |                                | x                                   |

| Family  | Species Name                                       | Tall <i>Senegalia nigrescens</i><br>Bushveld | Short Open<br><i>Vachellia tortilis</i><br>Bushveld | Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i><br>Bushveld | <i>Spirostachys africana</i> -<br><i>Vachellia grandicornuta</i><br>Woodland | <i>Euclea undulata</i><br>Thicket | Transformed /<br>Disturbed Mining<br>Area |
|---------|--|--|---|---|--|-----------------------------------|---|
| Poaceae | <i>Aristida congesta</i> subsp. <i>barbicollis</i> | x  | x   |   |  |                                   |   |
| Poaceae | <i>Aristida congesta</i> subsp. <i>congesta</i>    | x  | x   | x   |  |                                   | x   |
| Poaceae | <i>Aristida</i> sp.                                |  | x   | x   |  |                                   |   |
| Poaceae | <i>Aristida stipata</i>                            |  |   | x   |  |                                   |   |
| Poaceae | <i>Bothriochloa radicans</i>                       |  | x   |   |  |                                   |   |
| Poaceae | <i>Cenchrus ciliaris</i>                           | x  | x   |   |  |                                   | x   |
| Poaceae | <i>Chloris pycnothrix</i>                          |  | x   |   |  |                                   | x   |
| Poaceae | <i>Cynodon dactylon</i>                            |  |   |   | x  | x                                 | x   |
| Poaceae | <i>Dichanthium annulatum</i>                       | x  | x   |   | x  |                                   | x   |
| Poaceae | <i>Digitaria eriantha</i>                          | x  |   | x   |  |                                   |   |
| Poaceae | <i>Echinochloa colona</i>                          |  | x   |   |  |                                   |   |
| Poaceae | <i>Enneapogon cenchroides</i>                      | x  | x   |   |  | x                                 | x   |
| Poaceae | <i>Eragrostis cf biflora</i>                       |  |   |   | x  |                                   |   |
| Poaceae | <i>Eragrostis lehmanniana</i>                      |  | x   | x   |  |                                   |   |
| Poaceae | <i>Eragrostis pallens</i>                          |  |   | x   |  |                                   |   |



| Family  | Species Name                     | Tall <i>Senegalia nigrescens</i> Bushveld | Short Open <i>Vachellia tortilis</i> Bushveld | Open <i>Combretum apiculatum</i> – <i>Terminalia sericea</i> Bushveld | <i>Spirostachys africana</i> - <i>Vachellia grandicornuta</i> Woodland | <i>Euclea undulata</i> Thicket | Transformed / Disturbed Mining Area |
|---------|----------------------------------|---|---|---|--|--------------------------------|-------------------------------------|
| Poaceae | <i>Eragrostis rigidior</i>       |   | x   |   |  |                                |                                     |
| Poaceae | <i>Eragrostis</i> sp.            |   | x   |   |  | x                              |                                     |
| Poaceae | <i>Eragrostis superba</i>        |   | x   |   |  |                                |                                     |
| Poaceae | <i>Melinis repens</i>            | x   | x   |   |  |                                | x                                   |
| Poaceae | <i>Panicum coloratum</i>         | x   |   |   |  |                                |                                     |
| Poaceae | <i>Panicum maximum</i>           | x   |   |   |  | x                              |                                     |
| Poaceae | <i>Panicum</i> sp.               |   | x   |   |  |                                |                                     |
| Poaceae | <i>Perotis patens</i>            |   |   | x   |  |                                |                                     |
| Poaceae | <i>Pogonarthria squarrosa</i>    |   | x   |   |  |                                |                                     |
| Poaceae | <i>Schmidtia pappophoroides</i>  | x   | x   | x   |  |                                |                                     |
| Poaceae | <i>Sporobolus nitens</i>         |   |   |   | x  |                                |                                     |
| Poaceae | <i>Stipagrostis uniplumis</i>    | x   | x   | x   |  |                                | x                                   |
| Poaceae | <i>Tragus berteronianus</i>      |   |   |   | x  |                                | x                                   |
| Poaceae | <i>Tricholaena monachne</i>      |   | x   |   |  |                                |                                     |
| Poaceae | <i>Triraphis andropogonoides</i> |   |   | x   |  |                                |                                     |

| Family       | Species Name                                 | Tall <i>Senegalia nigrescens</i><br>Bushveld | Short Open<br><i>Vachellia tortilis</i><br>Bushveld | Open <i>Combretum apiculatum</i> –<br><i>Terminalia sericea</i><br>Bushveld | <i>Spirostachys africana</i> -<br><i>Vachellia grandicornuta</i><br>Woodland | <i>Euclea undulata</i><br>Thicket | Transformed /<br>Disturbed Mining<br>Area |
|--------------|--|--|---|---|--|-----------------------------------|---|
| Poaceae      | <i>Urochloa mossambicensis</i>               |  | x   |   |  |                                   |   |
| Polygalaceae | <i>Securidaca longipedunculata</i>           |  |   | x   |  |                                   |   |
| Rhamnaceae   | <i>Ziziphus mucronata</i>                    | x  |   | x   |  | x                                 | x   |
| Rubiaceae    | <i>Gardenia volkensii</i>                    |  |   | x   |  |                                   | x   |
| Solanaceae   | <i>Datura stramonium*</i>                    | x  |   |   |  |                                   |   |
| Solanaceae   | <i>Solanum catombelense</i>                  | x  |   |   |  | x                                 |   |
| Solanaceae   | <i>Solanum elaeagnifolium</i>                |  |   | x   |  |                                   | x   |
| Solanaceae   | <i>Solanum lichtensteinii</i>                | x  |   | x   |  |                                   | x   |
| Solanaceae   | <i>Solanum panduriforme</i>                  | x  | x   |   |  | x                                 |   |
| Solanaceae   | <i>Solanum tettense</i> var. <i>renschii</i> | x  | x   |   |  |                                   |   |
| Viscaceae    | <i>Viscum rotundifolium</i>                  |  | x   |   |  |                                   |   |

**Table 2: BODATSA (2016) flora species records**

| Family         | Species Name                                       |
|----------------|--|
| Acanthaceae    | <i>Asystasia mysorensis</i>                        |
| Acanthaceae    | <i>Barleria affinis</i>                            |
| Acanthaceae    | <i>Barleria galpinii</i>                           |
| Acanthaceae    | <i>Barleria mackenii</i>                           |
| Acanthaceae    | <i>Barleria</i> sp.                                |
| Acanthaceae    | <i>Barleria coriacea</i>                           |
| Acanthaceae    | <i>Blepharis maderaspatensis</i>                   |
| Acanthaceae    | <i>Blepharis breyeri</i>                           |
| Acanthaceae    | <i>Blepharis diversispina</i>                      |
| Acanthaceae    | <i>Chorisochoa transvaalensis</i>                  |
| Acanthaceae    | <i>Dicliptera minor</i> subsp. <i>minor</i>        |
| Acanthaceae    | <i>Dyschoriste fischeri</i>                        |
| Acanthaceae    | <i>Dyschoriste rogersii</i>                        |
| Acanthaceae    | <i>Justicia exigua</i>                             |
| Acanthaceae    | <i>Justicia divaricata</i>                         |
| Acanthaceae    | <i>Justicia flava</i>                              |
| Acanthaceae    | <i>Ruellia patula</i>                              |
| Agavaceae      | <i>Chlorophytum recurvifolium</i>                  |
| Amaranthaceae  | <i>Hermbstaedia odorata</i> var. <i>albi-rosea</i> |
| Amaranthaceae  | <i>Hermbstaedia odorata</i> var. <i>odorata</i>    |
| Amaranthaceae  | <i>Hermbstaedia odorata</i> var. <i>aurantiaca</i> |
| Amaranthaceae  | <i>Kyphocarpa angustifolia</i>                     |
| Amaranthaceae  | <i>Sericorema remotiflora</i>                      |
| Amaryllidaceae | <i>Nerine laticoma</i>                             |
| Anacardiaceae  | <i>Ozoroa paniculosa</i> var. <i>paniculosa</i>    |
| Anacardiaceae  | <i>Searsia rigida</i> var. <i>margaretae</i>       |

| Family          | Species Name  |
|-----------------|---|
| Apocynaceae     | <i>Ceropegia conrathii</i>                              |
| Apocynaceae     | <i>Cryptolepis oblongifolia</i>                         |
| Apocynaceae     | <i>Cynanchum viminale</i> subsp. <i>viminale</i>        |
| Apocynaceae     | <i>Diplorhynchus condylocarpon</i>                      |
| Apocynaceae     | <i>Gomphocarpus tomentosus</i> subsp. <i>tomentosus</i> |
| Apocynaceae     | <i>Huernia stapelioides</i>                             |
| Apocynaceae     | <i>Huernia transvaalensis</i>                           |
| Apocynaceae     | <i>Marsdenia sylvestris</i>                             |
| Apocynaceae     | <i>Pergularia daemia</i> subsp. <i>daemia</i>           |
| Apocynaceae     | <i>Secamone parvifolia</i>                              |
| Aponogetonaceae | <i>Aponogeton junceus</i>                               |
| Araceae         | <i>Stylochaeton natalensis</i>                          |
| Asparagaceae    | <i>Asparagus exuvialis</i> forma <i>exuvialis</i>       |
| Asparagaceae    | <i>Asparagus nelsii</i>                                 |
| Asparagaceae    | <i>Asparagus aggregatus</i>                             |
| Asparagaceae    | <i>Asparagus cooperi</i>                                |
| Asteraceae      | <i>Ambrosia artemisiifolia</i>                          |
| Asteraceae      | <i>Athrixia elata</i>                                   |
| Asteraceae      | <i>Cotula microglossa</i>                               |
| Asteraceae      | <i>Cotula anthemoides</i>                               |
| Asteraceae      | <i>Denekia capensis</i>                                 |
| Asteraceae      | <i>Dicoma tomentosa</i>                                 |
| Asteraceae      | <i>Felicia mossamedensis</i>                            |
| Asteraceae      | <i>Geigeria filifolia</i>                               |
| Asteraceae      | <i>Geigeria burkei</i> subsp. <i>burkei</i>             |
| Asteraceae      | <i>Helichrysum zeyheri</i>                              |
| Asteraceae      | <i>Helichrysum nudifolium</i> var. <i>oxyphyllum</i>    |

| Family           | Species Name   |
|------------------|--|
| Asteraceae       | <i>Hilliardiella oligocephala</i>                      |
| Asteraceae       | <i>Hilliardiella sutherlandii</i>                      |
| Asteraceae       | <i>Hirpicium bechuanense</i>                           |
| Asteraceae       | <i>Nidorella resedifolia</i> subsp. <i>resedifolia</i> |
| Asteraceae       | <i>Pseudognaphalium luteoalbum</i>                     |
| Asteraceae       | <i>Tarchonanthus camphoratus</i>                       |
| Asteraceae       | <i>Verbesina encelioides</i> var. <i>encelioides</i>   |
| Bignoniaceae     | <i>Rhigozum brevispinosum</i>                          |
| Boraginaceae     | <i>Heliotropium ciliatum</i>                           |
| Boraginaceae     | <i>Heliotropium zeylanicum</i>                         |
| Boraginaceae     | <i>Heliotropium ovalifolium</i>                        |
| Brassicaceae     | <i>Erucastrum griquense</i>                            |
| Burseraceae      | <i>Commiphora mollis</i>                               |
| Burseraceae      | <i>Commiphora pyracanthoides</i>                       |
| Burseraceae      | <i>Commiphora neglecta</i>                             |
| Campanulaceae    | <i>Wahlenbergia undulata</i>                           |
| Capparaceae      | <i>Boscia albitrunca</i>                               |
| Capparaceae      | <i>Boscia foetida</i> subsp. <i>rehmanniana</i>        |
| Capparaceae      | <i>Cadaba termitaria</i>                               |
| Capparaceae      | <i>Maerua angolensis</i> subsp. <i>angolensis</i>      |
| Caryophyllaceae  | <i>Corrigiola litoralis</i> subsp. <i>litoralis</i>    |
| Ceratophyllaceae | <i>Ceratophyllum demersum</i> var. <i>demersum</i>     |
| Cleomaceae       | <i>Cleome angustifolia</i> subsp. <i>petersiana</i>    |
| Cleomaceae       | <i>Cleome hirta</i>                                    |
| Cleomaceae       | <i>Cleome rubella</i>                                  |
| Combretaceae     | <i>Combretum apiculatum</i> subsp. <i>apiculatum</i>   |
| Combretaceae     | <i>Combretum hereroense</i>                            |



| Family         | Species Name  |
|----------------|---|
| Combretaceae   | <i>Terminalia sericea</i>                               |
| Commelinaceae  | <i>Commelina livingstonii</i>                           |
| Commelinaceae  | <i>Commelina benghalensis</i>                           |
| Commelinaceae  | <i>Commelina erecta</i>                                 |
| Commelinaceae  | <i>Cyanotis speciosa</i>                                |
| Convolvulaceae | <i>Evolvulus alsinoides</i>                             |
| Convolvulaceae | <i>Ipomoea magnusiana</i>                               |
| Convolvulaceae | <i>Ipomoea obscura</i> var. <i>obscura</i>              |
| Convolvulaceae | <i>Ipomoea coptica</i>                                  |
| Convolvulaceae | <i>Ipomoea hackeliana</i>                               |
| Convolvulaceae | <i>Ipomoea robertsiana</i>                              |
| Convolvulaceae | <i>Ipomoea adenioides</i> var. <i>adenioides</i>        |
| Convolvulaceae | <i>Ipomoea crassipes</i> var. <i>crassipes</i>          |
| Convolvulaceae | <i>Ipomoea gracilisepala</i>                            |
| Convolvulaceae | <i>Merremia verecunda</i>                               |
| Convolvulaceae | <i>Xenostegia tridentata</i> subsp. <i>angustifolia</i> |
| Crassulaceae   | <i>Crassula capitella</i> subsp. <i>sessilicymula</i>   |
| Cucurbitaceae  | <i>Acanthosicyos naudinianus</i>                        |
| Cucurbitaceae  | <i>Coccinia sessilifolia</i>                            |
| Cucurbitaceae  | <i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i>    |
| Cucurbitaceae  | <i>Cucumis africanus</i>                                |
| Cucurbitaceae  | <i>Kedrostis foetidissima</i>                           |
| Cucurbitaceae  | <i>Momordica repens</i>                                 |
| Cucurbitaceae  | <i>Pilogyne marlothii</i>                               |
| Cucurbitaceae  | <i>Trochomeria macrocarpa</i> subsp. <i>macrocarpa</i>  |
| Cyperaceae     | <i>Bulbostylis hispidula</i> subsp. <i>pyriformis</i>   |
| Cyperaceae     | <i>Bulbostylis humilis</i>                              |

| Family          | Species Name  |
|-----------------|---|
| Cyperaceae      | <i>Cyperus chersinus</i>                                |
| Cyperaceae      | <i>Eleocharis limosa</i>                                |
| Cyperaceae      | <i>Kyllinga alba</i>                                    |
| Cyperaceae      | <i>Pycreus polystachyos</i> var. <i>polystachyos</i>    |
| Cyperaceae      | <i>Pycreus pelophilus</i>                               |
| Dichapetalaceae | <i>Dichapetalum cymosum</i>                             |
| Ebenaceae       | <i>Diospyros lycioides</i> subsp. <i>lycioides</i>      |
| Ebenaceae       | <i>Diospyros lycioides</i> subsp. <i>nitens</i>         |
| Ebenaceae       | <i>Euclea undulata</i>                                  |
| Entodontaceae   | <i>Entodon cymbifolius</i>                              |
| Eriocaulaceae   | <i>Eriocaulon abyssinicum</i>                           |
| Euphorbiaceae   | <i>Acalypha caperonioides</i> var. <i>caperonioides</i> |
| Euphorbiaceae   | <i>Acalypha indica</i> var. <i>indica</i>               |
| Euphorbiaceae   | <i>Clutia pulchella</i> var. <i>pulchella</i>           |
| Euphorbiaceae   | <i>Dalechampia capensis</i>                             |
| Euphorbiaceae   | <i>Euphorbia neopolycnemoides</i>                       |
| Euphorbiaceae   | <i>Euphorbia waterbergensis</i>                         |
| Euphorbiaceae   | <i>Euphorbia tirucalli</i>                              |
| Euphorbiaceae   | <i>Euphorbia rhombifolia</i>                            |
| Euphorbiaceae   | <i>Schinziophyton rautanenii</i>                        |
| Euphorbiaceae   | <i>Spirostachys africana</i>                            |
| Euphorbiaceae   | <i>Tragia dioica</i>                                    |
| Fabaceae        | <i>Abrus laevigatus</i>                                 |
| Fabaceae        | <i>Aeschynomene indica</i>                              |
| Fabaceae        | <i>Albizia harveyi</i>                                  |
| Fabaceae        | <i>Alistilus bechuanicus</i>                            |
| Fabaceae        | <i>Bauhinia petersiana</i> subsp. <i>macrantha</i>      |

| Family   | Species Name  |
|----------|---|
| Fabaceae | <i>Chamaecrista absus</i>                             |
| Fabaceae | <i>Chamaecrista biensis</i>                           |
| Fabaceae | <i>Crotalaria podocarpa</i>                           |
| Fabaceae | <i>Crotalaria distans</i> subsp. <i>distans</i>       |
| Fabaceae | <i>Crotalaria orientalis</i> subsp. <i>orientalis</i> |
| Fabaceae | <i>Crotalaria monophylla</i>                          |
| Fabaceae | <i>Dichrostachys cinerea</i> subsp. <i>africana</i>   |
| Fabaceae | <i>Indigofera sordida</i>                             |
| Fabaceae | <i>Indigofera ingrata</i>                             |
| Fabaceae | <i>Indigofera flavicans</i>                           |
| Fabaceae | <i>Indigofera nebrowniana</i>                         |
| Fabaceae | <i>Indigofera daleoides</i> var. <i>daleoides</i>     |
| Fabaceae | <i>Indigofera bainesii</i>                            |
| Fabaceae | <i>Indigofera filipes</i>                             |
| Fabaceae | <i>Lablab purpureus</i> subsp. <i>uncinatus</i>       |
| Fabaceae | <i>Neorautanenia mitis</i>                            |
| Fabaceae | <i>Neorautanenia ficifolia</i>                        |
| Fabaceae | <i>Nesphostylis junodii</i>                           |
| Fabaceae | <i>Otoptera burchellii</i>                            |
| Fabaceae | <i>Pomaria burchellii</i> subsp. <i>burchellii</i>    |
| Fabaceae | <i>Ptychlobium contortum</i>                          |
| Fabaceae | <i>Requienia pseudosphaerosperma</i>                  |
| Fabaceae | <i>Rhynchosia spectabilis</i>                         |
| Fabaceae | <i>Rhynchosia</i> sp.                                 |
| Fabaceae | <i>Rhynchosia totta</i> var. <i>venulosa</i>          |
| Fabaceae | <i>Senegalia galpinii</i>                             |
| Fabaceae | <i>Senegalia caffra</i>                               |

| Family        | Species Name   |
|---------------|--|
| Fabaceae      | <i>Senegalia senegal</i> var. <i>rostrata</i>          |
| Fabaceae      | <i>Senegalia mellifera</i> subsp. <i>detinens</i>      |
| Fabaceae      | <i>Tephrosia purpurea</i> subsp. <i>leptostachya</i>   |
| Fabaceae      | <i>Tephrosia purpurea</i> subsp. <i>leptostachya</i>   |
| Fabaceae      | <i>Tephrosia zoutpansbergensis</i>                     |
| Fabaceae      | <i>Tylosema esculentum</i>                             |
| Fabaceae      | <i>Vachellia tortilis</i> subsp. <i>heteracantha</i>   |
| Fabaceae      | <i>Vachellia erioloba</i>                              |
| Fabaceae      | <i>Vigna frutescens</i> subsp. <i>frutescens</i>       |
| Fabaceae      | <i>Vigna unguiculata</i> subsp. <i>protracta</i>       |
| Fabaceae      | <i>Vigna unguiculata</i> subsp. <i>dekindtiana</i>     |
| Fabaceae      | <i>Xanthocercis zambesiaca</i>                         |
| Fabaceae      | <i>Zornia linearis</i>                                 |
| Fabroniaceae  | <i>Fabronia pilifera</i>                               |
| Gentianaceae  | <i>Chironia purpurascens</i> subsp. <i>humilis</i>     |
| Gentianaceae  | <i>Sebaea leiostyla</i>                                |
| Geraniaceae   | <i>Monsonia angustifolia</i>                           |
| Geraniaceae   | <i>Monsonia glauca</i>                                 |
| Gisekiaceae   | <i>Gisekia africana</i> var. <i>decagyna</i>           |
| Gisekiaceae   | <i>Gisekia pharnacioides</i> var. <i>pharnacioides</i> |
| Hyacinthaceae | <i>Albuca glauca</i>                                   |
| Hyacinthaceae | <i>Albuca virens</i> subsp. <i>virens</i>              |
| Hyacinthaceae | <i>Albuca virens</i> subsp. <i>arida</i>               |
| Hyacinthaceae | <i>Albuca seineri</i>                                  |
| Hyacinthaceae | <i>Albuca setosa</i>                                   |
| Hyacinthaceae | <i>Dipcadi papillatum</i>                              |
| Hyacinthaceae | <i>Dipcadi glaucum</i>                                 |

| Family        | Species Name   |
|---------------|--|
| Hyacinthaceae | <i>Dipcadi platyphyllum</i>                              |
| Hyacinthaceae | <i>Dipcadi</i> sp.                                       |
| Hyacinthaceae | <i>Dipcadi gracillimum</i>                               |
| Hyacinthaceae | <i>Dipcadi marlothii</i>                                 |
| Hyacinthaceae | <i>Dipcadi viride</i>                                    |
| Hyacinthaceae | <i>Drimia angustifolia</i>                               |
| Hypericaceae  | <i>Hypericum lalandii</i>                                |
| Iridaceae     | <i>Psilosiphon sandersonii</i> subsp. <i>sandersonii</i> |
| Kirkiaceae    | <i>Kirkia wilmsii</i>                                    |
| Kirkiaceae    | <i>Kirkia acuminata</i>                                  |
| Lamiaceae     | <i>Clerodendrum ternatum</i>                             |
| Lamiaceae     | <i>Leonotis pentadentata</i>                             |
| Lamiaceae     | <i>Vitex rehmannii</i>                                   |
| Leskeaceae    | <i>Lindbergia pseudoleskeoides</i>                       |
| Leskeaceae    | <i>Pseudoleskea</i> sp.                                  |
| Leskeaceae    | <i>Pseudoleskea leskeoides</i>                           |
| Limeaceae     | <i>Limeum fenestratum</i> var. <i>fenestratum</i>        |
| Lobeliaceae   | <i>Lobelia sonderiana</i>                                |
| Lythraceae    | <i>Nesaea rigidula</i>                                   |
| Malpighiaceae | <i>Sphedamnocarpus pruriens</i> subsp. <i>pruriens</i>   |
| Malvaceae     | <i>Abutilon pycnodon</i>                                 |
| Malvaceae     | <i>Abutilon austro-africanum</i>                         |
| Malvaceae     | <i>Corchorus asplenifolius</i>                           |
| Malvaceae     | <i>Corchorus psammophilus</i>                            |
| Malvaceae     | <i>Gossypium herbaceum</i> subsp. <i>africanum</i>       |
| Malvaceae     | <i>Grewia flavescens</i>                                 |
| Malvaceae     | <i>Grewia flava</i>                                      |

| Family    | Species Name  |
|-----------|---|
| Malvaceae | <i>Grewia occidentalis</i> var. <i>occidentalis</i> |
| Malvaceae | <i>Grewia avellana</i>                              |
| Malvaceae | <i>Grewia subspathulata</i>                         |
| Malvaceae | <i>Grewia retinervis</i>                            |
| Malvaceae | <i>Hermannia boraginiflora</i>                      |
| Malvaceae | <i>Hermannia tomentosa</i>                          |
| Malvaceae | <i>Hermannia stellulata</i>                         |
| Malvaceae | <i>Hermannia grisea</i>                             |
| Malvaceae | <i>Hermannia modesta</i>                            |
| Malvaceae | <i>Hibiscus sidiformis</i>                          |
| Malvaceae | <i>Hibiscus nigricaulis</i>                         |
| Malvaceae | <i>Hibiscus schinzii</i>                            |
| Malvaceae | <i>Hibiscus vitifolius</i> subsp. <i>vulgaris</i>   |
| Malvaceae | <i>Hibiscus calyphyllus</i>                         |
| Malvaceae | <i>Hibiscus praeteritus</i>                         |
| Malvaceae | <i>Hibiscus physaloides</i>                         |
| Malvaceae | <i>Hibiscus pusillus</i>                            |
| Malvaceae | <i>Hibiscus syriaca</i>                             |
| Malvaceae | <i>Hibiscus platycalyx</i>                          |
| Malvaceae | <i>Hibiscus micranthus</i> var. <i>micranthus</i>   |
| Malvaceae | <i>Melhania acuminata</i> var. <i>acuminata</i>     |
| Malvaceae | <i>Melhania forbesii</i>                            |
| Malvaceae | <i>Pavonia transvaalensis</i>                       |
| Malvaceae | <i>Pavonia clathrata</i>                            |
| Malvaceae | <i>Sida ovata</i>                                   |
| Malvaceae | <i>Sida chrysantha</i>                              |
| Malvaceae | <i>Triumfetta pilosa</i> var. <i>effusa</i>         |



| Family         | Species Name  |
|----------------|---|
| Malvaceae      | <i>Waltheria indica</i>                                     |
| Meliaceae      | <i>Turraea obtusifolia</i>                                  |
| Molluginaceae  | <i>Glinus bainesii</i>                                      |
| Moraceae       | <i>Ficus glumosa</i>  |
| Myrtaceae      | <i>Syzygium cordatum</i> subsp. <i>cordatum</i>             |
| Nyctaginaceae  | <i>Phaeoptilum spinosum</i>                                 |
| Nymphaeaceae   | <i>Nymphaea nouchali</i> var. <i>caerulea</i>               |
| Olacaceae      | <i>Ximenia americana</i> var. <i>microphylla</i>            |
| Onagraceae     | <i>Ludwigia adscendens</i> subsp. <i>diffusa</i>            |
| Orobanchaceae  | <i>Alectra orobanchoides</i>                                |
| Orobanchaceae  | <i>Striga bilabiata</i> subsp. <i>bilabiata</i>             |
| Orobanchaceae  | <i>Striga gesnerioides</i>                                  |
| Pedaliaceae    | <i>Ceratotheca triloba</i>                                  |
| Pedaliaceae    | <i>Dicerocaryum senecioides</i>                             |
| Pedaliaceae    | <i>Harpagophytum procumbens</i> subsp. <i>transvaalense</i> |
| Pedaliaceae    | <i>Pterodiscus ngamicus</i>                                 |
| Phyllanthaceae | <i>Phyllanthus loandensis</i>                               |
| Plantaginaceae | <i>Bacopa floribunda</i>                                    |
| Poaceae        | <i>Acroceras macrum</i>                                     |
| Poaceae        | <i>Andropogon schirensis</i>                                |
| Poaceae        | <i>Anthephora pubescens</i>                                 |
| Poaceae        | <i>Aristida spectabilis</i>                                 |
| Poaceae        | <i>Aristida stipitata</i> subsp. <i>stipitata</i>           |
| Poaceae        | <i>Aristida canescens</i> subsp. <i>canescens</i>           |
| Poaceae        | <i>Aristida</i> sp.   |
| Poaceae        | <i>Aristida congesta</i> subsp. <i>congesta</i>             |
| Poaceae        | <i>Aristida stipitata</i> subsp. <i>graciliflora</i>        |

| Family  | Species Name  |
|---------|---|
| Poaceae | <i>Aristida adscensionis</i>                          |
| Poaceae | <i>Arundinella nepalensis</i>                         |
| Poaceae | <i>Bothriochloa bladhii</i>                           |
| Poaceae | <i>Brachiaria nigropedata</i>                         |
| Poaceae | <i>Cenchrus ciliaris</i>                              |
| Poaceae | <i>Cymbopogon pospischilii</i>                        |
| Poaceae | <i>Dactyloctenium giganteum</i>                       |
| Poaceae | <i>Digitaria debilis</i>                              |
| Poaceae | <i>Digitaria eriantha</i>                             |
| Poaceae | <i>Echinochloa holubii</i>                            |
| Poaceae | <i>Eleusine coracana</i> subsp. <i>africana</i>       |
| Poaceae | <i>Eragrostis</i> sp.                                 |
| Poaceae | <i>Eragrostis sarmentosa</i>                          |
| Poaceae | <i>Eragrostis barbinodis</i>                          |
| Poaceae | <i>Eragrostis aspera</i>                              |
| Poaceae | <i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i> |
| Poaceae | <i>Eragrostis pallens</i>                             |
| Poaceae | <i>Eragrostis hierniana</i>                           |
| Poaceae | <i>Eragrostis biflora</i>                             |
| Poaceae | <i>Eragrostis superba</i>                             |
| Poaceae | <i>Eragrostis lehmanniana</i> var. <i>chaunantha</i>  |
| Poaceae | <i>Eulalia aurea</i>                                  |
| Poaceae | <i>Heteropogon contortus</i>                          |
| Poaceae | <i>Loudetia flavida</i>                               |
| Poaceae | <i>Megaloprotachne albescens</i>                      |
| Poaceae | <i>Melinis repens</i> subsp. <i>grandiflora</i>       |
| Poaceae | <i>Monocymbium cerasiiforme</i>                       |

| Family        | Species Name   |
|---------------|--|
| Poaceae       | <i>Panicum maximum</i>                               |
| Poaceae       | <i>Panicum schinzii</i>                              |
| Poaceae       | <i>Panicum repens</i>                                |
| Poaceae       | <i>Perotis patens</i>                                |
| Poaceae       | <i>Pogonarthria squarrosa</i>                        |
| Poaceae       | <i>Schmidtia pappophoroides</i>                      |
| Poaceae       | <i>Stipagrostis uniplumis</i> var. <i>uniplumis</i>  |
| Poaceae       | <i>Tragus berteronianus</i>                          |
| Poaceae       | <i>Triraphis schinzii</i>                            |
| Poaceae       | <i>Urochloa brachyura</i>                            |
| Polygonaceae  | <i>Oxygonum dregeanum</i> subsp. <i>canescens</i>    |
| Polygonaceae  | <i>Oxygonum sinuatum</i>                             |
| Polygonaceae  | <i>Persicaria limbata</i>                            |
| Polygonaceae  | <i>Persicaria attenuata</i> subsp. <i>africana</i>   |
| Polygonaceae  | <i>Polygonum plebeium</i>                            |
| Portulacaceae | <i>Talinum arnotii</i>                               |
| Rhamnaceae    | <i>Ziziphus mucronata</i> subsp. <i>mucronata</i>    |
| Rubiaceae     | <i>Agathisanthemum bojeri</i> subsp. <i>bojeri</i>   |
| Rubiaceae     | <i>Gardenia volkensii</i> subsp. <i>spatulifolia</i> |
| Rubiaceae     | <i>Kohautia virgata</i>                              |
| Rubiaceae     | <i>Kohautia caespitosa</i> subsp. <i>brachyloba</i>  |
| Rubiaceae     | <i>Kohautia cynanchica</i>                           |
| Rubiaceae     | <i>Pavetta harborii</i>                              |
| Rubiaceae     | <i>Pentanisia angustifolia</i>                       |
| Rubiaceae     | <i>Rubia horrida</i>                                 |
| Rubiaceae     | <i>Vangueria infausta</i> subsp. <i>infausta</i>     |
| Ruscaceae     | <i>Eriospermum porphyrovalve</i>                     |

| Family           | Species Name   |
|------------------|--|
| Ruscaceae        | <i>Eriospermum flagelliforme</i>                         |
| Ruscaceae        | <i>Sansevieria aethiopica</i>                            |
| Santalaceae      | <i>Osyris lanceolata</i>                                 |
| Santalaceae      | <i>Viscum tuberculatum</i>                               |
| Sapotaceae       | <i>Mimusops zeyheri</i>                                  |
| Scrophulariaceae | <i>Melanospermum foliosum</i>                            |
| Scrophulariaceae | <i>Selago lacunosa</i>                                   |
| Scrophulariaceae | <i>Selago welwitschii</i> var. <i>australis</i>          |
| Solanaceae       | <i>Solanum tomentosum</i> var. <i>coccineum</i>          |
| Solanaceae       | <i>Solanum tettense</i> var. <i>renschii</i>             |
| Solanaceae       | <i>Solanum tettense</i>                                  |
| Solanaceae       | <i>Solanum lichtensteinii</i>                            |
| Solanaceae       | <i>Solanum tomentosum</i> var. <i>tomentosum</i>         |
| Solanaceae       | <i>Solanum campylacanthum</i> subsp. <i>panduriforme</i> |
| Turneraceae      | <i>Afroqueta capensis</i>                                |
| Urticaceae       | <i>Pouzolzia mixta</i> var. <i>mixta</i>                 |
| Vahliaceae       | <i>Vahlia capensis</i> subsp. <i>vulgaris</i>            |
| Verbenaceae      | <i>Chascanum pinnatifidum</i> var. <i>pinnatifidum</i>   |
| Verbenaceae      | <i>Chascanum hederaceum</i> var. <i>hederaceum</i>       |
| Verbenaceae      | <i>Chascanum incisum</i>                                 |
| Verbenaceae      | <i>Lippia wilmsii</i>                                    |
| Verbenaceae      | <i>Phyla nodiflora</i> var. <i>nodiflora</i>             |
| Verbenaceae      | <i>Priva africana</i>                                    |
| Verbenaceae      | <i>Verbena officinalis</i>                               |
| Xyridaceae       | <i>Xyris capensis</i>                                    |
| Zygophyllaceae   | <i>Tribulus zeyheri</i> subsp. <i>zeyheri</i>            |
| Zygophyllaceae   | <i>Tribulus terrestris</i>                               |

| Family   | Species Name |
|--|--------------|
| <i>Source:</i> BODATSA (2016) flora species records for the 2327DA quarter degree square |              |

**APPENDIX C**

Mammals Recorded and  
Potentially Occurring in the Study  
Area



| Family                          | Scientific Name              | Common Name         | Conservation Status               |                        |                                  |
|---------------------------------|------------------------------|---------------------|-----------------------------------|------------------------|----------------------------------|
|                                 |                              |                     | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
| Bathyergidae                    | <i>Cryptomys hottentotus</i> | Common Mole-rat     |                                   |                        |                                  |
| Bovidae                         | <i>Tragelaphus oryx</i>      | Eland               | -                                 | -                      | -                                |
|                                 | <i>Alcelaphus buselaphus</i> | Red Hartebeest      | -                                 | -                      | -                                |
|                                 | <i>Connochaetes taurinus</i> | Blue Wildebeest     | -                                 | -                      | -                                |
|                                 | <i>Oryx gazelle</i>          | Gemsbok             | -                                 | -                      | -                                |
|                                 | <i>Kobus ellipsiprymnus</i>  | Waterbuck           | -                                 | -                      | -                                |
|                                 | <i>Hippotragus niger</i>     | Sable Antelope      | -                                 | -                      | -                                |
|                                 | <i>Syncerus caffer</i>       | Buffalo             | -                                 | -                      | -                                |
|                                 | <i>Aepyceros melampus</i>    | Impala              | -                                 | -                      | -                                |
|                                 | <i>Raphicerus campestris</i> | Steenbok            | -                                 | -                      | Protected                        |
|                                 | <i>Sylvicapra grimmia</i>    | Common Duiker       | -                                 | -                      | -                                |
|                                 | <i>Tragelaphus scriptus</i>  | Bushbuck            | -                                 | -                      | -                                |
| <i>Tregelaphus strepsiceros</i> | Kudu                         | -                   | -                                 | -                      |                                  |
| Canidae                         | <i>Canis mesomelas</i>       | Black-backed Jackal | -                                 | -                      | -                                |
|                                 | <i>Lycaon pictus</i>         | African Wild Dog    | Endangered                        | Endangered             | -                                |
|                                 | <i>Otocyo megalotis</i>      | Bat-eared Fox       | -                                 | Protected              | Protected                        |

| Family          | Scientific Name                 | Common Name               | Conservation Status               |                        |                                  |
|-----------------|---------------------------------|---------------------------|-----------------------------------|------------------------|----------------------------------|
|                 |                                 |                           | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
| Cercopithecidae | <i>Ceropithecus aethiops</i>    | Vervet Monkey             | -                                 | -                      | -                                |
|                 | <i>Papio urisus</i>             | Chacma Baboon             | -                                 | -                      | -                                |
| Felidae         | <i>Felis silvestris lybica</i>  | African Wild Cat          | -                                 | -                      | -                                |
|                 | <i>Panther pardus</i>           | Leopard                   | Vulnerable                        | -                      | -                                |
|                 | <i>Acinonyx jubatus</i>         | Cheetah                   | Vulnerable                        | Vulnerable             | Protected                        |
|                 | <i>Caracal caracal</i>          | Caracal                   | -                                 | -                      | -                                |
|                 | <i>Leptailurus serval</i>       | Serval                    | Near Threatened                   | Protected              | Protected                        |
| Galagidae       | <i>Galago moholi</i>            | Southern Lesser Bushbaby  |                                   |                        |                                  |
| Giraffidae      | <i>Giraffa camelopardalis</i>   | Giraffe                   | -                                 | -                      | -                                |
| Equidae         | <i>Equus quagga</i>             | Burchell's Zebra          | -                                 | -                      | -                                |
| Erinaceidae     | <i>Atelerix frontalis</i>       | South African Hedgehog    | Near Threatened                   | -                      | Protected                        |
| Hyaenidae       | <i>Parahyaena brunnea</i>       | Brown Hyaena              | Near Threatened                   | -                      | -                                |
|                 | <i>Proteles cristatus</i>       | Aardwolf                  | -                                 | -                      | -                                |
| Hystricidae     | <i>Hystrix africaeaustralis</i> | Porcupine                 | -                                 | -                      | -                                |
| Hipposideridae  | <i>Cloeotis percivali</i>       | Short-eared Trident Bat   | Endangered                        | -                      | -                                |
| Leporidae       | <i>Pronolagus randensis</i>     | Jameson's Red Rock Rabbit | -                                 | -                      | Protected                        |

| Family               | Scientific Name                    | Common Name              | Conservation Status               |                        |                                  |
|----------------------|------------------------------------|--------------------------|-----------------------------------|------------------------|----------------------------------|
|                      |                                    |                          | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
|                      | <i>Lepus saxatilis</i>             | Scrub Hare               | -                                 | -                      | -                                |
| <i>Manidae</i>       | <i>Manis temminckii</i>            | Pangolin                 | Vulnerable                        | Vulnerable             | Specially protected              |
| <i>Macroscelidea</i> | <i>Elephantulus intufi</i>         | Bushveld Sengi           | -                                 | -                      | -                                |
|                      | <i>Elephantulus brachyrhynchus</i> | Short-snouted Sengi      | -                                 | -                      | -                                |
|                      | <i>Elephantulus myurus</i>         | Eastern Rock Sengi       | -                                 | -                      | -                                |
| <i>Muridae</i>       | <i>Dasymys incomtus</i>            | Water Rat                | Near Threatened                   | -                      | -                                |
|                      | <i>Mus minutoides</i>              | Pygmy Mouse              | -                                 | -                      | -                                |
|                      | <i>Gerbilliscus leucogaster</i>    | Bushveld Gerbil          | -                                 | -                      | -                                |
|                      | <i>Desmodillus auricularis</i>     | Cape Short-tailed Gerbil | -                                 | -                      | -                                |
|                      | <i>Dendromus melanotis</i>         | Grey Climbing Mouse      | -                                 | -                      | -                                |
|                      | <i>Aethomys chrysophilus</i>       | Red Veld Rat             | -                                 | -                      | -                                |
|                      | <i>Acomys spinosissimus</i>        | Spiny Mouse              | -                                 | -                      | -                                |
|                      | <i>Saccostomus campestris</i>      | Pouched Mouse            | -                                 | -                      | -                                |
|                      | <i>Steatomys pratensis</i>         | Fat Mouse                | -                                 | -                      | -                                |
|                      | <i>Gerbillurus paeba</i>           | Hairy-footed Gerbil      | -                                 | -                      | -                                |
|                      | <i>Tatera brantsii</i>             | Highveld Gerbil          | -                                 | -                      | -                                |

| Family          | Scientific Name               | Common Name                | Conservation Status               |                        |                                  |
|-----------------|-------------------------------|----------------------------|-----------------------------------|------------------------|----------------------------------|
|                 |                               |                            | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
|                 | <i>Mastomys</i> sp.           | Multimammate Mouse         | -                                 | -                      | -                                |
|                 | <i>Micaelamys namaquensis</i> | Namaqua Rock Mouse         | -                                 | -                      | -                                |
|                 | <i>Rhabdomys pumilio</i>      | Four-striped Grass Mouse   | -                                 | -                      | -                                |
|                 | <i>Lemniscomys rosalia</i>    | Single-striped Grass Mouse | -                                 | -                      | -                                |
|                 | <i>Mus indutus</i>            | Desert Pygmy Mouse         | -                                 | -                      | -                                |
|                 | <i>Thallomys paedulus</i>     | Acacia Rat                 | -                                 | -                      | -                                |
|                 | <i>Otomys angoniensis</i>     | Angoni Vlei Rat            | -                                 | -                      | -                                |
| Mustelidae      | <i>Mellivora capensis</i>     | Honey Badger               | -                                 | -                      | Protected                        |
|                 | <i>Poecilogale albinucha</i>  | African Striped Weasel     | Near Threatened                   | -                      | -                                |
|                 | <i>Ictonyx striatus</i>       | Striped Polecat            | -                                 | -                      | -                                |
| Myoxidae        | <i>Graphiurus murinus</i>     | Woodland Dormouse          | -                                 | -                      | -                                |
|                 | <i>Graphiurus platyops</i>    | Rock Dormouse              | -                                 | -                      | -                                |
| Orycteropodidae | <i>Orycteropus afer</i>       | Aardvark                   | -                                 | Protected              | Specially protected              |
| Pedetidae       | <i>Pedetes capensis</i>       | Springhare                 | -                                 | -                      | -                                |
| Rhinolophidae   | <i>Rhinolophus blasii</i>     | Peak-saddle Horseshoe bat  | Near Threatened                   | -                      | -                                |
|                 | <i>Rhinolophus clivosus</i>   | Geoffroy's Horseshoe Bat   | Near Threatened                   | -                      | -                                |

| Family           | Scientific Name                  | Common Name                 | Conservation Status               |                        |                                  |
|------------------|----------------------------------|-----------------------------|-----------------------------------|------------------------|----------------------------------|
|                  |                                  |                             | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
|                  | <i>Rhinolophus darlingi</i>      | Darling's Horseshoe Bat     | Near Threatened                   | -                      | -                                |
|                  | <i>Rhinolophus hildebrandtii</i> | Hildebrandt's Horseshoe Bat | Near Threatened                   | -                      | -                                |
| Sciuridae        | <i>Xerus inauris</i>             | Ground Squirrel             | -                                 | -                      | -                                |
|                  | <i>Paraxenus cepapi</i>          | Tree Squirrel               | -                                 | -                      | -                                |
| Scoricidae       | <i>Crocidura hirta</i>           | Lesser Red Musk Shrew       | -                                 | -                      | -                                |
|                  | <i>Crocidura fuscomurina</i>     | Tiny Musk Shrew             | -                                 | -                      | -                                |
| Suidae           | <i>Potamochoerus larvatus</i>    | Bushpig                     | -                                 | -                      | -                                |
|                  | <i>Phacochoerus aethiopicus</i>  | Warthog                     | -                                 | -                      | -                                |
| Thryonomyidae    | <i>Thryonomys swinderianus</i>   | Greater Cane-rat            | -                                 | -                      | -                                |
| Vespertilionidae | <i>Miniopterus natalensis</i>    | Natal Long-fingered Bat     | -                                 | -                      | -                                |
|                  | <i>Myotis tricolor</i>           | Temminck's Hairy Bat        | -                                 | -                      | -                                |
|                  | <i>Myotis welwitschii</i>        | Welwitsch's Hairy Bat       | -                                 | -                      | -                                |
|                  | <i>Neromicia capensis</i>        | Cape Serotine Bat           | -                                 | -                      | -                                |
|                  | <i>Pipistrellus rusticus</i>     | Rusty Pipistrelle           | -                                 | -                      | -                                |
|                  | <i>Scotophilus dinganii</i>      | African Yellow Bat          | -                                 | -                      | -                                |
| Viverridae       | <i>Civettictis civetta</i>       | African Civet               | -                                 | -                      | Protected                        |

| Family             | Scientific Name            | Common Name         | Conservation Status               |                        |                                  |
|--------------------|----------------------------|---------------------|-----------------------------------|------------------------|----------------------------------|
|                    |                            |                     | Red List (2016) – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
|                    | <i>Genetta genetta</i>     | Small-spotted Genet | -                                 | -                      | -                                |
|                    | <i>Genetta maculata</i>    | Large-spotted Genet | -                                 | -                      | -                                |
| <i>Herpestidae</i> | <i>Galerella sanguinea</i> | Slender Mongoose    | -                                 | -                      | -                                |
|                    | <i>Mungos mungo</i>        | Banded Mongoose     | -                                 | -                      | -                                |
|                    | <i>Helogale parvula</i>    | Dwarf Mongoose      | -                                 | -                      | -                                |

Source: Based on the distribution maps in Stuart and Stuart (2007).



**APPENDIX D**

Birds Recorded and Potentially  
Occurring in the Study Area  
(Master list based on SABAP2  
records for the 2327DA QDC)

| Common Name                 | Scientific Name                | Conservation Status             |                        |                                   | Field Programme Records          |                               |
|-----------------------------|--------------------------------|---------------------------------|------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                             |                                | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003)# | Wet Season Survey (Jan/Feb 2018) | Dry Season Survey (June 2018) |
| Apalis, Bar-throated        | <i>Apalis thoracica</i>        | -                               | -                      | Protected                         |                                  |                               |
| Babbler, Arrow-marked       | <i>Turdoides jardineii</i>     | -                               | -                      | Protected                         | x                                | x                             |
| Babbler, Southern Pied      | <i>Turdoides bicolor</i>       | -                               | -                      | Protected                         | x                                | x                             |
| Barbet, Acacia Pied         | <i>Tricholaema leucomelas</i>  | -                               | -                      | Protected                         | x                                | x                             |
| Barbet, Black-collared      | <i>Lybius torquatus</i>        | -                               | -                      | Protected                         | x                                | x                             |
| Barbet, Crested             | <i>Trachyphonus vaillantii</i> | -                               | -                      | Protected                         | x                                |                               |
| Bateleur                    | <i>Terathopius ecaudatus</i>   | Endangered                      | Vulnerable             | Specially Protected               |                                  |                               |
| Batis, Chinspot             | <i>Batis molitor</i>           | -                               | -                      | Protected                         | x                                | x                             |
| Bee-eater, Blue-cheeked     | <i>Merops persicus</i>         | -                               | -                      | Protected                         | x                                |                               |
| Bee-eater, European         | <i>Merops apiaster</i>         | -                               | -                      | Protected                         | x                                |                               |
| Bee-eater, Little           | <i>Merops pusillus</i>         | -                               | -                      | Protected                         |                                  |                               |
| Bee-eater, Southern Carmine | <i>Merops nubicoides</i>       | -                               | -                      | Protected                         | x                                |                               |
| Bee-eater, Swallow-tailed   | <i>Merops hirundineus</i>      | -                               | -                      | Protected                         | x                                |                               |
| Bee-eater, White-fronted    | <i>Merops bullockoides</i>     | -                               | -                      | Protected                         |                                  |                               |

| Common Name                  | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|------------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                              |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Bishop, Southern Red         | <i>Euplectes orix</i>            | -                                  | -                         | Protected                            |  |                                     |
| Boubou, Southern             | <i>Laniarius ferrugineus</i>     | -                                  | -                         | Protected                            |  | x                                   |
| Brubru, Brubru               | <i>Nilaus afer</i>               | -                                  | -                         | Protected                            | x                                      |                                     |
| Buffalo-weaver, Red-billed   | <i>Bubalornis niger</i>          | -                                  | -                         | Protected                            | x                                      | x                                   |
| Bulbul, African Red-eyed     | <i>Pycnonotus nigricans</i>      | -                                  | -                         | Protected                            | x                                      |                                     |
| Bulbul, Dark-capped          | <i>Pycnonotus tricolor</i>       | -                                  | -                         | -                                    | x                                      | x                                   |
| Bunting, Cinnamon-breasted   | <i>Emberiza tahapisi</i>         | -                                  | -                         | Protected                            |  |                                     |
| Bunting, Golden-breasted     | <i>Emberiza flaviventris</i>     | -                                  | -                         | Protected                            |  |                                     |
| Bunting, Lark-like           | <i>Emberiza impetuani</i>        | -                                  | -                         | Protected                            |  |                                     |
| Bush-shrike, Grey-headed     | <i>Malaconotus blanchoti</i>     | -                                  | -                         | Protected                            |  |                                     |
| Bush-shrike, Orange-breasted | <i>Telophorus sulfureopectus</i> | -                                  | -                         | Protected                            | x                                      |                                     |
| Bustard, Kori                | <i>Ardeotis kori</i>             | Near Threatened                    | Protected                 | Specially Protected                  |  |                                     |
| Buzzard, Lizard              | <i>Kaupifalco monogrammicus</i>  | -                                  | -                         | Protected                            |  |                                     |
| Buzzard, Steppe              | <i>Buteo vulpinus</i>            | -                                  | -                         | Protected                            |  |                                     |

| Common Name                | Scientific Name                   | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|----------------------------|-----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                            |                                   | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Camaropectera, Grey-backed | <i>Camaropectera brevicaudata</i> | -                                  | -                         | Protected                            | x                                      |                                     |
| Canary, Black-throated     | <i>Crithagra atrogularis</i>      | -                                  | -                         | Protected                            |  |                                     |
| Canary, Yellow-fronted     | <i>Crithagra mozambicus</i>       | -                                  | -                         | Protected                            | x                                      |                                     |
| Chat, Anteating            | <i>Myrmecocichla formicivora</i>  | -                                  | -                         | Protected                            |  |                                     |
| Chat, Familiar             | <i>Cercomela familiaris</i>       | -                                  | -                         | Protected                            |  |                                     |
| Cisticola, Desert          | <i>Cisticola aridulus</i>         | -                                  | -                         | Protected                            |  |                                     |
| Cisticola, Levaillant's    | <i>Cisticola tinniens</i>         | -                                  | -                         | Protected                            |  |                                     |
| Cisticola, Rattling        | <i>Cisticola chiniana</i>         | -                                  | -                         | Protected                            | x                                      |                                     |
| Cisticola, Tinkling        | <i>Cisticola rufilatus</i>        | -                                  | -                         | Protected                            |  |                                     |
| Cisticola, Zitting         | <i>Cisticola juncidis</i>         | -                                  | -                         | Protected                            |  |                                     |
| Coot, Red-knobbed          | <i>Fulica cristata</i>            | -                                  | -                         | Protected                            |  |                                     |
| Cormorant, Reed            | <i>Phalacrocorax africanus</i>    | -                                  | -                         | Protected                            |  |                                     |
| Cormorant, White-breasted  | <i>Phalacrocorax carbo</i>        | -                                  | -                         | Protected                            |  |                                     |
| Coucal, Burchell's         | <i>Centropus burchellii</i>       | -                                  | -                         | Protected                            |  |                                     |

| Common Name            | Scientific Name                 | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                        |                                 | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Courser, Bronze-winged | <i>Rhinoptilus chalcopterus</i> | -                                  | -                         | Protected                            |  |                                     |
| Courser, Temminck's    | <i>Cursorius temminckii</i>     |                                    |                           | Protected                            | x                                      |                                     |
| Crake, Black           | <i>Amaurornis flavirostris</i>  | -                                  | -                         | Protected                            |  |                                     |
| Crombec, Long-billed   | <i>Sylvietta rufescens</i>      | -                                  | -                         | Protected                            |  |                                     |
| Crow, Pied             | <i>Corvus albus</i>             | -                                  | -                         | -                                    |  |                                     |
| Cuckoo, African        | <i>Cuculus gularis</i>          | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Black          | <i>Cuculus clamosus</i>         | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Diderick       | <i>Chrysococcyx caprius</i>     | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Jacobin        | <i>Clamator jacobinus</i>       | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Klaas's        | <i>Chrysococcyx klaas</i>       | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Levaiillant's  | <i>Clamator levaillantii</i>    | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo, Red-chested    | <i>Cuculus solitarius</i>       | -                                  | -                         | Protected                            |  |                                     |
| Cuckoo-shrike, Black   | <i>Campephaga flava</i>         | -                                  | -                         | Protected                            |  |                                     |
| Darter, African        | <i>Anhinga rufa</i>             | -                                  | -                         | Protected                            |  |                                     |

| Common Name           | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|-----------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                       |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Dove, Laughing        | <i>Streptopelia senegalensis</i> | -                                  | -                         | -                                    | x                                      | x                                   |
| Dove, Namaqua         | <i>Oena capensis</i>             | -                                  | -                         | Protected                            |  | x                                   |
| Dove, Red-eyed        | <i>Streptopelia semitorquata</i> | -                                  | -                         | -                                    | x                                      | x                                   |
| Dove, Rock            | <i>Columba livia</i>             | -                                  | -                         | Protected                            |  |                                     |
| Drongo, Fork-tailed   | <i>Dicrurus adsimilis</i>        | -                                  | -                         | Protected                            | x                                      | x                                   |
| Duck, Comb            | <i>Sarkidiornis melanotos</i>    | -                                  | -                         | Protected                            |  |                                     |
| Duck, White-faced     | <i>Dendrocygna viduata</i>       | -                                  | -                         | -                                    |  |                                     |
| Duck, Yellow-billed   | <i>Anas undulata</i>             | -                                  | -                         | Protected                            |  |                                     |
| Eagle, Martial        | <i>Polemaetus bellicosus</i>     | Endangered                         | Vulnerable                | Protected                            |  |                                     |
| Eagle, Tawny          | <i>Aquila rapax</i>              | Endangered                         | Vulnerable                | Specially Protected                  |  |                                     |
| Eagle, Verreaux's     | <i>Aquila verreauxii</i>         | Vulnerable                         | -                         | Protected                            |  |                                     |
| Eagle, Wahlberg's     | <i>Aquila wahlbergi</i>          | -                                  | -                         | Protected                            |  |                                     |
| Eagle-owl, Verreaux's | <i>Bubo lacteus</i>              | -                                  | -                         | Protected                            |  |                                     |
| Eagle-owl, Spotted    | <i>Bubo africanus</i>            | -                                  | -                         | Protected                            | x                                      |                                     |



| Common Name               | Scientific Name                 | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|---------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                           |                                 | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Egret, Cattle             | <i>Bubulcus ibis</i>            | -                                  | -                         | Protected                            |  |                                     |
| Egret, Great              | <i>Egretta alba</i>             | -                                  | -                         | Protected                            |  |                                     |
| Egret, Little             | <i>Egretta garzetta</i>         | -                                  | -                         | Protected                            |  |                                     |
| Egret, Yellow-billed      | <i>Egretta intermedia</i>       | -                                  | -                         | Protected                            |  |                                     |
| Eremomela, Burnt-necked   | <i>Eremomela usticollis</i>     | -                                  | -                         | Protected                            |  |                                     |
| Eremomela, Yellow-bellied | <i>Eremomela icteropygialis</i> | -                                  | -                         | Protected                            |  |                                     |
| Falcon, Amur              | <i>Falco amurensis</i>          | -                                  | -                         | Protected                            |  |                                     |
| Finch, Cut-throat         | <i>Amadina fasciata</i>         | -                                  | -                         | Protected                            |  |                                     |
| Finch, Red-headed         | <i>Amadina erythrocephala</i>   | -                                  | -                         | Protected                            |  |                                     |
| Finch, Scaly-feathered    | <i>Sporopipes squamifrons</i>   | -                                  | -                         | Protected                            |  | x                                   |
| Firefinch, Jameson's      | <i>Lagonosticta rhodopareia</i> | -                                  | -                         | Protected                            |  |                                     |
| Firefinch, Red-billed     | <i>Lagonosticta senegala</i>    | -                                  | -                         | Protected                            | x                                      | x                                   |
| Fiscal, Common (Southern) | <i>Lanius collaris</i>          | -                                  | -                         | Protected                            |  |                                     |
| Fish-eagle, African       | <i>Haliaeetus vocifer</i>       | -                                  | -                         | Protected                            |  |                                     |

| Common Name                     | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|---------------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                                 |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Flycatcher, Fiscal              | <i>Sigelus silens</i>            | -                                  | -                         | Protected                            |  |                                     |
| Flycatcher, Marico              | <i>Bradornis mariquensis</i>     | -                                  | -                         | Protected                            |  |                                     |
| Flycatcher, Pale                | <i>Bradornis pallidus</i>        | -                                  | -                         | Protected                            |  |                                     |
| Flycatcher, Southern Black      | <i>Melaenornis pammelaina</i>    | -                                  | -                         | Protected                            |  |                                     |
| Flycatcher, Spotted             | <i>Muscicapa striata</i>         | -                                  | -                         | Protected                            | x                                      |                                     |
| Francolin, Crested              | <i>Dendroperdix sephaena</i>     | -                                  | -                         | Protected                            | x                                      | x                                   |
| Go-away-bird, Grey              | <i>Corythaixoides concolor</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Goose, Egyptian                 | <i>Alopochen aegyptiacus</i>     | -                                  | -                         | Protected                            | x                                      |                                     |
| Goose, Spur-winged              | <i>Plectropterus gambensis</i>   | -                                  | -                         | Protected                            | x                                      |                                     |
| Goshawk, Gabar                  | <i>Melierax gabar</i>            | -                                  | -                         | Protected                            |  |                                     |
| Goshawk, Southern Pale Chanting | <i>Melierax canorus</i>          | -                                  | -                         | Protected                            |  |                                     |
| Grebe, Little                   | <i>Tachybaptus ruficollis</i>    | -                                  | -                         | Protected                            | x                                      |                                     |
| Greenbul, Yellow-bellied        | <i>Chlorocichla flaviventris</i> | -                                  | -                         | Protected                            |  |                                     |
| Green-pigeon, African           | <i>Treeron calvus</i>            | -                                  | -                         | Protected                            |  |                                     |

| Common Name                  | Scientific Name            | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|------------------------------|----------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                              |                            | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Greenshank, Common           | <i>Tringa nebularia</i>    | -                                  | -                         | Protected                            |  |                                     |
| Guineafowl, Helmeted         | <i>Numida meleagris</i>    | -                                  | -                         | Protected                            | x                                      | x                                   |
| Hamerkop                     | <i>Scopus umbretta</i>     | -                                  | -                         | Protected                            | x                                      |                                     |
| Harrier-Hawk, African        | <i>Polyboroides typus</i>  | -                                  | -                         | Protected                            |  |                                     |
| Hawk-eagle, African          | <i>Aquila spilogaster</i>  | -                                  | -                         | Protected                            |  |                                     |
| Helmet-shrike, White-crested | <i>Prionops plumatus</i>   | -                                  | -                         | Protected                            |  |                                     |
| Heron, Black                 | <i>Egretta ardesiaca</i>   | -                                  | -                         | Protected                            |  |                                     |
| Heron, Black-headed          | <i>Ardea melanocephala</i> | -                                  | -                         | Protected                            |  |                                     |
| Heron, Grey                  | <i>Ardea cinerea</i>       | -                                  | -                         | Protected                            |  |                                     |
| Heron, Purple                | <i>Ardea purpurea</i>      | -                                  | -                         | Protected                            |  |                                     |
| Heron, Squacco               | <i>Ardeola ralloides</i>   | -                                  | -                         | Protected                            |  |                                     |
| Honeyguide, Greater          | <i>Indicator indicator</i> | -                                  | -                         | Protected                            |  |                                     |
| Honeyguide, Lesser           | <i>Indicator minor</i>     | -                                  | -                         | Protected                            |  |                                     |
| Hoopoe, African              | <i>Upupa africana</i>      | -                                  | -                         | Protected                            | x                                      | x                                   |

| Common Name                      | Scientific Name                 | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|----------------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                                  |                                 | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Hornbill, African Grey           | <i>Tockus nasutus</i>           | -                                  | -                         | Protected                            | x                                      | x                                   |
| Hornbill, Red-billed             | <i>Tockus erythrorhynchus</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Hornbill, Southern Yellow-billed | <i>Tockus leucomelas</i>        | -                                  | -                         | Protected                            | x                                      | x                                   |
| House-martin, Common             | <i>Delichon urbicum</i>         | -                                  | -                         | Protected                            |  |                                     |
| Ibis, African Sacred             | <i>Threskiornis aethiopicus</i> | -                                  | -                         | Protected                            |  |                                     |
| Ibis, Hadeda                     | <i>Bostrychia hagedash</i>      | -                                  | -                         | Protected                            | x                                      | x                                   |
| Indigobird, Village              | <i>Vidua chalybeata</i>         | -                                  | -                         | Protected                            |  |                                     |
| Jacana, African                  | <i>Actophilornis africanus</i>  | -                                  | -                         | Protected                            |  |                                     |
| Kingfisher, Brown-hooded         | <i>Halcyon albiventris</i>      | -                                  | -                         | Protected                            | x                                      | x                                   |
| Kingfisher, Giant                | <i>Megaceryle maximus</i>       | -                                  | -                         | Protected                            |  |                                     |
| Kingfisher, Malachite            | <i>Alcedo cristata</i>          | -                                  | -                         | Protected                            |  |                                     |
| Kingfisher, Pied                 | <i>Ceryle rudis</i>             | -                                  | -                         | Protected                            |  |                                     |
| Kingfisher, Striped              | <i>Halcyon chelicuti</i>        | -                                  | -                         | Protected                            |  |                                     |
| Kingfisher, Woodland             | <i>Halcyon senegalensis</i>     | -                                  | -                         | Protected                            | x                                      |                                     |

| Common Name              | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|--------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                          |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Kite, Black-shouldered   | <i>Elanus caeruleus</i>          | -                                  | -                         | Protected                            |  | x                                   |
| Kite, Yellow-billed      | <i>Milvus aegyptius</i>          | -                                  | -                         | Protected                            | x                                      |                                     |
| Korhaan, Northern Black  | <i>Afrotis afraoides</i>         | -                                  | -                         | Protected                            |  |                                     |
| Korhaan, Red-crested     | <i>Lophotis ruficrista</i>       | -                                  | -                         | Protected                            | x                                      | x                                   |
| Lapwing, African Wattled | <i>Vanellus senegallus</i>       | -                                  | -                         | Protected                            |  |                                     |
| Lapwing, Blacksmith      | <i>Vanellus armatus</i>          | -                                  | -                         | Protected                            | x                                      | x                                   |
| Lapwing, Crowned         | <i>Vanellus coronatus</i>        | -                                  | -                         | Protected                            | x                                      | x                                   |
| Lark, Fawn-coloured      | <i>Calendulauda africanoides</i> | -                                  | -                         | Protected                            |  |                                     |
| Lark, Rufous-naped       | <i>Mirafra africana</i>          | -                                  | -                         | Protected                            |  |                                     |
| Lark, Sabota             | <i>Calendulauda sabota</i>       | -                                  | -                         | Protected                            |  |                                     |
| Mannikin, Bronze         | <i>Spermestes cucullatus</i>     | -                                  | -                         | Protected                            |  |                                     |
| Martin, Brown-throated   | <i>Riparia paludicola</i>        | -                                  | -                         | Protected                            |  |                                     |
| Martin, Rock             | <i>Hirundo fuligula</i>          | -                                  | -                         | Protected                            |  |                                     |
| Martin, Sand             | <i>Riparia riparia</i>           | -                                  | -                         | Protected                            |  |                                     |

| Common Name             | Scientific Name               | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|-------------------------|-------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                         |                               | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Masked-weaver, Lesser   | <i>Ploceus intermedius</i>    | -                                  | -                         | Protected                            |  |                                     |
| Masked-weaver, Southern | <i>Ploceus velatus</i>        | -                                  | -                         | Protected                            | x                                      |                                     |
| Moorhen, Common         | <i>Gallinula chloropus</i>    | -                                  | -                         | Protected                            |  |                                     |
| Mousebird, Red-faced    | <i>Urocolius indicus</i>      | -                                  | -                         | -                                    | x                                      | x                                   |
| Mousebird, Speckled     | <i>Colius striatus</i>        | -                                  | -                         | -                                    |  |                                     |
| Myna, Common            | <i>Acridotheres tristis</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Neddicky, Neddicky      | <i>Cisticola fulvicapilla</i> | -                                  | -                         | Protected                            |  |                                     |
| Nightjar, Fiery-necked  | <i>Caprimulgus pectoralis</i> | -                                  | -                         | Protected                            |  |                                     |
| Nightjar, Freckled      | <i>Caprimulgus tristigma</i>  | -                                  | -                         | Protected                            |  |                                     |
| Oriole, Black-headed    | <i>Oriolus larvatus</i>       | -                                  | -                         | Protected                            | x                                      | x                                   |
| Osprey, Osprey          | <i>Pandion haliaetus</i>      | -                                  | -                         | Protected                            |  |                                     |
| Ostrich, Common         | <i>Struthio camelus</i>       | -                                  | -                         | -                                    | x                                      | x                                   |
| Owl, Barn               | <i>Tyto alba</i>              | -                                  | -                         | Protected                            |  | x                                   |
| Owlet, Pearl-spotted    | <i>Glaucidium perlatum</i>    | -                                  | -                         | Protected                            |  | x                                   |



| Common Name                  | Scientific Name                 | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|------------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                              |                                 | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Oxpecker, Red-billed         | <i>Buphagus erythrorhynchus</i> | -                                  | -                         | Protected                            |  |                                     |
| Palm-swift, African          | <i>Cypsiurus parvus</i>         | -                                  | -                         | Protected                            |  |                                     |
| Paradise-flycatcher, African | <i>Terpsiphone viridis</i>      | -                                  | -                         | Protected                            |  |                                     |
| Paradise-whydah, Long-tailed | <i>Vidua paradisaea</i>         | -                                  | -                         | Protected                            | x                                      | x                                   |
| Petronia, Yellow-throated    | <i>Petronia supercilialis</i>   | -                                  | -                         | Protected                            |  |                                     |
| Pigeon, Speckled             | <i>Columba guinea</i>           | -                                  | -                         | Protected                            |  |                                     |
| Pipit, African               | <i>Anthus cinnamomeus</i>       | -                                  | -                         | Protected                            |  |                                     |
| Pipit, Bushveld              | <i>Anthus caffer</i>            | -                                  | -                         | Protected                            |  | x                                   |
| Plover, Three-banded         | <i>Charadrius tricollaris</i>   | -                                  | -                         | Protected                            | x                                      |                                     |
| Prinia, Black-chested        | <i>Prinia flavicans</i>         | -                                  | -                         | Protected                            |  |                                     |
| Prinia, Tawny-flanked        | <i>Prinia subflava</i>          | -                                  | -                         | Protected                            |  |                                     |
| Puffback, Black-backed       | <i>Dryoscopus cubla</i>         | -                                  | -                         | Protected                            | x                                      | x                                   |
| Pygmy-Kingfisher, African    | <i>Ispidina picta</i>           | -                                  | -                         | Protected                            |  |                                     |
| Pytilia, Green-winged        | <i>Pytilia melba</i>            | -                                  | -                         | Protected                            | x                                      |                                     |

| Common Name                | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|----------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                            |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Quail, Harlequin           | <i>Coturnix delegorguei</i>      | -                                  | -                         | Protected                            |  |                                     |
| Quailfinch, African        | <i>Ortygospiza atricollis</i>    | -                                  | -                         | Protected                            |  |                                     |
| Quelea, Red-billed         | <i>Quelea quelea</i>             | -                                  | -                         | -                                    | x                                      | x                                   |
| Reed-warbler, African      | <i>Acrocephalus baeticatus</i>   | -                                  | -                         | Protected                            |  |                                     |
| Reed-warbler, Great        | <i>Acrocephalus arundinaceus</i> | -                                  | -                         | Protected                            |  |                                     |
| Robin-chat, White-throated | <i>Cossypha humeralis</i>        | -                                  | -                         | Protected                            |  |                                     |
| Roller, European           | <i>Coracias garrulus</i>         | Near Threatened                    | -                         | Protected                            |  |                                     |
| Roller, Lilac-breasted     | <i>Coracias caudatus</i>         | -                                  | -                         | Protected                            | x                                      | x                                   |
| Roller, Purple             | <i>Coracias naevius</i>          | -                                  | -                         | Protected                            |  |                                     |
| Ruff                       | <i>Philomachus pugnax</i>        | -                                  | -                         | Protected                            |  |                                     |
| Sandgrouse, Burchell's     | <i>Pterocles burchelli</i>       | -                                  | -                         | Protected                            |  |                                     |
| Sandgrouse, Double-banded  | <i>Pterocles bicinctus</i>       | -                                  | -                         | Protected                            | x                                      | x                                   |
| Sandpiper, Common          | <i>Actitis hypoleucos</i>        | -                                  | -                         | Protected                            |  |                                     |
| Sandpiper, Curlew          | <i>Calidris ferruginea</i>       | -                                  | -                         | Protected                            |  |                                     |

| Common Name                    | Scientific Name                 | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|--------------------------------|---------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                                |                                 | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Sandpiper, Marsh               | <i>Tringa stagnatilis</i>       | -                                  | -                         | Protected                            |  |                                     |
| Sandpiper, Wood                | <i>Tringa glareola</i>          | -                                  | -                         | Protected                            |  |                                     |
| Scimitarbill, Common           | <i>Rhinopomastus cyanomelas</i> | -                                  | -                         | Protected                            | x                                      |                                     |
| Scops-owl, African             | <i>Otus senegalensis</i>        | -                                  | -                         | Protected                            |  |                                     |
| Scrub-robin, Kalahari          | <i>Cercotrichas paena</i>       | -                                  | -                         | Protected                            |  |                                     |
| Scrub-robin, White-browed      | <i>Cercotrichas leucophrys</i>  | -                                  | -                         | Protected                            |  | x                                   |
| Secretarybird                  | <i>Sagittarius serpentarius</i> | Vulnerable                         |                           | Protected                            |  |                                     |
| Shikra                         | <i>Accipiter badius</i>         | -                                  | -                         | Protected                            |  |                                     |
| Shrike, Crimson-breasted       | <i>Laniarius atrococcineus</i>  | -                                  | -                         | Protected                            | x                                      |                                     |
| Shrike, Lesser Grey            | <i>Lanius minor</i>             | -                                  | -                         | Protected                            |  |                                     |
| Shrike, Magpie                 | <i>Corvinella melanoleuca</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Shrike, Red-backed             | <i>Lanius collurio</i>          | -                                  | -                         | Protected                            | x                                      |                                     |
| Shrike, Southern White-crowned | <i>Eurocephalus anguitimens</i> | -                                  | -                         | Protected                            | x                                      | x                                   |
| Snake-eagle, Black-chested     | <i>Circaetus pectoralis</i>     | -                                  | -                         | Protected                            |  |                                     |

| Common Name                   | Scientific Name                | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|-------------------------------|--------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                               |                                | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Snake-eagle, Brown            | <i>Circaetus cinereus</i>      | -                                  | -                         | Protected                            |  |                                     |
| Sparrow, Cape                 | <i>Passer melanurus</i>        | -                                  | -                         | -                                    | x                                      |                                     |
| Sparrow, Great                | <i>Passer motitensis</i>       | -                                  | -                         | Protected                            |  |                                     |
| Sparrow, House                | <i>Passer domesticus</i>       | -                                  | -                         | Protected                            | x                                      | x                                   |
| Sparrow, Southern Grey-headed | <i>Passer diffusus</i>         | -                                  | -                         | Protected                            |  |                                     |
| Sparrowhawk, Little           | <i>Accipiter minullus</i>      | -                                  | -                         | Protected                            |  |                                     |
| Sparrowlark, Chestnut-backed  | <i>Eremopterix leucotis</i>    | -                                  | -                         | Protected                            |  |                                     |
| Sparrow-weaver, White-browed  | <i>Plocepasser mahali</i>      | -                                  | -                         | Protected                            |  |                                     |
| Spoonbill, African            | <i>Platalea alba</i>           | -                                  | -                         | Protected                            |  |                                     |
| Spurfowl, Natal               | <i>Pternistis natalensis</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Spurfowl, Swainson's          | <i>Pternistis swainsonii</i>   | -                                  | -                         | Protected                            | x                                      | x                                   |
| Starling, Burchell's          | <i>Lamprotornis australis</i>  | -                                  | -                         | Protected                            |  | x                                   |
| Starling, Cape Glossy         | <i>Lamprotornis nitens</i>     | -                                  | -                         | Protected                            | x                                      | x                                   |
| Starling, Greater Blue-eared  | <i>Lamprotornis chalybaeus</i> | -                                  | -                         | Protected                            | x                                      |                                     |

| Common Name             | Scientific Name                   | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|-------------------------|-----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                         |                                   | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Starling, Red-winged    | <i>Onychognathus morio</i>        | -                                  | -                         | -                                    |  |                                     |
| Starling, Violet-backed | <i>Cinnyricinclus leucogaster</i> | -                                  | -                         | Protected                            |  |                                     |
| Starling, Wattled       | <i>Creatophora cinerea</i>        | -                                  | -                         | Protected                            |  |                                     |
| Stilt, Black-winged     | <i>Himantopus himantopus</i>      | -                                  | -                         | Protected                            |  |                                     |
| Stint, Little           | <i>Calidris minuta</i>            | -                                  | -                         | Protected                            |  |                                     |
| Stonechat, African      | <i>Saxicola torquatus</i>         | -                                  | -                         | Protected                            |  |                                     |
| Stork, Abdim's          | <i>Ciconia abdimii</i>            | Near Threatened                    | -                         | Protected                            |  |                                     |
| Stork, Black            | <i>Ciconia nigra</i>              | Vulnerable                         | -                         | Protected                            |  |                                     |
| Stork, Marabou          | <i>Leptoptilos crumeniferus</i>   | Near Threatened                    | -                         | Protected                            |  |                                     |
| Stork, White            | <i>Ciconia ciconia</i>            | -                                  | -                         | Protected                            |  |                                     |
| Stork, Yellow-billed    | <i>Mycteria ibis</i>              | Endangered                         | -                         | Protected                            |  |                                     |
| Sunbird, Amethyst       | <i>Chalcomitra amethystina</i>    | -                                  | -                         | Protected                            |  |                                     |
| Sunbird, Marico         | <i>Cinnyris mariquensis</i>       | -                                  | -                         | Protected                            |  |                                     |
| Sunbird, White-bellied  | <i>Cinnyris talatala</i>          | -                                  | -                         | Protected                            | x                                      |                                     |

| Common Name              | Scientific Name                    | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|--------------------------|------------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                          |                                    | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Swallow, Barn            | <i>Hirundo rustica</i>             | -                                  | -                         | Protected                            | x                                      |                                     |
| Swallow, Greater Striped | <i>Hirundo cucullata</i>           | -                                  | -                         | Protected                            |  |                                     |
| Swallow, Lesser Striped  | <i>Hirundo abyssinica</i>          | -                                  | -                         | Protected                            | x                                      |                                     |
| Swallow, Pearl-breasted  | <i>Hirundo dimidiata</i>           | -                                  | -                         | Protected                            |  |                                     |
| Swallow, Red-breasted    | <i>Hirundo semirufa</i>            | -                                  | -                         | Protected                            |  |                                     |
| Swallow, White-throated  | <i>Hirundo albigularis</i>         | -                                  | -                         | Protected                            |  |                                     |
| Swallow, Wire-tailed     | <i>Hirundo smithii</i>             | -                                  | -                         | Protected                            |  |                                     |
| Swamp-warbler, Lesser    | <i>Acrocephalus gracilirostris</i> | -                                  | -                         | Protected                            |  |                                     |
| Swift, African Black     | <i>Apus barbatus</i>               | -                                  | -                         | Protected                            |  |                                     |
| Swift, Common            | <i>Apus apus</i>                   | -                                  | -                         | Protected                            |  |                                     |
| Swift, Little            | <i>Apus affinis</i>                | -                                  | -                         | Protected                            |  |                                     |
| Swift, White-rumped      | <i>Apus caffer</i>                 | -                                  | -                         | Protected                            |  |                                     |
| Tchagra, Black-crowned   | <i>Tchagra senegalus</i>           | -                                  | -                         | Protected                            |  |                                     |
| Tchagra, Brown-crowned   | <i>Tchagra australis</i>           | -                                  | -                         | Protected                            |  |                                     |

| Common Name                  | Scientific Name                  | Conservation Status                |                           |                                      | Field Programme Records                |                                     |
|------------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------------------|--|-------------------------------------|
|                              |                                  | Red List (2016)<br>Regional Status | NEMBA TOPS<br>List (2013) | Limpopo Protected<br>Species (2003)# | Wet Season<br>Survey<br>(Jan/Feb 2018) | Dry Season<br>Survey (June<br>2018) |
| Teal, Red-billed             | <i>Anas erythrorhyncha</i>       | -                                  | -                         | Protected                            |  |                                     |
| Thick-knee, Spotted          | <i>Burhinus capensis</i>         | -                                  | -                         | Protected                            |  |                                     |
| Thick-knee, Water            | <i>Burhinus vermiculatus</i>     | -                                  | -                         | Protected                            |  |                                     |
| Thrush, Groundscraper        | <i>Psophocichla litsipsirupa</i> | -                                  | -                         | Protected                            | x                                      |                                     |
| Thrush, Karoo                | <i>Turdus smithi</i>             | -                                  | -                         | Protected                            |  |                                     |
| Thrush, Kurrichane           | <i>Turdus libonyanus</i>         | -                                  | -                         | Protected                            | x                                      |                                     |
| Tinkerbird, Yellow-fronted   | <i>Pogoniulus chrysoconus</i>    | -                                  | -                         | Protected                            |  |                                     |
| Tit, Ashy                    | <i>Parus cinerascens</i>         | -                                  | -                         | Protected                            |  |                                     |
| Tit, Southern Black          | <i>Parus niger</i>               | -                                  | -                         | Protected                            |  |                                     |
| Tit-babbler, Chestnut-vented | <i>Parisoma subcaeruleum</i>     | -                                  | -                         | Protected                            |  |                                     |
| Tit-flycatcher, Grey         | <i>Myioparus plumbeus</i>        | -                                  | -                         | Protected                            |  |                                     |
| Turtle-dove, Cape            | <i>Streptopelia capicola</i>     | -                                  | -                         | Protected                            | x                                      | x                                   |
| Vulture, Cape                | <i>Gyps coprotheres</i>          | Endangered                         | Vulnerable                | Specially Protected                  |  |                                     |
| Vulture, White-backed        | <i>Gyps africanus</i>            | Critically<br>Endangered           | Protected                 | Protected                            | x                                      |                                     |



| Common Name              | Scientific Name               | Conservation Status             |                        |                                   | Field Programme Records          |                               |
|--------------------------|-------------------------------|---------------------------------|------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                          |                               | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003)# | Wet Season Survey (Jan/Feb 2018) | Dry Season Survey (June 2018) |
| Vulture, Lappet-faced    | <i>Torgos tracheliotus</i>    | Endangered                      | Vulnerable             | Protected                         |                                  |                               |
| Wagtail, African Pied    | <i>Motacilla aguimp</i>       | -                               | -                      | Protected                         |                                  |                               |
| Wagtail, Cape            | <i>Motacilla capensis</i>     | -                               | -                      | Protected                         | x                                | x                             |
| Warbler, Icterine        | <i>Hippolais icterina</i>     | -                               | -                      | Protected                         |                                  |                               |
| Warbler, Marsh           | <i>Acrocephalus palustris</i> | -                               | -                      | Protected                         |                                  |                               |
| Warbler, Willow          | <i>Phylloscopus trochilus</i> | -                               | -                      | Protected                         |                                  |                               |
| Waxbill, Black-faced     | <i>Estrilda erythronotos</i>  | -                               | -                      | Protected                         |                                  |                               |
| Waxbill, Blue            | <i>Uraeginthus angolensis</i> | -                               | -                      | Protected                         | x                                | x                             |
| Waxbill, Common          | <i>Estrilda astrild</i>       | -                               | -                      | Protected                         |                                  | x                             |
| Waxbill, Orange-breasted | <i>Amandava subflava</i>      | -                               | -                      | Protected                         |                                  |                               |
| Waxbill, Violet-eared    | <i>Granatina granatina</i>    | -                               | -                      | Protected                         |                                  |                               |
| Weaver, Red-headed       | <i>Anaplectes rubriceps</i>   | -                               | -                      | Protected                         |                                  |                               |
| Weaver, Village          | <i>Ploceus cucullatus</i>     | -                               | -                      | Protected                         |                                  |                               |
| Wheatear, Capped         | <i>Oenanthe pileata</i>       | -                               | -                      | Protected                         |                                  |                               |

| Common Name                | Scientific Name                 | Conservation Status             |                        |                                   | Field Programme Records          |                               |
|----------------------------|---------------------------------|---------------------------------|------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                            |                                 | Red List (2016) Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003)# | Wet Season Survey (Jan/Feb 2018) | Dry Season Survey (June 2018) |
| White-eye, Cape            | <i>Zosterops virens</i>         | -                               | -                      | Protected                         |                                  |                               |
| Whydah, Pin-tailed         | <i>Vidua macroura</i>           | -                               | -                      | Protected                         |                                  |                               |
| Whydah, Shaft-tailed       | <i>Vidua regia</i>              | -                               | -                      | Protected                         |                                  |                               |
| Widowbird, White-winged    | <i>Euplectes albonotatus</i>    | -                               | -                      | Protected                         |                                  |                               |
| Wood-dove, Emerald-spotted | <i>Turtur chalcospilos</i>      | -                               | -                      | Protected                         | x                                |                               |
| Wood-hoopoe, Green         | <i>Phoeniculus purpureus</i>    | -                               | -                      | Protected                         | x                                | x                             |
| Woodpecker, Bearded        | <i>Dendropicos namaquus</i>     | -                               | -                      | Protected                         | x                                | x                             |
| Woodpecker, Bennett's      | <i>Campethera bennettii</i>     | -                               | -                      | Protected                         |                                  |                               |
| Woodpecker, Cardinal       | <i>Dendropicos fuscescens</i>   | -                               | -                      | Protected                         |                                  |                               |
| Woodpecker, Golden-tailed  | <i>Campethera abingoni</i>      | -                               | -                      | Protected                         | x                                |                               |
| Wren-warbler, Barred       | <i>Calamonastes fasciolatus</i> | -                               | -                      | Protected                         |                                  |                               |

#All bird species, except those listed as Specially Protected or common/game species, are protected according to the Limpopo Environmental Management Act (2003).  
Source: SABAP2 and 2018 Field Programme

**APPENDIX E**

Herpetofauna Recorded and  
Potentially Occurring in the Study  
Area

**Table 1: Reptiles recorded and potentially occurring in the study area based on literature**

| Family         | Scientific Name                               | Common Name                 | Conservation Status               |                        |   |                |
|----------------|---|-----------------------------|-----------------------------------|------------------------|---|----------------|
|                |   |                             | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
| Agamidae       | <i>Acanthocercus atricollis atricollis</i>    | Southern Tree Agama         | -                                 | -                      | Protected                                   | -              |
|                | <i>Agama aculeata</i>                         | Ground Agama                | -                                 | -                      | Protected                                   | -              |
|                | <i>Agama aculeata distantii</i>               | Eastern Ground Agama        | -                                 | -                      | Protected                                   | Endemic        |
| Aphisbaenidae  | <i>Monopeltis capensis</i>                    | Cape Worm Lizard            | -                                 | -                      | Protected                                   | Near Endemic   |
|                | <i>Zygaspis quadrifrons</i>                   | Kalahari Dwarf Worm Lizard  | -                                 | -                      | Protected                                   | -              |
|                | <i>Zygaspis vandami</i>                       | Van Dam's Dwarf Worm Lizard | -                                 | -                      | Protected                                   | -              |
| Chamaeleonidae | <i>Chamaeleo dilepis</i>                      | Flap-neck Chameleon         | -                                 | -                      | Protected                                   | -              |
| Colubridae     | <i>Crotaphopeltis hotamboeia</i>              | Red-lipped Snake            | -                                 | -                      | -   | -              |
|                | <i>Dasypeltis scabra</i>                      | Rhombic Egg-eater           | -                                 | -                      | -   | -              |
|                | <i>Dispholidus typus</i>                      | Boomslang                   | -                                 | -                      | -   | -              |
|                | <i>Philothamnus natalensis occidentalis</i>   | Western Natal Green Snake   | -                                 | -                      | -   | Endemic        |
|                | <i>Philothamnus semivariegatus</i>            | Spotted Bush Snake          | -                                 | -                      | -   | -              |
|                | <i>Telescopus semiannulatus semiannulatus</i> | Eastern Tiger Snake         | -                                 | -                      | -   | -              |

| Family       | Scientific Name                      | Common Name               | Conservation Status               |                        |   |                |
|--------------|--------------------------------------|---------------------------|-----------------------------------|------------------------|---|----------------|
|              |                                      |                           | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
|              | <i>Thelotornis capensis capensis</i> | Southern Twig Snake       | -                                 | -                      | -   | -              |
| Cordylidae   | <i>Cordylus jonesii</i>              | Jone's Girdled Lizard     | -                                 | -                      | Protected                                   | -              |
|              | <i>Platysaurus guttatus</i>          | Dwarf Flat Lizard         | -                                 | -                      | Protected                                   | -              |
|              | <i>Platysaurus lebomboensis</i>      | Lebombo Flat Lizard       | -                                 | -                      | Protected                                   | Near Endemic   |
|              | <i>Platysaurus minor</i>             | Waterberg Flat Lizard     | -                                 | -                      | Protected                                   | -              |
|              | <i>Smaug breyi</i>                   | Waterberg Dragon Lizard   | -                                 | -                      | Protected                                   | Endemic        |
|              | <i>Smaug vandami</i>                 | Van Dam's Dragon Lizard   | -                                 | -                      | Protected                                   | Endemic        |
| Crocodylidae | <i>Crocodylus niloticus</i>          | Nile Crocodile            | Vulnerable                        | Vulnerable             | Specially Protected                         | -              |
| Elapidae     | <i>Aspidelaps scutatus scutatus</i>  | Common Shield Cobra       | -                                 | -                      | -   | -              |
|              | <i>Dendroaspis polylepis</i>         | Black Mamba               | -                                 | -                      | -   | -              |
|              | <i>Elapsoidea sundevallii</i>        | Sundevall's Garter Snake  | -                                 | -                      | -   | -              |
|              | <i>Naja annulifera</i>               | Snouted Cobra             | -                                 | -                      | -   | -              |
|              | <i>Naja mossambica</i>               | Mozambique Spitting Cobra | -                                 | -                      | -   | -              |
| Gekkonidae   | <i>Chondrodactylus turneri</i>       | Turner's Gecko            | -                                 | -                      | Protected                                   | -              |

| Family         | Scientific Name                       | Common Name                   | Conservation Status               |                        |   |                |
|----------------|---------------------------------------|-------------------------------|-----------------------------------|------------------------|---|----------------|
|                |                                       |                               | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
|                | <i>Hemidactylus mabouia</i>           | Common Tropical House Gecko   | -                                 | -                      | Protected                                   | -              |
|                | <i>Homopholis wahbergii</i>           | Wahlberg's Velvet Gecko       | -                                 | -                      | Protected                                   | -              |
|                | <i>Lygodactylus bradfieldi</i>        | Bradfield's Dwarf Gecko       | -                                 | -                      | Protected                                   | -              |
|                | <i>Lygodactylus capensis capensis</i> | Common Dwarf Gecko            | -                                 | -                      | Protected                                   | -              |
|                | <i>Pachydactylus affinis</i>          | Transvaal Gecko               | -                                 | Protected              | Protected                                   | Endemic        |
|                | <i>Pachydactylus capensis</i>         | Cape Gecko                    | -                                 | Protected              | Protected                                   | -              |
|                | <i>Pachydactylus punctatus</i>        | Speckled Gecko                | -                                 | Protected              | Protected                                   | -              |
|                | <i>Ptenopus garrulus garrulus</i>     | Spotted Barking Gecko         | -                                 | -                      | Protected                                   | -              |
| Gerrhosauridae | <i>Gerrhosaurus auritus</i>           | Kalahari Plated Lizard        | -                                 | -                      | Protected                                   | -              |
|                | <i>Gerrhosaurus flavigulari</i>       | Yellow-throated Plated Lizard | -                                 | -                      | Protected                                   | -              |
|                | <i>Matobosaurus validus</i>           | Common Giant Plated Lizard    | -                                 | -                      | Protected                                   |                |
| Lacertidae     | <i>Heliobolus lugubris</i>            | Bushveld Lizard               | -                                 | -                      | Protected                                   | -              |
|                | <i>Ichnotropis capensis</i>           | Ornate Rough-scaled Lizard    | -                                 | -                      | Protected                                   | -              |
|                | <i>Meroles squamulosus</i>            | Savanna Lizard                | -                                 | -                      | Protected                                   | -              |

| Family        | Scientific Name                              | Common Name                       | Conservation Status               |                        |   |                |
|---------------|--|-----------------------------------|-----------------------------------|------------------------|---|----------------|
|               |  |                                   | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
|               | <i>Nucras holubi</i>                         | Holub's Sandveld                  | -                                 | -                      | Protected                                   | -              |
|               | <i>Nucras intertexta</i>                     | Spotted Sandveld Lizard           | -                                 | -                      | Protected                                   | -              |
|               | <i>Nucras ornata</i>                         | Ornate Sandveld Lizard            | -                                 | -                      | Protected                                   | -              |
|               | <i>Pedioplanis lineocellata lineocellata</i> | Spotted Sand Snake                | -                                 | -                      | -   | -              |
| Lamprophiidae | <i>Amblyodipas polylepis polylepis</i>       | Common Purple-glossed Snake       | -                                 | -                      | -   | -              |
|               | <i>Aparallactus capensis</i>                 | Cape centipede-eater              | -                                 | -                      | -   | -              |
|               | <i>Atractaspis bibronii</i>                  | Bibron's Stiletto Snake           | -                                 | -                      | -   | -              |
|               | <i>Boaedon capensis</i>                      | Common House Snake                | -                                 | -                      | -   | -              |
|               | <i>Lycodonomorphus inornatus</i>             | Live Ground Snake                 | -                                 | -                      | -   | Endemic        |
|               | <i>Lycophidion capense</i>                   | Cape Wolf Snake                   | -                                 | -                      | -   | -              |
|               | <i>Prosymna bivittata</i>                    | Two-striped Shovel-Snout          | -                                 | -                      | -   | -              |
|               | <i>Psammophis brevirostris</i>               | Short-snouted Grass Snake         | -                                 | -                      | -   | -              |
|               | <i>Psammophis subtaeniatus</i>               | Western Yellow-bellied Sand Snake | -                                 | -                      | -   | -              |
|               | <i>Pseudaspis cana</i>                       | Mole Snake                        | -                                 | -                      | -   | -              |



| Family           | Scientific Name                        | Common Name                   | Conservation Status               |                        |   |                |
|------------------|--|-------------------------------|-----------------------------------|------------------------|---|----------------|
|                  |  |                               | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
|                  | <i>Xenocalamus bicolor australis</i>   | Waterberg Quill-snouted Snake | -                                 | -                      | -   | -              |
| Leptotyphlopidae | <i>Leptotyphlops incognitus</i>        | Incognito Thread Snake        | -                                 | -                      | -   | -              |
|                  | <i>Leptotyphlops scutifrons</i>        | Peter's Thread Snake          | -                                 | -                      | -   | -              |
| Pelomedusidae    | <i>Pelomedusa subrufa</i>              | Marsh Terrapin                | -                                 | -                      | Protected                                   | -              |
|                  | <i>Pelusois sinuatus</i>               | Serrated Hinged Terrapin      | -                                 | -                      | Protected                                   | -              |
| Pythonidae       | <i>Python natalensis</i>               | South African Python          | -                                 | Protected              | Protected                                   | -              |
| Scincidae        | <i>Acontias occidentalis</i>           | Savanna Legless Skink         | -                                 | -                      | Protected                                   | -              |
|                  | <i>Acontias plumbeus</i>               | Giant Legless Skink           | -                                 | -                      | Protected                                   | -              |
|                  | <i>Afroablepharus maculicollis</i>     | Spotted-neck Snake-eyed Skink | -                                 | -                      | Protected                                   | -              |
|                  | <i>Afroablepharus wahlbergii</i>       | Wahlberg's Snake-eyed Skink   | -                                 | -                      | Protected                                   | -              |
|                  | <i>Mochlus sundevallii sundevallii</i> | Sundevall's Writhing Skink    | -                                 | -                      | Protected                                   | -              |
|                  | <i>Trachylepis capensis capensis</i>   | Cape Skink                    | -                                 | -                      | Protected                                   | -              |
|                  | <i>Trachylepis margaritifer</i>        | Rainbow Skink                 | -                                 | -                      | Protected                                   | -              |
|                  | <i>Trachylepis punctulata</i>          | Speckled Sand Skink           | -                                 | -                      | Protected                                   | -              |

| Family       | Scientific Name                        | Common Name                  | Conservation Status               |                        |   |                |
|--------------|--|------------------------------|-----------------------------------|------------------------|---|----------------|
|              |  |                              | Red List (2014) – Regional Status | NEMBA TOPS List (2013) | Limpopo Environmental Management Act (2003) | Endemic Status |
|              | <i>Trachylepis striata</i>             | Striped Skink                | -                                 | -                      | Protected                                   | -              |
|              | <i>Trachylepis varia</i>               | Variable Skink               | -                                 | -                      | Protected                                   | -              |
| Testudinidae | <i>Kinixys lobatsiana</i>              | Lobatse Hinged-back Tortoise | -                                 | -                      | Protected                                   | Near Endemic   |
|              | <i>Kinixys spekii</i>                  | Speke's Hinged-back Tortoise | -                                 | -                      | Protected                                   | -              |
|              | <i>Psammobates oculifer</i>            | Serrated tent Tortoise       |                                   |                        | Protected                                   | -              |
|              | <i>Stigmochelys pardalis</i>           | Leopard Tortoise             | -                                 | -                      | Protected                                   | -              |
| Typhlopidae  | <i>Afrotyphlops bibronii</i>           | Bibron's Blind Snake         | -                                 | -                      | -   | Near Endemic   |
| Varanidae    | <i>Varanus albigularis albigularis</i> | Rock Monitor                 | -                                 | -                      | -   | -              |
|              | <i>Varanus niloticus</i>               | Water Monitor                | -                                 | -                      | -   | -              |
| Viperidae    | <i>Bitis arietans arietans</i>         | Puff Adder                   | -                                 | -                      | -   | -              |
|              | <i>Bitis caudalis</i>                  | Horned Adder                 | -                                 | Protected              | -   | -              |
|              | <i>Causus defillippii</i>              | Snouted Night Adder          | -                                 | -                      | -   | -              |

Source: Distribution = Bates et al. (2014) and ADU - Virtual Museum (2015). Conservation Status = Bates et al. (2014), NEMBA ToPS List (2013) and Limpopo Environmental Management Act (2003).

**Table 2 Amphibians recorded and potentially occurring in the study area based on literature**

| Family            | Scientific name                   | Common name               | Conservation Status        |                        |                                  |
|-------------------|-----------------------------------|---------------------------|----------------------------|------------------------|----------------------------------|
|                   |                                   |                           | Red List – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
| Brevipectidae     | <i>Breviceps adspersus</i>        | Bushveld Rain Frog        | -                          | -                      | -                                |
| Bufonidae         | <i>Amietophrynus garmani</i>      | Eastern Olive Toad        | -                          | -                      | -                                |
|                   | <i>Amietophrynus gutturalis</i>   | Guttural Toad             | -                          | -                      | -                                |
|                   | <i>Amietophrynus maculatus</i>    | Flat-Backed Toad          | -                          | -                      | -                                |
|                   | <i>Amietophrynus rangeri</i>      | Raucous Toad              | -                          | -                      | -                                |
|                   | <i>Poyntonophrynus fenoulheti</i> | Northern Pygmy Toad       | -                          | -                      | -                                |
|                   | <i>Schisaderma carens</i>         | Red Toad                  | -                          | -                      | -                                |
| Hemisotidae       | <i>Hemisis marmoratus</i>         | Mottled Shovel-nosed Frog | -                          | -                      | -                                |
| Hyperoliidae      | <i>Kassina senegalensis</i>       | Bubbling Kassina          | -                          | -                      | -                                |
| Phrynobatrachidae | <i>Phrynobatrachus natalensis</i> | Snoring Puddle Frog       | -                          | -                      | -                                |
|                   | <i>Phrynomantis bifasciatus</i>   | Banded Rubber Frog        | -                          | -                      | -                                |
| Pipidae           | <i>Xenopus laevis</i>             | Common Platanna           | -                          | -                      | -                                |
| Ptychadenidae     | <i>Ptychadena anchietae</i>       | Plain Grass Frog          | -                          | -                      | -                                |
|                   | <i>Ptychadena mossambica</i>      | Broad-Banded Grass Frog   | -                          | -                      | -                                |
| Pyxicephalidae    | <i>Amieta angolensis</i>          | Common River Frog         | -                          | -                      | -                                |

| Family        | Scientific name                | Common name             | Conservation Status        |                        |                                  |
|---------------|--------------------------------|-------------------------|----------------------------|------------------------|----------------------------------|
|               |                                |                         | Red List – Regional Status | NEMBA TOPS List (2013) | Limpopo Protected Species (2003) |
|               | <i>Cacosternum boettgeri</i>   | Common Caco             | -                          | -                      | -                                |
|               | <i>Pyxicephalus adspersus</i>  | Giant Bullfrog          | -                          | -                      | Protected                        |
|               | <i>Pyxicephalus edulis</i>     | African Bullfrog        | -                          | -                      | -                                |
|               | <i>Strongylopus fasciatus</i>  | Striped Stream Frog     | -                          | -                      | -                                |
|               | <i>Tomopterna cryptotis</i>    | Tremolo Sand Frog       | -                          | -                      | -                                |
|               | <i>Tomopterna krugerensis</i>  | Knocking Sand Frog      | -                          | -                      | -                                |
|               | <i>Tomopterna marmorata</i>    | Russet-backed Sand Frog | -                          | -                      | -                                |
|               | <i>Tomopterna natalensis</i>   | Natal Sand Frog         | -                          | -                      | -                                |
|               | <i>Tomopterna tandyi</i>       | Tandy's Sand Frog       | -                          | -                      | -                                |
| Rhacophoridae | <i>Chiromantis xerampelina</i> | Foam Nest Frog          | -                          | -                      | -                                |

Source: Du Preez & Carruthers (2009) and ADU's AmphibianMAP

**APPENDIX F**

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# SPECIALIST DECLARATION

As required under Appendix 6 of the Environmental Impact Assessment Regulations, 2014 (as amended), I, **Andrew Zinn**, declare that:

- I act as an independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with all applicable Acts and Regulations in compiling this report;
- I have not, and will not engage in conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing:
  - any decision to be taken with respect to the application by the competent authority; and
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.



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Signature of the specialist:

**Golder Associates Africa (Pty) Ltd**

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Name of company (if applicable):

**3 August 2019**

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Date:





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