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ENVIRONMENTAL



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## Sun International Environmental Authorisation for the Sun City Chairlift

### Fauna and Flora Basic Assessment

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**Project Number:**

SUN3877

**Prepared for:**

MDT Environmental

June 2018

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## DECLARATION OF INDEPENDENCE

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I, Rudi Greffrath as duly authorised representative of Digby Wells and Associates (South Africa) (Pty) Ltd., hereby confirm my independence (as well as that of Digby Wells and Associates (South Africa) (Pty) Ltd.) and declare that neither I nor Digby Wells and Associates (South Africa) (Pty) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of MDT Environmental, other than fair remuneration for work performed, specifically in connection with the proposed development of Sun City Chairlift and associated infrastructure, located in Sun City, North West Province.



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## EXECUTIVE SUMMARY

Digby Wells Environmental (hereafter Digby Wells) has been requested by MDT Environmental to undertake the Environmental Authorisation (Basic Assessment) Process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for the proposed chairlift.

The objectives of this report are to describe the results of the infield assessment and the current state of the flora and fauna within the proposed chairlift project area and assess the impacts of the proposed development. The report describes various flora and fauna findings in compliance with existing provincial and national legislation.

Sun International at their Sun City Resort is continuously exploring various alternatives to enhance the attraction of the resort for tourists. Sun International explores these alternatives through joint ventures and building on the success of the joint ventures between Sun International and UNREAL. UNREAL proposes to construct and operate a chair lift from the Sun City Welcome Centre to the top of the so-called "Sun City Mountain".

The chair lift, manufactured in South Africa, constructed and operated by UNREAL to internationally recognised safety standards, will transport guests up to the Sun City Mountain. The chairlift consists of a top and bottom station, with 30 two-seater chairs suspended from a moving wire rope. The guests board the chairlift at the bottom station to be transported to the top station. The planned chairlift will be 900 m long with pylons at approximately 100 m intervals.

According to the vegetation maps of southern Africa (Mucina and Rutherford, 2006), the study area falls within the Zeerust Thornveld vegetation type. Current land use for the hillside area is infrequent grazing by cattle of the local herders, and road usage from the main Sun City area to the top of this hillside for the Zipline operations. The grazing of cattle herds is only evident in the more accessible areas, with little evidence of grazing encountered in the inaccessible steep areas. The presence and dominance of *Aristida* spp and *Dichrostachys cinerea* are indicators of veld overgrazed and poor veld management. Domestic livestock can have high impacts on natural vegetation, resulting in decreases to species richness and diversity. A total of 42 plant species were encountered, 22 of these were trees or tall shrubs, one fern, six grass species and ten herb species. Sixteen mammal species were recorded during the field visit, none of these are considered protected. Twelve Bird species were recorded, with 21 (Species of Special Concern) SSC bird species potentially occurring in the area of interest. No reptile species and amphibian species were recorded during the one day site visit.

Impacts include Loss of Mountain Bushveld on steep slopes and Mountain Bushveld on moderate slopes with mitigation measures as follows:

- Rehabilitation of the disturbed area should take place after construction, whereby a mixture of native grass species harvested from climax *Themeda* grassland and native grass species (such as *Cynodon dactylon*) are planted immediately to prevent erosion;

- The footprint area should be limited as far as possible; and
- Protected species, *Spirostachys africana*, Tambotie, *Boophane disticha*, Poison Bulb and *Sclerocaria birrea*, Maroela are present at the site, all effort must be made to avoid disturbance of these species.

Alien plant invasion with mitigation measures as follows:

- An AIPs Management Plan should be compiled and implemented.

Mitigation measure for bird collisions with project infrastructure are:

- Install bird deflectors; and
- Initiate bird monitoring plan.

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## LIST OF ABBREVIATIONS

<b>Acronym</b>	<b>Description</b>
EX	Extinct
EW	Extinct in the Wild
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
NT	Near Threatened
LC	Least Concern
DDT	Data Deficient Taxa
CITES	Convention on International Trade in Endangered Species of Flora and Fauna
CSIR	Council for Scientific and Industrial Research
EIA	Environmental Impact Assessment
BA	Basic Assessment
DEA	Department of Environmental Affairs
IUCN	International Union for the Conservation of Nature
HR	Habitat requirements
HS	Habitat status
HL	Habitat link
NEMBA	National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004),
PRECIS	PRECIS list (National Herbarium Pretoria (PRE) Computerised Information System).
POSA	Plants of Southern Africa
SANBI	South African National Biodiversity Institute
SSC	Species of Special Concern
ToPS	Threatened or Protected Species List (listed by NEMBA)

## 1 Introduction

Digby Wells Environmental (hereafter Digby Wells) has been requested by MDT Environmental to undertake the Environmental Authorisation (Basic Assessment - BA) Process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for the proposed chairlift at Sun City, North West Province.

MDT Environmental Services (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the BA and associated Public Participation Process (PPP). Digby Wells Environmental, as Sub-Consultant was appointed to conduct the Basic Ecological Assessment (BEA) as part of the application for Environmental Authorisation (EA) for the Sun City Chairlift Project.

The study area is located in the Sun International's Sun City Holiday Resort, within the Plianesberg National Park Alkaline Ring Complex, North-West Province.

This fauna and flora assessment report relates to the Chairlift and its accompanying infrastructure. The current site specific environment was assessed through infield ecological studies and sensitive plants, animals and landscapes recorded, were highlighted for further management consideration. Further to this, the impacts of the project development were assessed through evaluation of activities and their interactions with the study site.

### 1.1 Project Description

The proposed Sun City Chairlift Project involves the construction and operation of a 900 metres (m) long chairlift from a site 85 m from the Welcome Centre to the top of the Sun City Mountain. It is planned that the proposed Sun City Chairlift Project be operated by the company UNREAL. The chairlift will consist of a top and bottom station, with 30 two-seater chairs suspended from a moving wire rope. The idea would be for the chairs to move just above the tree tops. The objective of the proposed Sun City Chairlift Project is to provide the guests the opportunity to visit the Sun City Star and the Zip Line which have been constructed on top of the Sun City Mountain.

## 2 Scope and Purpose of this Specialist Report

This specialist study serves to undertake a basic ecological assessment of the local flora and fauna communities associated with the proposed Sun City Chairlift Project, referred to as the study areas, to determine the current state of these components.

The objectives of the ecological study were therefore:

- To determine if any flora and fauna species or assemblages will be directly impacted upon by the proposed Sun City Chairlift Project activities and its associated infrastructure. This includes the flora and fauna communities present, the state of these communities, identification of possible Red Data species/ Species of Special Concern (SSC) according to the International Union for Conservation of Nature (IUCN), National and Provincial criteria; and

- To undertake an assessment of the impacts associated with various activities on the flora and fauna species or assemblages and to recommend measures that should be included in the Environmental Management Plan (EMP) to prevent or limit impacts to flora and fauna species or assemblages.

## 2.1 Terms of Reference

Digby Wells were commissioned by MDT Environmental Consulting Services (Pty) Ltd to complete a terrestrial biodiversity basic assessment report which will include the findings of a single site visit and site specific ecological assessment as detailed in the methodology section of this report. Potential impacts on terrestrial biodiversity were identified and the significance of these impacts were assessed to determine suitable mitigation measures to managed identified impacts that can be included in a Biodiversity Management Plan for the proposed Sun City Chairlift Project development.

The agreed Terms of Reference (ToR) are summarised below and include:

- Flora and fauna list of expected species for the area;
- Potential SSC;
- Identification and description of habitats on site;
- Identification of flora and fauna on site;
- Sensitivity assessment; and
- Impacts Assessment, as well as relevant mitigation and management measures.

## 2.2 Assessment Details

The table below indicates the details of this report from a type, date and seasonality point of view.

**Table 2-1: Assessment Details**

<b>Type of specialist investigation</b>	Flora and Fauna Basic Assessment
<b>Date of specialist investigation</b>	31 November to 1 December 2016
<b>Season, relevance of season</b>	Wet Season Assessment

## 3 Approach and Methodology

### 3.1 Desktop Assessment

A detailed desktop assessment was conducted prior to the site visit and infield assessment. During this desktop assessment the broad habitats/ vegetation units were identified and demarcated using aerial photographs/ satellite imagery to demarcate identified homogenous vegetation units. In addition, the following desktop studies in the form of literature overview and consultation of available databases were used to generate expected species lists and to ascertain the likelihood of the presence of SSC on site:

- Pretoria Computerised Information System Lists (PRECIS): This database provides taxonomic information for plant species occurring in southern Africa and follows the format of Germishuizen and Meyer, 2003. It is updated every two months and is supplied by the South African National Biodiversity Institute (SANBI). The PRECIS List is accessible on the Plants of Southern Africa (POSA) website;
- SIBIS: SABIF (South African Biodiversity Information Facility) established by the Department of Science and Technology (DST); and
- The Threatened Species Programme (TSP) listing in collaboration with the National Botanical Institute (NBI) was consulted to identify any SSC and/ or any Red Data Fauna and Flora Listed Species that may be present within the proposed Sun City Chairlift Project area of development.

Regional Biodiversity Planning documents were consulted, including:

- North West Biodiversity Sector Plan 2015; and
- North West Province Biodiversity Conservation Assessment, Technical Report 2009.

### 3.2 Flora Assessment

A site specific and infield assessment was conducted during 31 November to 1 December 2016. The infield vegetation assessment was conducted using randomly transects methods where the location of the sample plots were determined prior to infield assessment. Transects were then set infield and all species present within these transects were recorded. During this flora assessment all species encountered during random transects was recorded. Characterisation of vegetation in the study area in conjunction with an in-depth study including plant species lists, SSC and their locations, declared Alien and Invader Plant Species (AIPs) present and areas of sensitivity. In addition, all species of ethnobotanical (medicinal or cultural use) importance were recorded. Species lists of all species recorded onsite were compiled and the following will be reported on:

- Red Data Listed plant species and/ or SSC recorded on site (including their locations);
- AIPs recorded on site (including their Invasive Categories according to the National Environmental Management: Biodiversity Act (NEM: BA);

- Dominant plant species recorded in each identified plant community; and
- A vegetation map indicating the distribution of the identified plant community. The location and distribution of each sampling point as well as Red Data Listed Plant Species and/ or SSC recorded onsite are included on the vegetation map.

### 3.3 Fauna

A list of all potential fauna species was compiled by means of a desktop study and all potential red data listed species were highlighted. Site specific infield fauna surveys were conducted concurrently with vegetation surveys and all animals observed in the area were noted. The presence of fauna (including mammals, amphibians, reptiles, avifauna, and selected invertebrates) were evaluated using tracks, dung, ecological indicators, and visual sightings. Fauna lists were generated and discussed and related back to the floristic component of the area.

The current status of the faunal environment was determined and an evaluation of the extent of site-related effects in terms of certain ecological indicators, as well as identification of specific important ecological attributes such as rare and endangered species, SSC, protected species, sensitive species and endemic species were made. The faunal environment and habitat was characterised in relation to biota and the extent of site related effects.

#### 3.3.1 Mammals

Visual sightings and ecological indications were used to identify the mammal inhabitants of the study area; this includes scats, tracks and nesting sites such as burrows and dens. Scats found were collected (if required), photographed on scale and along with any tracks found were identified. Passive sampling was completed by means of small mammal traps (Sherman Traps) and motion sensor cameras, these were placed strategically within the study area to record species that occur here. For identification purposes a field guide Mammals of Southern Africa (Smithers, 2006) and Stuart's Field Guide to Mammals of Southern Africa (Stuart *et al.*, 2015) was used.

The following was recorded:

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

#### 3.3.2 Birds

The principal ornithological field survey technique was transect counts. Transect counts were taken in sites representative of different avifauna habitat, specifically mountain bushveld. A transect line was selected to reflect the general habitat conditions. Transect count procedures

involve slow attentive walks along transects during which any bird seen or heard is identified and recorded.

The following were recorded:

- All birds encountered; and
- A list of rare and endangered species encountered.

Because the primary purpose of this work was to establish the presence of species, no distance or time limit was set, and hence any species seen or heard anywhere within the general vicinity of the proposed Sun City Chairlift Project site was recorded. Visual identification was used to confirm calls of the less common species.

Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN 2016) and birds listed by the North West Biodiversity Sector Plan (NW BSP) 2015. South African Bird Atlas Project 1&2 (SABAP) was used to compile a list of possible species that might occur in the project area which falls within the QDS 2527 AC (Appendix B).

### 3.3.3 Reptiles and Frogs

Herpetofauna include reptile and amphibian species. Direct/ opportunistic observations were completed along trails or paths within the proposed Sun City Chairlift Project area. Any herpetofauna species seen or heard along such paths or trails within the project area were identified and recorded. Another method used was to examine refuges using visual scanning of terrains to record smaller herpetofaunal species which often conceal themselves under rocks and in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, etc. Du Preez, *et al.* (2009) and Alexander, *et al.*, (2007) were used to confirm identification of species, where necessary.

Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN, 2015) and herpetofauna listed by NW BSP (2015).

### 3.3.4 Invertebrates (Spiders, Scorpions, Beetles and Butterflies)

During the field survey insects were identified when observed and transects were walked throughout the chairlift footprint area and the surrounding vegetation where necessary to identify any scorpion or baboon spider nests/ burrows.

The focus of this assessment was on protected species as this would narrow the field considerably and provide a reasonable indication of the current state.

Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN, 2015) and invertebrates listed by NW BSP 2015 and National lists.

### 3.4 Sensitive areas

The position and locality, as well as species composition of sensitive areas such as the wetlands of pans, streams and rivers was conducted in order to identify and map all sensitive habitat/ species in the area.

Officially protected areas as described by the IUCN, was specifically investigated. The IUCN specifies six categories of protected areas; they are:

- Strict nature reserve/ wilderness area: protected area managed mainly for science or wilderness protection;
- National Parks: protected area managed mainly for ecosystem protection and recreation;
- Natural Monument: protected area managed mainly for conservation of specific natural features;
- Habitat/ Species Management Area: protected area managed mainly for conservation through management intervention;
- Protected Landscape/ Seascape: protected area managed mainly for landscape/ seascape protection and recreation; and
- Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

### 3.5 Information Sources

The following literature and databases were used for this flora and fauna assessment:

- Plants of Southern Africa (POSA) database (<http://posa.sanbi.org/searchspp.php>);
- IUCN Red Data List (2016);
- North West Biodiversity Sector Plan (2015);
- North West Province Biodiversity Conservation Assessment, Technical Report (2009);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (2016);
- The South African Red Data lists for mammals, birds, butterflies,
- The National Forests Act, 1998 (Act No. 84 of 1998) with regards to Protected Trees, and
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), Threatened and Protected Species.

### 3.6 Assumptions, Knowledge Gaps and Limitations

The following assumptions have been made for this study:



- The site visit and site specific infield assessments was completed in December 2016, and was completed well into the wet season when most plants present are identifiable by their characteristics;
- The faunal sampling assessment was intended to document any faunal activity or evidence thereof on site. It is likely that some elusive, shy, nocturnal or migrant species may not have been recorded during the faunal survey;
- Only a single wet season site visit was performed and it is proposed that a wet season walkthrough be conducted prior to construction as additional Red Data Listed species could be present; and
- The proposed Sun City Chairlift Project was assessed according to the project activities listed herein (that were made available to Digby Wells by the client). Any changes to these after the assessments were done would not be captured in this report. Should any changes be made, additional studies will be required.

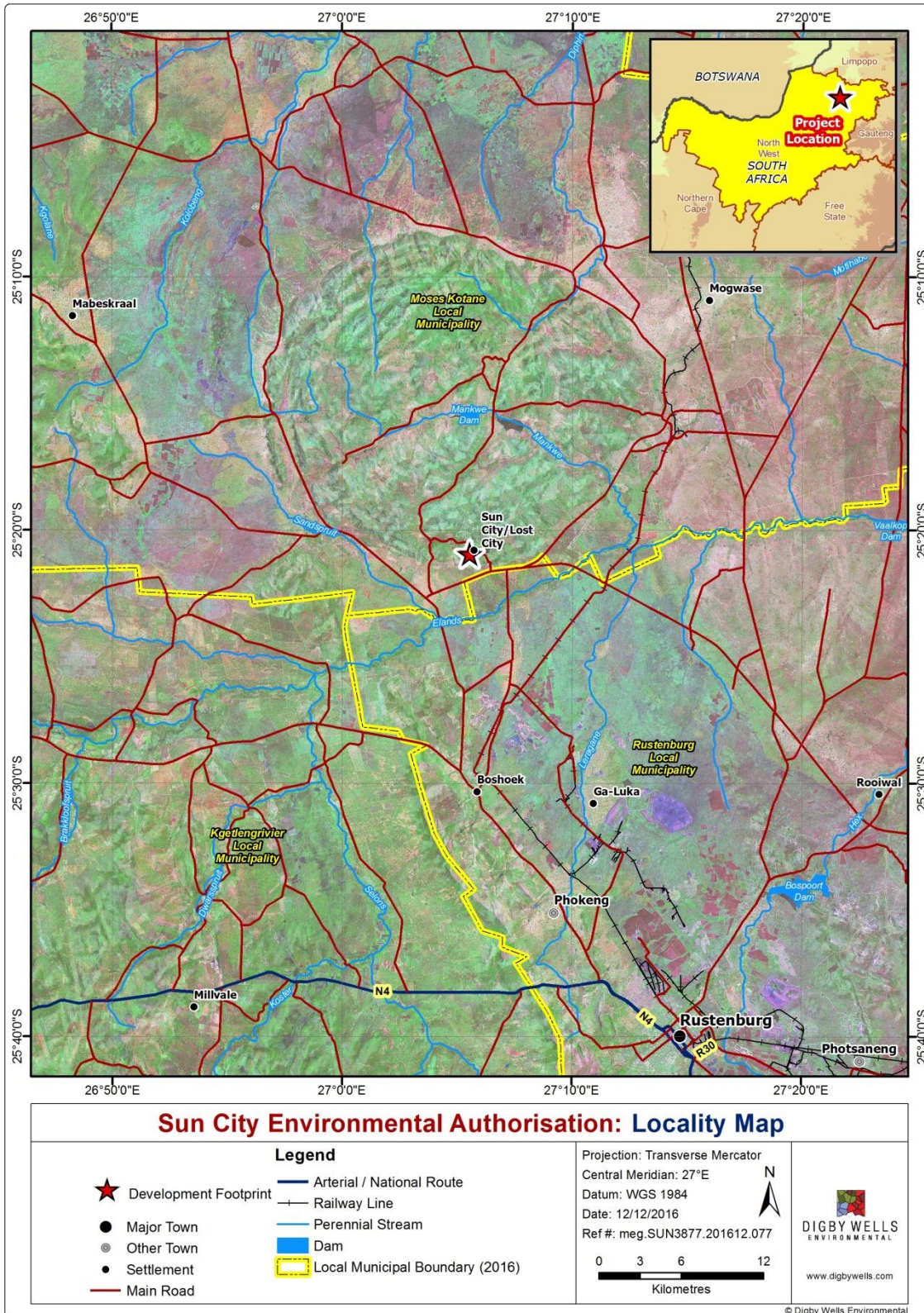
### **3.7 Consultation Processes Undertaken**

To date this report was not subject to any consultation processes.

## **4 Description of the Receiving Environment**

### **4.1 Locality**

The study area is located in the Sun International's Sun City Holiday Resort, within the Pilanesberg National Park Alkaline Ring Complex in the North-West Province.



**Figure 4-1: Sun City Chairlift Project Area**



## 4.2 Regional Vegetation

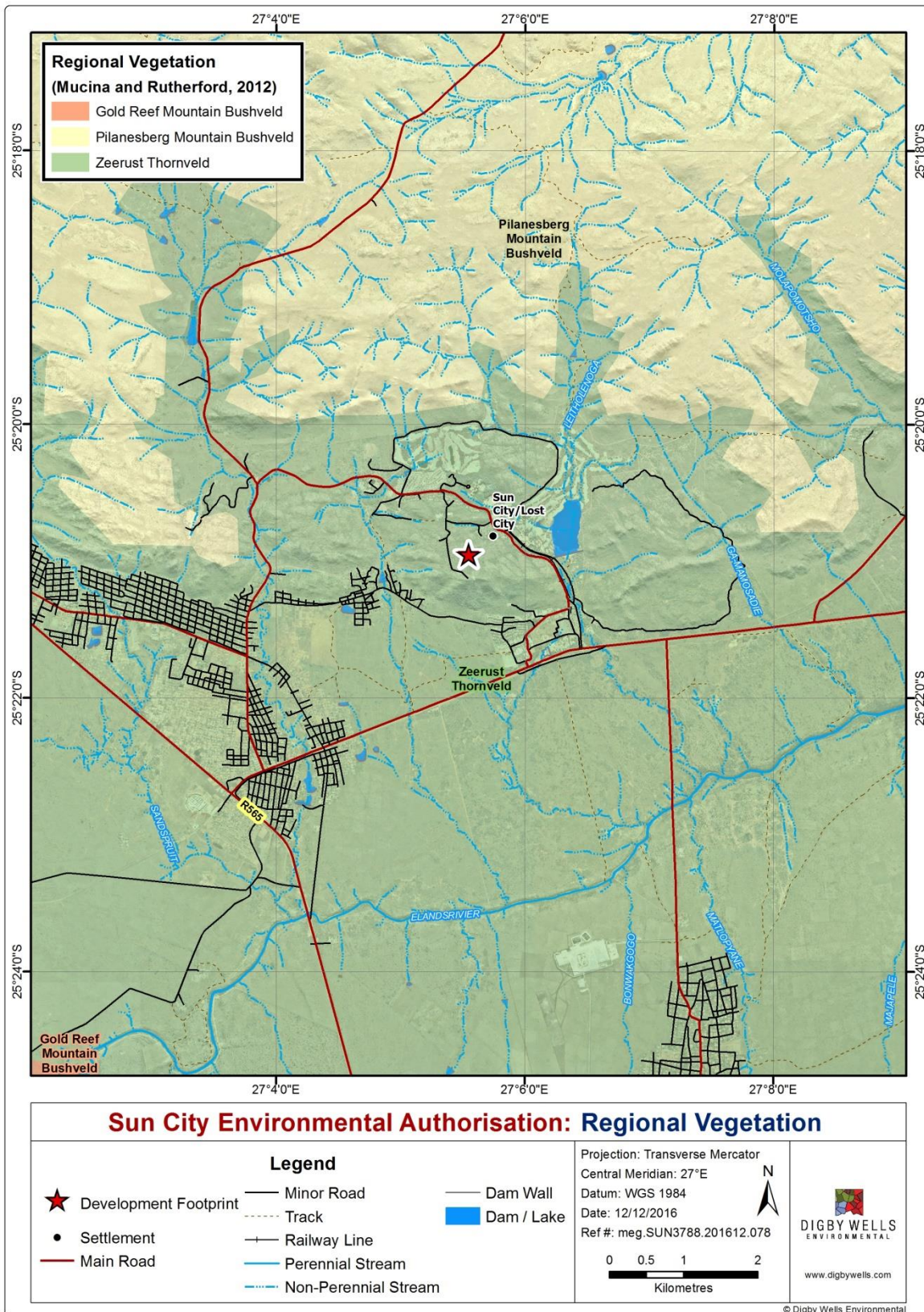
According to the Vegetation map of South Africa, Lesotho and Swaziland (Mucina and Rutherford, 2006), the study area falls within the Zeerust Thornveld vegetation type. This vegetation type extends from the plains of Lobatsi River in the west via Zeerust, Groot Marico and Mabaalstad to the flats between the Pilanesberg and the western end of the Magaliesberg in the east, and is an Endemic Vegetation type.

Vegetation consists of deciduous, open to dense short thorny woodland, dominated by *Senegalia* and *Vachellia* species (previous known as *Acacia*). The herbaceous layer is comprised predominantly of grasses on deep, high-base and some clay soils on plains and lowlands. Common and characteristic plant species for the Zeerust Thornveld vegetation type are listed in Table 4-1 and the distribution of this vegetation type is shown in Figure 4-2.

**Table 4-1: Common and characteristic plant species of the Zeerust Thornveld vegetation type (Mucina and Rutherford, 2006)**

Plant form	Species
Tall trees:	<i>Senegalia burkei</i> (d), <i>Vachellia erioloba</i> (d).
Small trees:	<i>Senegalia mellifera</i> (d), <i>Vachellia nilotica</i> (d), <i>Vachellia tortilis</i> (d), <i>Searsia lancea</i> (d), <i>Senegalia cinerea</i> (d), <i>Peltephorum africanum</i> , <i>Terminalia sericea</i> .
Tall shrubs:	<i>Diospyros lycioides</i> , <i>Grewia flava</i> , <i>Mystroxylon aethiopicum</i> .
Low shrubs:	<i>Agathisanthemum bojeri</i> , <i>Chaetecanthus costatus</i> , <i>Clerodendrum ternatum</i> , <i>Indigofera filipes</i> , <i>Searsia grandidens</i> , <i>Sida chrysantha</i> , <i>Stylosanthes fruticose</i> .
Graminoids (grasses and sedges):	<i>Eragrostis lehmanniana</i> (d), <i>Panicum maximum</i> (d), <i>Aristida congesta</i> , <i>Cymbopogon pospichilii</i> .
Herbs:	<i>Blepharis integrifolia</i> , <i>Chamaecristua absus</i> , <i>C. mimosoides</i> , <i>Cleome maculate</i> , <i>Dicoma anomal</i> , <i>Kyphocarpa angustifolia</i> , <i>Limeum viscosum</i> , <i>Lophiocarpus tenuissimus</i> .





**Figure 4-2: Regional Vegetation Types (Mucina & Rutherford, 2006)**



### 4.3 Flora

Current land use for the hillside area is infrequent grazing by cattle of local herders, and road usage from the main Sun City area to the top of this hillside for the Zipline operations. The grazing of cattle herds is only evident in the more accessible areas, with little evidence of grazing encountered in the inaccessible steep areas. The presence and dominance of *Aristida* spp. and *Dichrostachys cinerea* are indicators of veld that is overgrazed and poor veld management. Domestic livestock can have high impacts on natural vegetation, resulting in decreases to species richness and diversity. A total of 42 plant species were encountered, 22 of these were trees or tall shrubs, one fern, six grass species and ten herb species.

This floristic unit Mountain Bushveld consists of woodland which has a strong resemblance to the Zeerust Thornveld vegetation type. It consists of a floristic composition that is dominated by woody species with a fairly high richness that is reminiscent of the Zeerust Thornveld vegetation type across the site. The vegetation type consists of mesophyllous woodland consisting of *Combretum molle*, *C. zeyheri*, *Croton gratissimus* and *Searsia (Rhus) leptodictya*, including various microphyllous species such as *Acacia nilotica* and *A. tortilis*.

The graminoid and herbaceous layer is dominated by species that is typical of areas subjected to grazing as evidenced by the dominance of *Eragrostis rigidior*, *E. lehmanniana* and *Heteropogon contortus*. Noteworthy forb species include *Asparagus suaveolens*, *Felicia muricata*, *Sida chrysantha* and *Barleria bremekampii*.

Common species include *Dichrostachys cinerea*, *Aristida congesta barbicolis* and *Gymnosporea senegalensis*. It is important to note that despite the pressure of grazing, the bushveld area forms an important habitat for species such as small mammals and birds forming process areas that are vital to the functioning of the ecosystem. The two main vegetation types contained in the proposed Sun City Chairlift Project areas are Mountain Bushveld on steep slopes and Mountain Bushveld on moderate slopes, which are described in Figure 4-3 to Figure 4-5 below respectively.

**Table 4-2: Vegetation types found in the study area**

Vegetation type	Description	Dominant and Notable Species
Mountain Bushveld on steep slopes	Mountain bushveld on steep slopes occur near the top of the koppies, here the topography is very steep and rocky with a few large boulders present. The tree canopy was closed in areas where taller trees persisted, grass species present were sparse.	<i>Asparagus larycinus</i> , <i>Croton gratissimus</i> , <i>Dicerocaryum eriocarpum</i> , <i>Elionurus muticus</i> , <i>Sansevieria hyacinthoides</i> , <i>Spirostachys africana</i> .
Mountain Bushveld	Mountain bushveld on moderate slopes, are more easily accessible to livestock and other grazing animals, bush encroachment was encountered in places and confirmed	<i>Sclerocarya birrea</i> , <i>Tarchonanthus camphoratus</i> , <i>Gymnosporea senegalensis</i> , <i>Commiphora glandulosa</i> ,





Vegetation type	Description	Dominant and Notable Species
	by species such as <i>Dichrostachys cinerea</i> and <i>Vachellia tortillis</i> being present in these areas.	<i>Vachellia mellifera</i> , <i>Dichrostachys cinerea</i> .

Certain areas of the study areas have undergone pressure from livestock utilisation. Evidence of livestock was observed throughout most of the site and evidence of overgrazing was recorded in areas. Despite these impacts, the study area showed a high diversity of grasses and tree species (see below in Figure 4-3, Figure 4-4 and Figure 4-5).



**Figure 4-3: Moderate sloped *Dichrostachys cinerea* encroached bushveld**



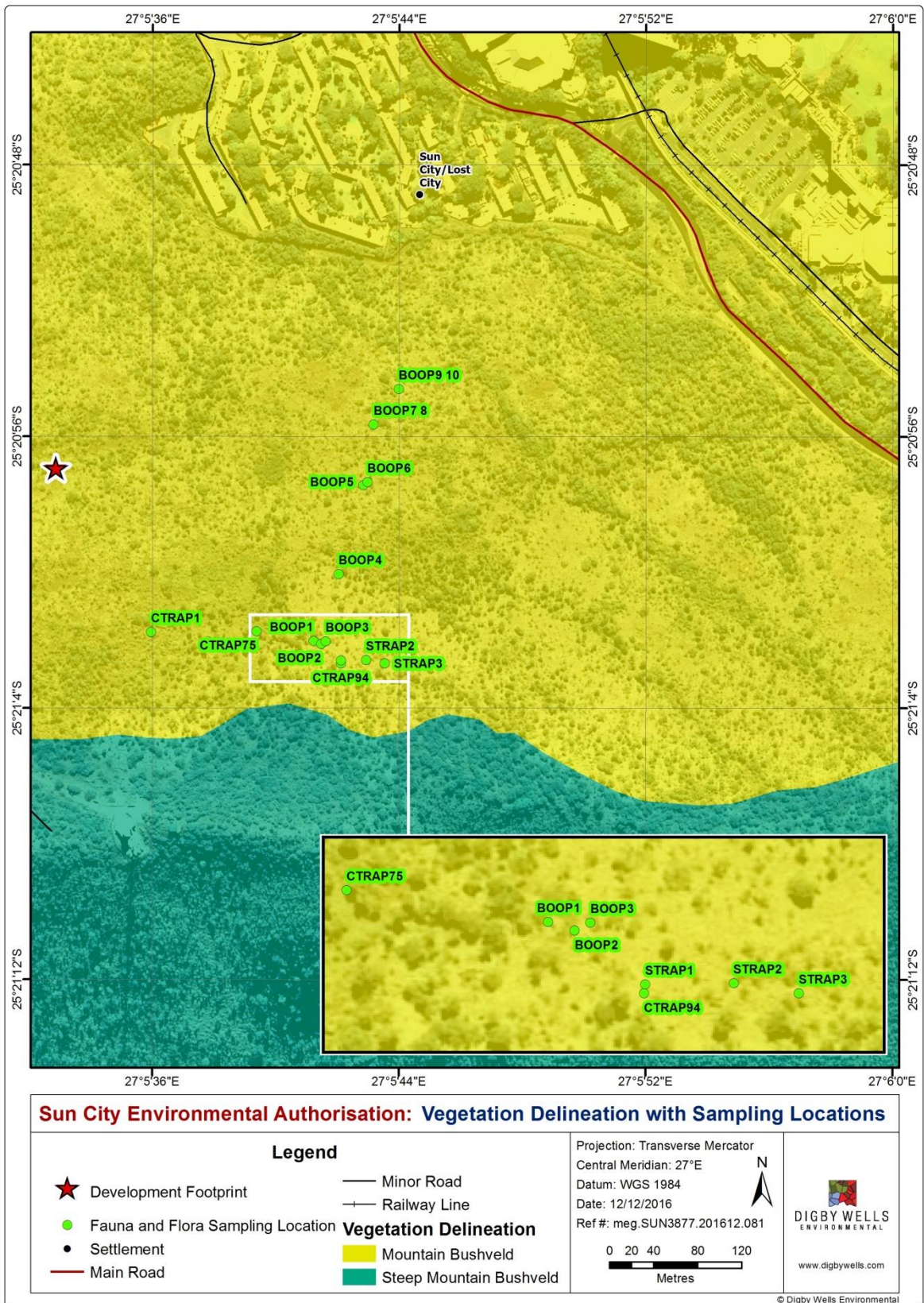


**Figure 4-4: Steep rocky Slopes**



**Figure 4-5: Northerly view**





**Figure 4-6: Vegetation delineation, Trapping Locations and Protected Plant species**





### 4.3.1 Species of Special Concern

According to POSA (2016) no Red Data listed species have been recorded previously in the QDS 2527AC. However during this site visit *Boophane disticha* (*Poison bulb*) (Figure 4-9), declining under SA Red Data List and *Sclerocarya birrea* (*Maroela*) (Figure 4-8) protected according to the list of Protected Tree Species under the National Forest Act, 1998 (Act No. 84 of 1998) and *Spirostachys africana* (*Tambotie*) (Figure 4-7) protected under Schedule 11 of the Nature Conservation Ordinance of Transvaal, 1983 (Act No. 12 of 1983) were encountered.



**Figure 4-7: *Spirostachys africana*, Tambotie**



**Figure 4-8: *Sclerocarya birrea*, Marula**





**Figure 4-9: *Boophane disticha* (Poison Bulb)**

## 4.4 Fauna

As described in the flora findings, much of the terrestrial vegetation and habitat within the proposed Sun City Chairlift Project footprint area is inaccessible to most people and therefore relatively undisturbed. Certain areas have been modified by current and historical land use such as the Zip line operating area at the top of the hill and the fence and drainage lines at the bottom. It is assumed that these impacts have had a subsequent effect on the fauna species diversity and abundance. The findings of the fauna survey are used as a secondary reflection of the ecosystem health.

### 4.4.1 Mammals

Actual sightings, spoor, calls, dung and nesting sites, as well as active sampling by means of motion detection cameras and Sherman traps, were used to establish the presence of mammals present on the proposed Sun City Chairlift Project site. The evidence of dung and spoor suggests that animals were present in the area although very few were recorded during this survey.

Sixteen mammal species were recorded during the field visit; however the following species are known to occur in the proposed Sun City Chairlift Project area, as confirmed by staff of the resort. Three of the below species have a high probability of occurring in the project area. See Table 4-3 below.


**Table 4-3: Mammal Species recorded and High Probability Species**

Scientific Name	Common Name	Observation	Protection Status (IUCN 2016-2)/ NWBSP 2015
<i>Aethomys chrysophilus</i>	Red Veld Rat	Burrows	Least Concerned
<i>Atelerix frontalis</i>	South African Hedgehog	Potential to occur on site	Friedmann and Daly, Near Threatened
<i>Atilax paludinosus</i>	Marsh Mongoose	Spoor	Least Concerned
<i>Canis mesomelas</i>	Black-backed Jackal	Spoor & scats	Least Concerned
<i>Caracal caracal</i>	Caracal	Personal Communication	Least Concerned
<i>Cercopithecus pygerythrus</i>	Vervet Monkey	Spoor, Observed	Least Concerned
<i>Cryptomys hottentotus</i>	African Mole-rat.	Soil heaps	Least Concerned
<i>Galago senegalensis</i>	Lesser Bush Baby	Personal Communication	Least Concerned
<i>Galerella sanguinea</i>	Slender Mongoose	Scats	Least Concerned
<i>Genetta genetta</i>	Genet	Personal Communication	Least Concerned
<i>Hystrix africae australis</i>	Cape Porcupine	Diggings & quills	Least Concerned
<i>Lepus saxatilis</i>	Scrub Hare	Droppings	Least Concerned
<i>Mastomys coucha</i>	Multimammate Mouse	Sherman trap	Least Concerned
<i>Mellivora capensis</i>	Honey Badger	Potential to occur on site	Friedmann and Daly, Near
<i>Papio cynocephalus ursinus</i>	Savanna Baboon	Motion Sensor Cameras	Least Concerned
<i>Parahyaena brunnea</i>	Brown Hyaena	Potential to occur on site	Near Threatened
<i>Paraxerus cepapi</i>	Tree Squirrel	Alarm call	Least Concerned
<i>Sylvicapra grimmia</i>	Common Duiker	Droppings & spoor	Least Concerned
<i>Tatera leucogaster/brantsii</i>	Highveld/Bushveld Gerbil	Burrows	Least Concerned

#### 4.4.1.1 Bats

One bat species (*Miniopterus natalensis*, “Near-threatened” 1) could utilize the study area during nocturnal foraging bouts. However, this species roost and breed in caves or mine adits which were absent on the proposed study site area.

#### 4.4.1.2 “Data Deficient” species”

All shrew species (genera *Crocidura* and *Suncus*), the Single-striped Mouse (*Lemniscomys rosalia*), the Bushveld Gerbil (*Tatera leucogaster*) and the Short-snouted Elephant-shrew (*Elephantulus brachyrhynchus*) are “Data Deficient” and likely to occur on the study area.



#### 4.4.2 Avifauna

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007).

Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. The bird species observed during the transect counts are listed in Table 4-4. The SABAP2 list for the QDS can be found in Appendix D.

**Table 4-4: Avifauna species recorded**

Birds	Scientific Name	Protection Status (IUCN 2016-2)/ NWBSP 2015
Black Shouldered kite	<i>Elanus axillaris</i>	Not protected
Blacksmith Lapwing	<i>Vanellus armatus</i>	Not protected
Cape Turtle Dove	<i>Streptopelia capicola</i>	Provincially protected
Cape Glossy Starling	<i>Lamprotornis nitens</i>	Not protected
Fiscal Flycatcher	<i>Sigelus silens</i>	Not protected
Hadeda Ibis	<i>Bostrychia hagedash</i>	Not protected
Helmeted Guineafowl	<i>Numida meleagris</i>	Not protected
Laughing Dove	<i>Spilopelia senegalensis</i>	Provincially protected
Southern Grey-headed Sparrow	<i>Passer diffusus</i>	Not protected
Masked Weaver	<i>Ploceus velatus</i>	Not protected
Speckled Pigeon	<i>Columba guinea</i>	Not protected
Crested Barbet	<i>Trachyphonus vaillantii</i>	Not protected

Avifauna diversity was found to be very low, primarily due to the limited amount and diversity of habitat types available in the study area. As is discussed previously the habitat varied between mountain bushveld on steep slopes and mountain bushveld on the moderate slopes. No species of special concern were encountered, however the species indicated in Table 4-5, can possibly occur on site.

**Table 4-5: Red Data Protected Bird Species that could occur in the area of concern**

Species	Global Conservation Status (IUCN 2016)	National Conservation Status (SA Red Data 2016)	Preferred Habitat	Potential Likelihood of Occurrence
<i>Anthropoides paradiseus</i> (Blue Crane)	Vulnerable	Near- threatened	Prefers open grassland, open karroid veld, as well as wetland habitats.	Unlikely to occur



Species	Global Conservation Status (IUCN 2016)	National Conservation Status (SA Red Data 2016)	Preferred Habitat	Potential Likelihood of Occurrence
<i>Alcedo semitorquata</i> (Half-collared Kingfisher)	Least Concern	Near- threatened	Clear, fast-flowing streams with dense overhanging vegetation.	Unlikely to occur
<i>Aquila rapax</i> (Tawny Eagle)	Least Concern	Endangered	Lowveld and Kalahari savanna, especially game farming areas and reserves.	Regarded as an irregular foraging visitor on the study area.
<i>Ciconia nigra</i> (Black Stork)	Least Concern	Vulnerable	Breeds on steep cliffs within mountain ranges; forages on ephemeral wetlands.	Vagrant on study area.
<i>Circus ranivorus</i> (African Marsh Harrier)	Least Concern	Endangered	Wetlands and vleis, breeds in extensive wetland systems with reedbed structure.	Unlikely to occur.
<i>Coracias garrulus</i> (European Roller)	Least Concern	Near- threatened	Open woodland and bushveld.	Common summer visitor
<i>Falco biarmicus</i> (Lanner Falcon)	Least Concern	Vulnerable	Varied, but prefers to breed in mountainous areas.	An occasional foraging visitor.
<i>Gorsachius leuconotus</i> (White-backed Night Heron)	Least Concern	Vulnerable	Clear well- vegetated perennial rivers. Prefers lowland rivers to Highveld rivers.	Unlikely to occur
<i>Gyps africanus</i> (White-backed Vulture)	Critically Endangered	Critically Endangered	Breed on tall, flat-topped trees. Mainly restricted to large rural or game farming areas	Irregular and opportunistic foraging visitor.
<i>Gyps coprotheres</i> (Cape Vulture)	Endangered	Endangered	Varied but breeds on steep south or east facing cliffs.	Irregular and opportunistic foraging visitor.
<i>Leptoptilos crumeniferus</i> (Marabou Stork)	Least Concern	Near- threatened	Varied, often near surface water or feeding on carcasses.	A vagrant to the study area.
<i>Mirafra cheniana</i> (Melodious Lark)	Near- threatened	Least Concern	A species with a preference for open dry "climax" <i>Themeda triandra</i> grassland or open primary grassland dominated by sour wiry grasses on well drained sandy substrates.	A rare resident, probably absent.





Species	Global Conservation Status (IUCN 2016)	National Conservation Status (SA Red Data 2016)	Preferred Habitat	Potential Likelihood of Occurrence
<i>Mycteria ibis</i> (Yellow-billed Stork)	Least Concern	Endangered	Prefers shoreline habitat bordering large impoundments and extensive wetland systems.	Vagrant to the study area.
<i>Oxyura maccoa</i> (Maccoa Duck)	Near- threatened	Near- threatened	Large saline pans and shallow impoundments.	Unlikely to occur
<i>Phoenicopterus minor</i> (Lesser Flamingo)	Near- threatened	Near- threatened	Restricted to large saline pans and other inland water bodies.	Unlikely to occur
<i>Phoenicopterus ruber</i> Greater Flamingo)	Least Concern	Near- threatened	Restricted to large shallow pans and other inland water bodies.	Unlikely to occur
<i>Polemaetus bellicosus</i> (Martial Eagle)	Vulnerable	Endangered	Varied, from open karroid shrub to lowland savanna.	Vagrant to the study area.
<i>Sagittarius serpentarius</i> (Secretarybird)	Vulnerable	Vulnerable	Prefers open grassland or lightly wooded habitat.	Uncommon and irregular foraging visitor.
<i>Pterocles gutturalis</i> (Yellow-throated Sandgrouse)	Least Concern	Near- threatened	Prefers open grassland or agricultural land on vertic soils	Unlikely to utilise study area, although known to fly overhead.
<i>Torgos tracheliotus</i> (Lappet-faced Vulture)	Endangered	Endangered	Lowveld and Kalahari savanna; mainly on game farms and reserves	Vagrant to the study area.
<i>Tyto capensis</i> (African Grass- owl)	Least Concern	Vulnerable	Prefers rank moist grassland that borders drainage lines or wetlands.	Unlikely to occur

Species indicated in the table above all have historic records in the general area, species such as storks and birds of prey whom were recorded opportunistically. These depend on food items that must be available most often in areas such as reserves or game farms and will travel long distances to find these food items. These species are common in the nearby Pilansberg National Park and could frequent the proposed Sun City Chairlift Project area.

#### 4.4.3 Herpetofauna

According to Du Preez and Carruthers (2009), frogs occur throughout every habitat within Southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore a collection of amphibians associated with the Savanna Biome will all choose to breed under the prevailing biotic and abiotic features present. Further niche differentiation is encountered

by means of geographic location within the biome, this differentiation includes, banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the area of interest.

No reptile or amphibian species were encountered during this field survey even though active searching was employed. The expected reptile species for the area can be found in Appendix G.

#### *Amphibians*

A total of 18 taxa are known to occur in the study area (QDS 2527AC; Minter *et al.*, 2004) of which 12 could occur on the study site (Appendix 2) based on the presence of suitable habitat. In addition, five of these are believed to be irregular visitors on passage during exceptionally high precipitation events. Those species with a high probability of occurrence include dispersing individuals of *Amietophrynus gutturalis* (Gutteral Toad), *Schismaderma carens* (Red Toad), *Kassina senegalensis* (Bubbling Kassina), *Tomopterna cryptotis* (Tremolo Sand Frog) and *Cacosternum boettgeri* (Boettger's Caco).

Currently, none of the frog species likely to occur (Appendix D) is of any conservation significance (see Measey, 2010).

#### *Reptiles*

Forty-nine (49) reptile taxa (comprising of two chelonians, 28 snakes, 15 lizards, three gecko species and one chameleon; Appendix E) could occur on the study area. Twenty-six (26) species have been recorded from QDG 2527AC that overlaps with the study site (information obtained from the South African Reptile Conservation Assessment (SARCA) (Appendix E).

The outcrops associated with the mountain bushveld provide the highest reptile richness when compared to the other floristic units. None of the species likely to occur is threatened or near-threatened.

#### **4.4.4 Invertebrates**

During the field survey, selected invertebrates were recorded using a butterfly net and opportunistic observation and photographed where possible. In support of this, transects were walked along the roads, vegetation types, and bushveld areas in order to identify any scorpion or spider nests.

The diversity and density of the invertebrates was relatively low for the proposed Sun City Chairlift Project footprint area and surroundings, however this in general could assist in providing an indication of the health of the regional ecology. Although livestock have modified the general area, there is sufficient habitat that still remains to sustain moderate populations of the typical bushveld/savanna species of fauna. The study area is not known to overlap with the known distribution range of any threatened or near-threatened butterfly species as assessed by Mecenero *et al.* (2013). According to Mecenero *et al.* (2013), approximately 70 species could be present on the study area consisting of six skippers (Hesperiidae), 28 blues



(Lycaenidae), 22 "brush-footed" butterflies (Nymphalidae), two swallowtails (Papilionidae) and 12 whites (Pieridae).

Dominant species include members of the genus *Junonia* (*J. hierta* & *J. oenone*), *Vanessa cardui*, *Papilio demodocus*, *Belenois aurota*, *Catopsilia florella*, *Colotis evagore*, *Eurema brigitta*, *Danaus chrysippus*, *Charaxes jasius*, *Tuxentius melaena*, *Tarucus sybaris*, *Leptotes pirithous*, *Lampides boeticus* and *Anthene definita*.

The rocky soils and outcrops associated with the mountain bushveld provide habitat for the stenotopic (habitat specialist) rock scorpion *Hadogenes troglodytes* and burrowing scorpion *Opisthophthalmus glabrifrons*. Both species are currently protected by Schedule B1 of the list of threatened and protected species issued in terms of Section 56(1) of the NEM: BA.

#### 4.5 Identification of Environmental Sensitivities

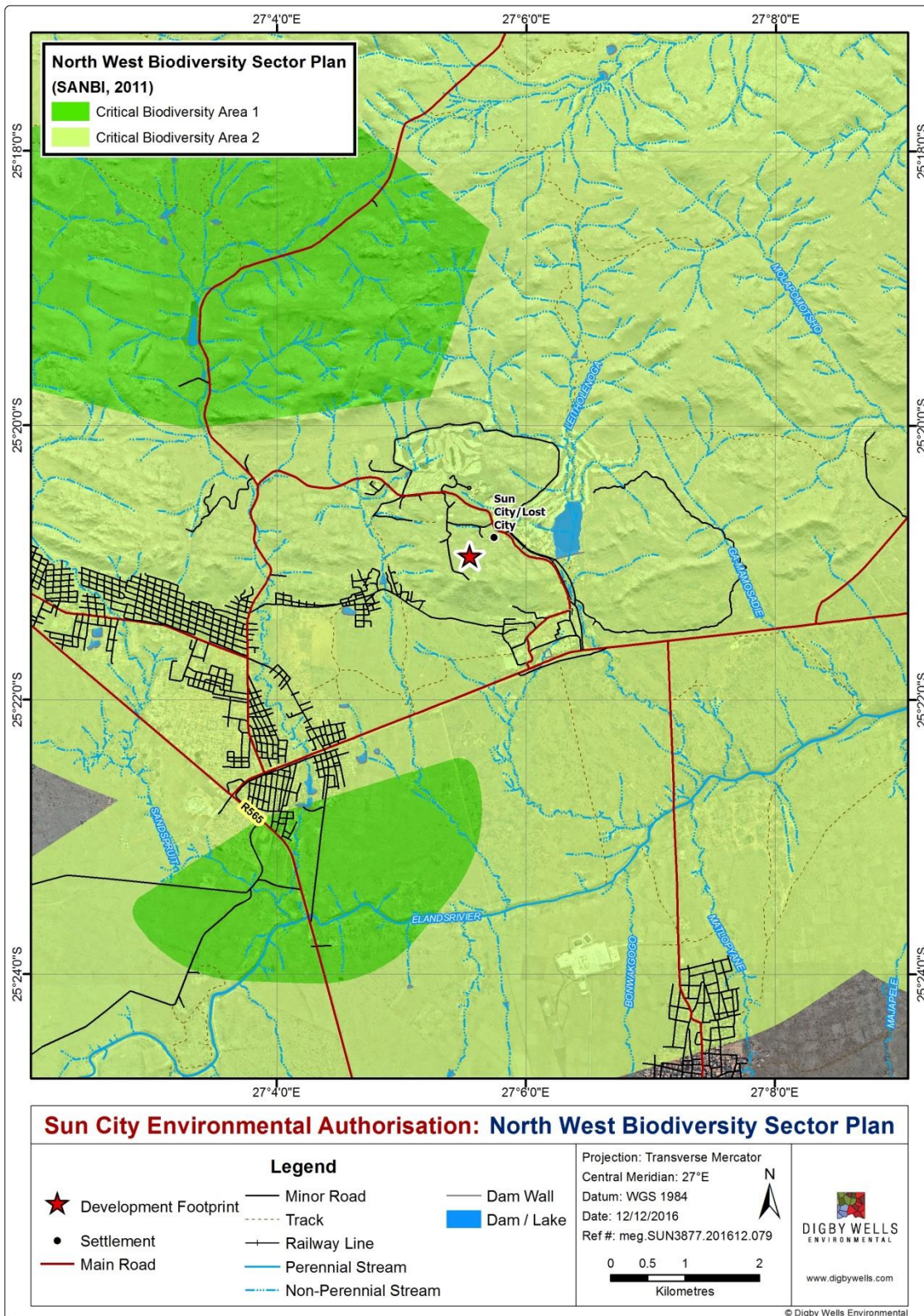
In terms of ecological sensitivity, the following features are assessed to determine how sensitive the habitat identified within the site is:

- Presence or absence of Red Data Listed or protected plant and animal species;
- Presence or absence of exceptional species diversity;
- Extent of intact habitat in good ecological condition in the absence of disturbance; and
- Presence or absence of important ecosystems such as Important Bird Areas (IBA's), Protected Areas, areas demarcated for future protected area status (NPAES) and wetlands.

The proposed Sun City Chairlift Project area has undergone a small degree of disturbance due to livestock grazing, resulting in the establishment of bush encroachment. The proposed Sun City Chairlift Project site falls within a Critical Biodiversity area 2 (Figure 4-10) as far as regional ecological importance is concerned (North West Biodiversity Sector Plan; 2014)

Land management objectives of areas classified as CBA 2 are:

- Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process:
- Ecosystems and species fully or largely intact and undisturbed;
- Areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs; and
- These are biodiversity features that are approaching but have not passed their limits of acceptable change.



**Figure 4-10: North West Biodiversity Sector Plan (2014)**



#### 4.5.1 Important Bird Areas

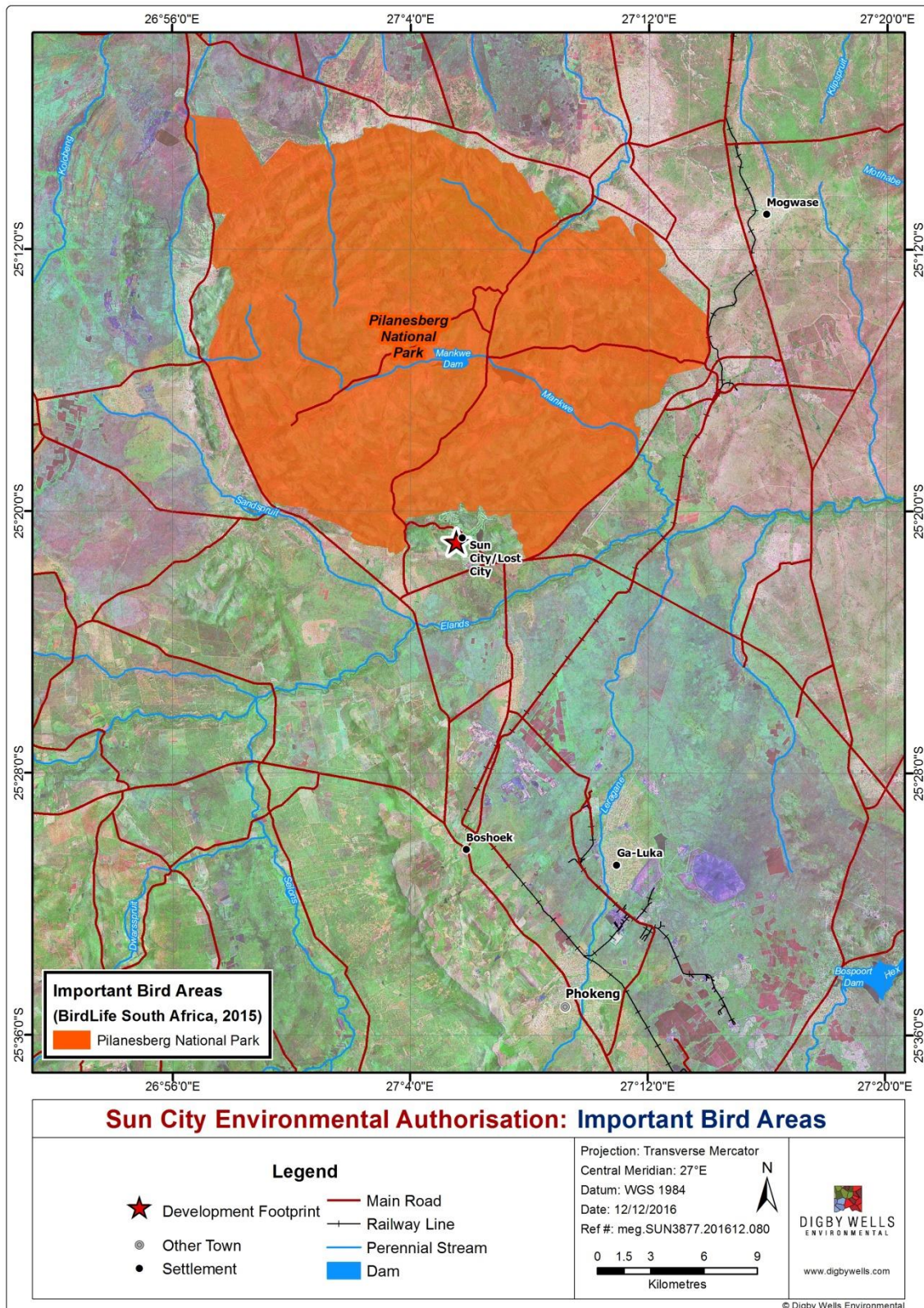
An IBA is an area recognised as being globally important habitat for the conservation of bird populations. Currently there are about 10,000 IBAs worldwide. At present, South Africa has 124 IBA's, covering over 14 million hectares of habitat for our threatened, endemic and congregatory birds. Yet only a million hectares of the total land surface covered by our IBA's is legally protected. The BirdLife SA IBA programme continues a programme of stewardship which will ultimately achieve formal protection (Birdlife, 2013). The Pilansberg National Park IBA occurs north of the project site.

Managed by North West Parks and Tourism Board, Pilanesberg National Park lies approximately 160 km north-west of Johannesburg. It covers a wide range of habitats, including vleis, lakes, streams, thick bush, broad-leaved and acacia woodland, koppies, open grasslands and former farmlands.

More than 300 species occur in the park, thanks to its extensive range of habitats and the fact that it lies in the overlap between the dry western and wet eastern parts of the country. The site lies midway between the Cape Vulture (*Gyps coprotheres*) colonies in the Magaliesberg and the Waterberg and Cape Vultures periodically forage in it. Small numbers of White-backed Vulture (*G. africanus*) and Lappet-faced Vulture (*Torgos tracheliotus*) also occasionally visit it. Pilanesberg supports several breeding pairs of Verreaux's Eagle (*Aquila verreauxii*), and other raptors, such as Wahlberg's Eagle (*Hieraaetus wahlbergi*), African Hawk Eagle (*Aquila spilogaster*), Brown Snake Eagle (*Circaetus cinereus*), Black-chested Snake Eagle (*C. pectoralis*) and Lanner Falcon (*Falco biarmicus*), occur in small numbers. Individual Martial Eagles (*Polemaetus bellicosus*), Bateleurs (*Terathopius ecaudatus*) and Tawny Eagles (*Aquila rapax*) occasionally visit. Mankwe River holds small populations of African Finfoot (*Podica senegalensis*). White-backed Night Heron (*Gorsachius leuconotus*) is an occasional visitor. A large vlei with mixed grassland at the eastern end of Mankwe Dam provides habitat for African Grass Owl (*Tyto capensis*).

The surrounding woodland–grassland mosaic is known to hold Secretarybird (*Sagittarius serpentarius*) and Kori Bustard (*Ardeotis kori*). Other threatened species occasionally seen are European Roller (*Coracias garrulous*) and Yellow-throated Sandgrouse (*Pterocles gutturalis*). Black Stork (*Ciconia nigra*), Marabou Stork (*Leptoptilos crumeniferus*) and Yellow-billed Stork (*Mycteria ibis*) occur as occasional visitors. Other woodland specials include Monotonous Lark (*Mirafraga passerina*), Southern Pied Babbler (*Turdoides bicolor*) White-throated Robin-chat (*Cossypha humeralis*), Kalahari Scrub Robin (*Erythropygia paeon*), Burnt-necked Eremomela (*Eremomela usticollis*), Striped Pipit (*Anthus lineiventris*), Barred Wren-Warbler (*Calamonastes fasciolatus*), Marico Flycatcher (*Bradornis mariquensis*), Crimson-breasted Shrike (*Laniarius atrococcineus*), Great Sparrow (*Passer motitensis*), Scaly-feathered Finch (*Sporopipes squamifrons*), Violet-eared Waxbill (*Uraeginthus granatinus*), Black-faced Waxbill (*Estrilda erythronotos*) and Shaft-tailed Whydah (*Vidua regia*).



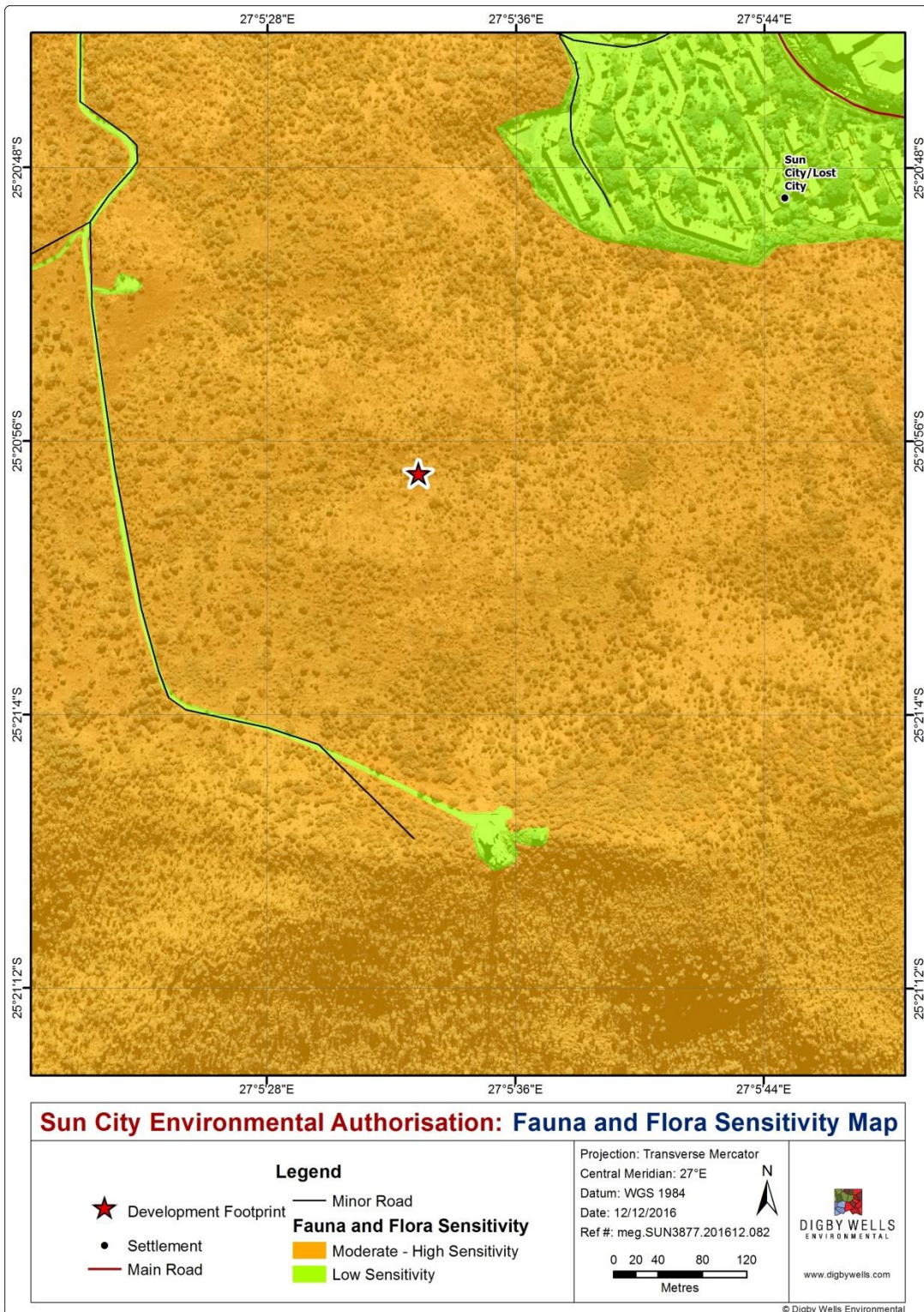


**Figure 4-11: Important bird Areas in relation to the proposed Sun City Chairlift Project site**

## 4.6 Site Specific Sensitivity

The proposed Sun City Chairlift Project site consists of intact and relatively undisturbed Zeerus thornveld (Endemic), within this vegetation type three species of special concern was encountered. Due to the extent of this vegetation type and the minimal impact that the activities of the construction and operational will have on the biophysical environment; this site was assigned and medium high sensitivity rating (Figure 4-12).





**Figure 4-12: Site Specific Sensitivity Plan**

#### 4.6.1 Comments and Responses Trail

No comments have been received to date. Should any comments be submitted during the PPP specific responses will be addressed and the report updated as soon as these are received.

## 5 Impact Assessment

### 5.1 Methodology

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

The significance rating process follows the established impact/ risk assessment formula:

$$\text{Significance} = \text{Consequence} \times \text{Probability} \times \text{Nature}$$

Where

$$\text{Consequence} = \text{Intensity} + \text{Extent} + \text{Duration}$$

And

$$\text{Probability} = \text{Likelihood of an impact occurring}$$

And

$$\text{Nature} = \text{Positive (+1) or negative (-1) impact}$$

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 5-3. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 5-2, which is extracted from Table 5-1. The description of the significance ratings is discussed in Table 5-3.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

**Table 5-1: Impact Assessment Parameter Ratings**

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and/or social benefits which have improved the overall conditions of the baseline.	<u>International</u> The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	<u>National</u> Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain/Highly probable: It is most likely that the impact will occur. <80% probability.



Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	<u>Province/Region</u> Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures/items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	<u>Municipal Area</u> Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	<u>Local</u> Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	<u>Limited</u> Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare/improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and/or social benefits felt by a very small percentage of the baseline.	<u>Very limited/Isolated</u> Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely/None: Expected never to happen. <1% probability.

**Table 5-2: Probability/Consequence Matrix**

		Significance																																					
		-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					


**Table 5-3: Significance Rating Description**

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/ or social) environment.	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and/ or social environment.	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and/ or social environment.	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment.	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and/ or social environment.	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and/ or social) environment and result in severe changes.	Moderate (negative) (-)

Score	Description	Rating
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

## 5.2 Project Activities

The following activities are envisioned for each of the project phases:

- Construction:
  - Site establishment;
  - Site clearing, including the removal of topsoil and vegetation;
  - Construction of Pylons.
- Operational:
  - Operation of chairlift.

## 5.3 Impact Assessment

### 5.3.1 Construction Phase

#### 5.3.1.1 Project Activities, Site Clearing

The construction of the chairlift and ablation facilities will focus on low impact construction methods. The construction duration is expected not to exceed eight months. No labour camp will be established, and a bowser will be used to cart construction water to the site on a daily basis. The existing road to the top of the mountain will be used to gain access to the top station, ablation facility site and pylons. No new or additional access roads will be created. All equipment and construction material will be hand carted to the pylon sites.

The clearing and trimming of trees and vegetation will be kept to a minimum with a platform created at each pylon, and a trail between the pylons, that will become the permanent access for maintenance purposes. Natural bioengineering methods will be used to control erosion.

During the construction phase (construction of surface infrastructure), mountain bushveld vegetation type, present on steep rocky slopes and more moderate footslopes will be impacted on. The impact of loss of mountain bushveld (assigned a medium-high sensitivity) will have negative impacts on biodiversity on a localised scale. It is not anticipated that any plant SSC will be lost, as these must be avoided during the planning phase of this project. Should any

plant SSC be recorded within the infrastructure development footprint area, it should be reported to the relevant authorities and a relocation strategy must be compiled. Once all permits are in place, such species may be relocated.

**Table 5-4: Interactions and Impacts**

Interaction	Impact
Site clearing	Loss of Mountain Bushveld on steep slopes and Mountain Bushveld on moderate slopes.
	Habitat fragmentation and edge effects.

### **5.3.1.2 Impact Description**

For site clearing, the Mountain Bushveld has been rated as moderately high sensitivity and will be negatively impacted on, through tree removal and pruning to accommodate the Chairlift and associated infrastructure. The Mountain Bushveld represents a ubiquitous habitat that shows moderately high ecological sensitivity and as a result, the intensity of the impact was rated as minor. Further to this, the extent of the impact is limited to a very small area and will not have considerable negative impacts on overarching biodiversity of the site.

### **5.3.1.3 Management Objectives**

The objective of management measures is to ensure that the impact to habitat is restricted only to the footprint area and that protected plant species are not affected through construction and AIPs invasion does not take place as a result of development.

### **5.3.1.4 Management Actions and Targets**

In addition, the following mitigation and management measures have been prescribed:

- The footprint area should be kept as small as possible;
- Existing access roads should be used to reach the site for clearing and vehicles should not be allowed to traverse natural areas or leave the demarcated road, it has been established that no access roads will be constructed and materials will be moved by hand from the existing road;
- As plant SSC is present in the proposed Sun City Chairlift Project area, specifically *Spirostachys africana*, (Tambotie), *Boophane disticha* (Poison Bulb) and *Sclerocaria birrea* (Maroela), care must be taken not to disturb these plant species. As pruning of protected trees are a restricted activity that requires a permit from the Provincial authority, the trees that will be affected must be quantified and permits must be obtained; and
- An AIPs Management Plan should be implemented, whereby the disturbed site is monitored quarterly for at least two years to ensure that AIPs does not take place.

Currently bush encroachment is an issue on the lower slopes of the proposed Sun City Chairlift Project area, this problem is likely to spread of uncontrolled grazing in allowed to continue in controlled.

### 5.3.1.5 Impact Ratings

The impacts of the construction phase are rated in the table below.

**Table 5-5: Potential Impacts of the Construction Phase – Loss of Habitat/Vegetation Types**

Dimension	Rating	Motivation	Significance
<b>Site Clearing</b>			
<b>Impact Description:</b> Loss of Mountain Bushveld on steep slopes and Mountain Bushveld on moderate slopes			
<b>Prior to Mitigation/Management</b>			
<b>Duration</b>	Medium-term (3)	Limited native vegetation will be removed for surface infrastructure and the impact will be permanent, but reversible. Fauna species will move away with no permanent impact on them.	Minor (negative) 49
<b>Extent</b>	Very limited (1)	The area to be cleared is minor in comparison to the extent of the vegetation unit, as well as the extent of the total study area. No faunal SSC was encountered in the area of disturbance; therefore no direct impact is expected.	
<b>Intensity x type of impact</b>	Moderate (-3)	Since the vegetation unit has been assigned moderate-high ecological sensitivity and the area coincides with CBA1, the impact is not regarded as particularly significant for terrestrial biodiversity.	
<b>Probability</b>	Certain (7)	Clearing of vegetation will definitely take place for the establishment of infrastructure, but this will take place on very limited areas.	
<b>Nature</b>	Negative	The impact will be negative.	
<b>Mitigation/Management Actions</b>			





Dimension	Rating	Motivation	Significance
<ul style="list-style-type: none"> <li>Rehabilitation of the disturbed area should take place after construction, whereby a mixture of native grass species harvested from climax <i>Themeda</i> grassland and native grass species (such as <i>Cynodon dactylon</i>) are planted immediately to prevent erosion, this must be completed soon after construction stops to avoid erosion from the steep slopes that the project is located on;</li> <li>The footprint area should be limited as far as possible; and</li> <li>Protected species, <i>Spirostachys africana</i>, Tambotie, <i>Boophane disticha</i>, Poison Bulb and <i>Sclerocaria birrea</i>, Maroela are present at the site, all effort must be made to avoid disturbance of these species.</li> </ul>			
<b>Post-Mitigation</b>			
<b>Duration</b>	Project Life (3)	The area will return to natural if the chairlift is removed.	Minor (negative) 35
<b>Extent</b>	Very limited (1)	The area to be cleared is minor in extent.	
<b>Intensity x type of impact</b>	Minimal (1)	No loss of SSC or the moderate-high sensitive vegetation type is expected.	
<b>Probability</b>	Likely (7)	This impact will occur.	
<b>Nature</b>	negative	The impact will be negative.	

**Table 5-6: Potential Impacts of the Construction Phase –Alien plant Invasion**

Dimension	Rating	Motivation	Significance
<b>Site Clearing</b>			
<b>Impact Description:</b> Alien plant invasion			
<b>Prior to Mitigation/Management</b>			
<b>Duration</b>	Medium-term (3)	Habitat fragmentation and AIPs invasion will take place on a small scale	Minor (negative) 54
<b>Extent</b>	Limited (2)	AIPs will establish around disturbed areas associated with the construction phase.	
<b>Intensity x type of impact</b>	Serious (4)	AIPs invasion is a serious problem with significant ecological consequences; hence its reference in the NEM: BA and CARA legislation.	



Dimension	Rating	Motivation	Significance
<b>Probability</b>	Highly probable (6)	Since AIPs have already been recorded on site, the spread of these species due to disturbance will invariably take place. The seedbank in the soil will contain alien species.	
<b>Nature</b>	negative	The impact will be negative	
<b>Mitigation/Management Actions</b>			
<ul style="list-style-type: none"> <li>▪ An AIPs Management Plan should be compiled and implemented.</li> </ul>			
<b>Post-Mitigation</b>			
<b>Duration</b>	Medium-term (3)	As seedlings emerge, they will be removed bi-annually as part of an AIPs Management Plan.	Minor (negative) 42
<b>Extent</b>	Limited (2)	AIPs will establish around disturbed areas associated with the construction phase.	
<b>Intensity x type of impact</b>	Minimal (1)	AIPs invasion is serious for terrestrial biodiversity; however, if these species are controlled timeously, the impact will be reduced.	
<b>Probability</b>	Likely (7)	Since AIPs have already been recorded on site, the spread of these species due to disturbance will invariably take place. The seedbank in the soil will contain alien species.	
<b>Nature</b>	Negative	The impact will be negative	

### 5.3.2 Operations Phase

#### 5.3.2.1 Project Activities Assessed

During the operational phase of the development, the chairlift will be in use by guests. No planned loss of habitat or flora species are expected, however the chairlift cable does pose a collision risk for birds, specifically slow flying large bodied species. The only activity that is considered at this time is increased human activities on the site.

### **5.3.2.2 Impact Description**

Due to increased human movement on site, fauna may be disturbed due to noise and litter. Due to the presence of large bodied birds that are known to occur in the Pilansberg National Park and Waterbirds form the Sun City lake, these include, Cape Vulture (*Gyps coprotheres*), White-backed Vulture (*G. africanus*), Lappet-faced Vulture (*Torgos tracheliotus*), Verreaux's Eagle (*Aquila verreauxii*), Wahlberg's Eagle (*Hieraaetus wahlbergi*), African Hawk Eagle (*Aquila spilogaster*), Brown Snake Eagle (*Circaetus cinereus*), Black-chested Snake Eagle (*C. pectoralis*). As these birds are known to forage over large areas the possible interaction between them and the cables, suspended chairs and supporting pylons must be quantified.

### **5.3.2.3 Management Objectives**

The objective of management measures is to ensure that littering does not take place and faunal disturbance is kept to a minimum. Furthermore the objective is to ensure that no bird collisions take place.

### **5.3.2.4 Management Actions and Targets**

Signage should be erected to indicate an expected plant and animal species, and that no disturbance of these is allowed. Bird deflectors must be installed on cables, chairs and pylons to make the structures visible to birds in flight.

### **5.3.2.5 Impact Ratings**

The impacts of the operational phase are rated in the table below.

**Table 5-7: Potential Risks of the Operational Phase disturbance to fauna including birds**

Dimension	Rating	Motivation	Significance
<b>Increased vehicular movement and noise on site</b>			
<b>Impact Description:</b> Disturbance to fauna on site (noise, litter), including bird collisions			
<b>Prior to Mitigation/Management</b>			
<b>Duration</b>	Project life (5)	The impact will last for the project life.	<b>Moderate (negative) 84</b>
<b>Extent</b>	Municipal area (4)	The extent could affect breeding pairs within the Pilansberg National Park, even though surface infrastructure is minimal.	
<b>Intensity x type of impact</b>	Limited (-5)	Certain Red Data avifauna species are expected to be at risk but the impact will not be frequent.	



Dimension	Rating	Motivation	Significance
<b>Probability</b>	Highly probable (6)	This is a commonly observed impact but it is not definite.	
<b>Nature</b>	negative	The impact will be negative.	
<b>Mitigation/Management Actions</b>			
<ul style="list-style-type: none"> <li>▪ Install bird deflectors on cables, chairs and pylons to make the structures visible to birds in flight;</li> <li>▪ Erect signage on site;</li> <li>▪ Adhere to designated areas; and</li> <li>▪ Ensure guest know that feeding of/interaction with animals are not allowed.</li> </ul>			
<b>Post-Mitigation</b>			
<b>Duration</b>	Project Life (5)	The impact will last for the project life.	Negligible(negative) 24
<b>Extent</b>	Municipal Area (4)	The extent is limited since surface infrastructure is minimal.	
<b>Intensity x type of impact</b>	Moderate (3)	Vvry few Red Data avifauna species are expected to be at risk and the impact will not be frequent.	
<b>Probability</b>	Rare (2)	Animals would have moved away by this time.	
<b>Nature</b>	negative	The impact will be negative.	

## 5.4 Cumulative Impacts

The greater study area has in parts been impacted due to historical agriculture and livestock farming and current impacts that accompanies the operation of the Sun City Resort. The cumulative effects of the proposed Sun City Chairlift Project construction will affect the areas available for grazing and browsing that wild herbivores need for survival, it will however not be a severe impact due to the small footprint of the actual disturbance areas or pylons. The ecosystem functioning and services that are currently produced in the area could be impaired or reduced in small areas; these include food and shelter for the animals.

The footprint of the proposed pylons and base stations areas and access roads will impact minimally on the ecosystem services and present habitats such as mountain Bushveld.

## 6 Legislative and Permit Requirements

As protected plant species were encountered on site, these species must firstly be avoided as far as possible thereafter permits can be applied for from the relevant provincial department (North West Department of Rural Environment and Agricultural Development) for translocation consideration. This report is compiled in accordance with the Environmental Impact Assessment (EIA) Regulations (2014) under the National Environmental Management Act, 1998 (Act No. 107 of 1998), as set out in the schedule under Government Gazette Notice 38282 and The National Environmental Management Biodiversity Act (Act No. 10 of 2004) (NEM: BA) affords threatened or protected species a legal status and protection.

Protected tree permits must be obtained from Department of Agriculture, Forestry and Fisheries (DAFF) for the plant species regarded as protected that could be disturbed.

## 7 Environmental Management Programme Inputs

### 7.1 AIPS Monitoring

AIPs were recorded on site. If the development is to go ahead, AIP monitoring and implementation of control/ eradication measures should take place. Monitoring, eradication and control should be initiated after constructed and should take place annually for two years to ensure that AIPs area completely removed.

### 7.2 Protected Plant Species

The presence of protected plant species has been proven in this assessment, it is therefore required that all infrastructure areas be walked through by an experienced ecologist prior to construction to mark any protected plant species that may be present in the infrastructure placement areas.

### 7.3 Avifauna Monitoring

As the risk of bird collisions are discussed in this report as a probable impact, the efficacy of the mitigation measures stipulated here must be quantified through monitoring of Avifauna species that occur on the Sun City property that could be affected by the chairlift.

## 8 Conclusion and Recommendations

The study area falls within the Zeerust Thornveld vegetation type unit (Mucina and Rutherford, 2006). Vegetation was largely woodland/ bushveld vegetation and mostly comprised of *Dichrostachys cinerea/ Aristida congesta barbicolis* and *Gymnospora senegalensis* bushveld.

More Red Data Listed species may be located within or close to the site, as certain species were evident during the survey. It is therefore recommended that a screening for Red Data Listed Plants take place prior to site clearance, during the rainy season to identify, mark and apply for required permits to relocate/ destroy such species where impacts cannot be avoided, as soon as the final layout of the Chairlift is available.

Protected tree permit application must be compiled and submitted to DAFF. No protected trees can be removed, pruned, destroyed or relocated without a Protected Permit. Depending on the total number of trees present and impacted, offsets might be required. Engagement with authorities is therefore recommended once a detail protected tree assessment have been conducted and permit application completed. It is suggested that the protected species be included in the rehabilitation plan species list.

The proposed development will result in the loss of moderate ecologically sensitive habitat in the form of Mountain Bushveld. It is recommended that species of special concern be managed and specific mitigation measures described in this assessment are adhered to. The presence of the Pilansberg National Park and associated protected and large bodied birds is a risk that must be managed as stipulated in this report. The overall impact of the chairlift and will be moderate to low, if strict adherence to mitigation measures is followed.

## 9 Final Statement by the Specialist

### 9.1 Recommended Conditions to be included in Environmental Authorisation

Since the majority of the site is of moderate-high ecological sensitivity, it is of the specialist's opinion should the project proceed then the ecological aspects related to the impact assessment can be managed accordingly. Mitigation and management measures described in this report should be strictly followed. As not all plant species on site were encountered during the flora survey, it is possible that additional Red Data species could have been missed. It is strongly recommended that an additional flora Red Data survey is conducted prior to the clearing of any habitat associated with the site.

Permit Application for the removal/ relocation and/ or destruction of any Red Data Plants, as well as protected trees will be required. It is therefore recommended that such permits are applied for and submitted to relevant authorities (DAFF and North West Department of Rural Environment and Agricultural Development) prior to commencement of any vegetation clearing.





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## Appendix A: CV

Mr. Rudolph Greffrath  
Senior Fauna and Flora Specialist  
Biophysical Department  
Digby Wells Environmental

### 1. Education

2005: B-tech Degree in Nature Conservation, Nelson Mandela Metropolitan University (NMMU).

2001- 2004: Diploma in Nature Conservation, Nelson Mandela Metropolitan University (NMMU).

### 2. Professional Registration

South African Council for Natural Scientific Professions (Membership No. 200245/13).

IAIA, International Association for Impact assessments;

Botanical Society of South Africa.

### 3. Employment

2006 – Present: Digby Wells Environmental, Johannesburg, South Africa.

2002 - 2003: Shamwari Game Reserve, Eastern Cape, South Africa.

2001: Kop-Kop Geotechnical instrumentation specialists, Johannesburg, South Africa.

### 4. Experience

Rudi's current role is that of a fauna and flora specialist, in this capacity he is responsible for planning and conducting fauna and flora impact assessments, including surveys/studies that are either completed in support of environmental authorisations or are focused specialist studies which meet local and international standards. In addition to this, Rudi is responsible for compiling Biodiversity Land Management Programs where different specialist studies are collated into a working document for clients in order to aid in pre or post mining management. He is also involved in rehabilitation studies which entail the planning, implementation and monitoring of vegetative rehabilitation in designated areas on mines. Rudi also fulfils the role of project manager for selected projects; here he manages national and international projects across Africa, specifically west, central and southern Africa, managing a multi-disciplinary team of specialists.

Rudi is also involved in the acquisition of permits for landowners, this includes the planning of relocation strategies for protected and endangered plant species in areas where mines are to be established. This involves the planning and execution of data gathering surveys, thereafter

he manages the process involving relevant provincial and National authorities in order to obtain the specific permit that allows for a development to continue.

Information pertaining to the technical expertise of Rudi includes the following:

Environmental Impact Assessments (EIAs), Basic Assessments and Environmental Management Plans (EMPs) for environmental authorisations in terms of the South African National Environmental Management Act (NEMA), 1998 (Act 107 of 1998);

Environmental pre-feasibility studies for gold tailings reclamation and iron ore mining projects;

Biodiversity Assessments including Mammalia, Avifauna, Herpetofauna and Arthropoda;

Impact assessments based on the terrestrial environment;

Biodiversity and Land Management Programs;

Protected plant species management strategies planning and implementation;

Monitoring of rehabilitation success through vegetation establishment;

Rehabilitation planning;

Environmental auditing of rehabilitated areas;

Project management of ecological specialist studies;

Planning and design of Rehabilitation off-set strategies.

## 5. Training

Measurements of Biodiversity at the University of the Free State, led by Prof. M. T. Seaman. September 2008.

Bird Identification course led by Ettiene Maraise November 2009.

Introduction to VEGRAI and Eco-classification led by Dr. James Mackenzie December 2009.

Dangerous snake handling and snake bite treatment with Mike Perry 2011.

Rehabilitation of Mine impacted areas, with Fritz van Oudshoorn, Dr Wayne Truter and Gustav le Roux 2011.

## 6. Projects

The following project list is indicative of Rudi's experience, providing insight into the various projects, roles and locations he has worked in.

Project	Location	Client	Main project features	Positions held	Activities performed
Mmamabula Energy Project (MEP).	Botswana	CIC energy	Construction of a railway, opencast mine, wellfield,	Ecologist	Fauna and Flora surveys for the project features,



Project	Location	Client	Main project features	Positions held	Activities performed
			conveyors, addits, housing.		including impact assessments, management plans. Alien eradication plans.
Tongan Biodiversity Land Management Plan	Ivory Coast	Randgold	Design, compilation and implementation of the BLMP	Ecologist, Project Manager	Fauna and Flora surveys for the BLMP, compilation of BLMP. Alien eradication plans.
Kibali Gold mine	DRC Congo	Randgold	Gold mine infrastructure	Ecologist	Fauna and Flora surveys for the project features, including impact assessments, management plans.
Nzoro Hydroelectric station	DRC Congo	Randgold	Hydroelectric plant	Ecologist	Fauna and Flora surveys for the project features, including impact assessments, management plans.
Loulo Biodiversity Land Management Plan	Mali	Randgold	Design, compilation and implementation of the BLMP	Ecologist, Project Manager	Fauna and Flora surveys for the project features,





Project	Location	Client	Main project features	Positions held	Activities performed
					compilation of BLMP.
Koidu Diamond Mine	Sierra Leone	Koidu Resources	Construction of new open pit	Ecologist	Fauna and Flora surveys for the project features, including impact assessments, management plans. Alien eradication plan.
Resource Generation	South Africa	Temo Coal	Coal mine/Railway Line	Ecologist	Fauna and Flora surveys, Protected plant species management plans, Permitting and Rehabilitation design.
Impunzi Rehabilitation monitoring	South Africa	Glencore	Monitoring of rehabilitation success and suggested management measures	Flora specialist, Project manager	Vegetation surveys, rehabilitation monitoring. Alien eradication plan.

## 7. Publications

Biodiversity Action Plans for faunal habitat maintenance and expansion in mining. Poster presented at the 48th Annual Grassland Society of Southern Africa (GSSA) conference.



### Appendix B: Expected Plant List

Family	Species	Threat status	SA Endemic
ACANTHACEAE	<i>Barleria bremekampii</i> Oberm.	LC	No
ACANTHACEAE	<i>Barleria pretoriensis</i> C.B.Clarke	LC	No
ACANTHACEAE	<i>Blepharis serrulata</i> (Nees) Ficalho & Hiern	LC	No
ACANTHACEAE	<i>Crabbea angustifolia</i> Nees	LC	No
ACANTHACEAE	<i>Justicia betonica</i> L.	LC	No
ACANTHACEAE	<i>Justicia flava</i> (Vahl) Vahl	LC	No
ACANTHACEAE	<i>Ruellia cordata</i> Thunb.	LC	No
ACANTHACEAE	<i>Ruelliosis setosa</i> (Nees) C.B.Clarke	LC	No
ACANTHACEAE	<i>Thunbergia atriplicifolia</i> E.Mey. ex Nees	LC	No
ACANTHACEAE	<i>Thunbergia neglecta</i> Sond.	LC	No
AMARANTHACEAE	<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Not Evaluated	No
AMARANTHACEAE	<i>Aerva leucura</i> Moq.	LC	No
AMARANTHACEAE	<i>Gomphrena celosioides</i> Mart.	Not Evaluated	No
AMARANTHACEAE	<i>Hermbstaedtia odorata</i> (Burch.) T.Cooke var. <i>albirosea</i> Suess.	LC	No
ANACARDIACEAE	<i>Ozoroa paniculosa</i> (Sond.) R. & A.Fern. var. <i>salicina</i> (Sond.) R. & A.Fern.	LC	No
ANACARDIACEAE	<i>Searsia discolor</i> (E.Mey. ex Sond.) Moffett	LC	No
ANACARDIACEAE	<i>Searsia lancea</i> (L.f.) F.A.Barkley	LC	No
ANACARDIACEAE	<i>Searsia pallens</i> (Eckl. & Zeyh.) Moffett	LC	No
ANACARDIACEAE	<i>Searsia pyroides</i> (Burch.) Moffett var. <i>gracilis</i> (Engl.) Moffett	LC	No
ANTHERICACEAE	<i>Chlorophytum galpinii</i> (Baker) Kativu var. <i>galpinii</i>	LC	No
ANTHERICACEAE	<i>Chlorophytum transvaalense</i> (Baker) Kativu	LC	No
APIACEAE	<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schtdl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H.Wolff	LC	No
APOCYNACEAE	<i>Acokanthera oppositifolia</i> (Lam.) Codd	LC	No
APOCYNACEAE	<i>Ancylobotrys capensis</i> (Oliv.) Pichon	LC	No
APOCYNACEAE	<i>Asclepias aurea</i> (Schltr.) Schltr.	LC	No
APOCYNACEAE	<i>Asclepias fallax</i> (Schltr.) Schltr.	LC	No
APOCYNACEAE	<i>Aspidoglossum lamellatum</i> (Schltr.) Kupicha	LC	No
APOCYNACEAE	<i>Cryptolepis oblongifolia</i> (Meisn.) Schltr.	LC	No
APOCYNACEAE	<i>Duvalia polita</i> N.E.Br.	LC	No



Family	Species	Threat status	SA Endemic
APOCYNACEAE	<i>Sarcostemma viminale</i> (L.) R.Br. subsp. <i>viminale</i>	LC	No
ASPARAGACEAE	<i>Asparagus flavicaulis</i> (Oberm.) Fellingham & N.L.Mey. subsp. <i>flavicaulis</i>	LC	No
ASTERACEAE	<i>Aster squamatus</i> (Spreng.) Hieron.	Not Evaluated	No
ASTERACEAE	<i>Athrixia elata</i> Sond.	LC	No
ASTERACEAE	<i>Berkheya radula</i> (Harv.) De Wild.	LC	No
ASTERACEAE	<i>Dicoma anomala</i> Sond. subsp. <i>gerrardii</i> (Harv. ex F.C.Wilson) S.Ortiz & Rodr.Oubiña	LC	No
ASTERACEAE	<i>Felicia clavipilosa</i> Grau subsp. <i>clavipilosa</i>	LC	No
ASTERACEAE	<i>Felicia muricata</i> (Thunb.) Nees subsp. <i>muricata</i>	LC	No
ASTERACEAE	<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>burkei</i>	LC	No
ASTERACEAE	<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	LC	No
ASTERACEAE	<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	LC	No
ASTERACEAE	<i>Helichrysum harveyanum</i> Wild	LC	No
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC	No
ASTERACEAE	<i>Helichrysum rugulosum</i> Less.	LC	No
ASTERACEAE	<i>Hirpicium bechuanense</i> (S.Moore) Roessler	LC	No
ASTERACEAE	<i>Litogyne gariepina</i> (DC.) Anderb.	LC	No
ASTERACEAE	<i>Nidorella hottentotica</i> DC.	LC	No
ASTERACEAE	<i>Nidorella microcephala</i> Steetz	LC	No
ASTERACEAE	<i>Osteospermum muricatum</i> E.Mey. ex DC. subsp. <i>muricatum</i>	LC	No
ASTERACEAE	<i>Philyrophyllum schinzii</i> O.Hoffm.	LC	No
ASTERACEAE	<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & B.L.Burt		No
ASTERACEAE	<i>Senecio inornatus</i> DC.	LC	No
ASTERACEAE	<i>Xanthium strumarium</i> L.	Not Evaluated	No
ASTERACEAE	<i>Zinnia peruviana</i> (L.) L.	Not Evaluated	No
AYTONIACEAE	<i>Mannia capensis</i> (Steph.) S.W.Arnell		No
BORAGINACEAE	<i>Ehretia alba</i> Retief & A.E.van Wyk	LC	No
BORAGINACEAE	<i>Ehretia rigida</i> (Thunb.) Druce subsp. <i>nervifolia</i> Retief & A.E.van Wyk	LC	No
BRYACEAE	<i>Bryum argenteum</i> Hedw.		No
BRYACEAE	<i>Bryum capillare</i> Hedw.		No
BURSERACEAE	<i>Commiphora schimperii</i> (O.Berg) Engl.	LC	No
CAMPANULACEAE	<i>Wahlenbergia undulata</i> (L.f.) A.DC.	LC	No
CAPPARACEAE	<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	LC	No
CAPPARACEAE	<i>Boscia foetida</i> Schinz subsp. <i>rehmanniana</i> (Pestal.) Toelken	LC	No



Family	Species	Threat status	SA Endemic
CAPPARACEAE	<i>Maerua angolensis</i> DC. subsp. <i>angolensis</i>	LC	No
CARYOPHYLLACEAE	<i>Dianthus zeyheri</i> Sond. subsp. <i>zeyheri</i>	Not Evaluated	No
CELASTRACEAE	<i>Gymnosporia maranguensis</i> (Loes.) Loes.	LC	No
CELASTRACEAE	<i>Gymnosporia tenuispina</i> (Sond.) Szyszyl.	LC	No
CELTIDACEAE	<i>Celtis africana</i> Burm.f.	LC	No
COMBRETACEAE	<i>Terminalia sericea</i> Burch. ex DC.	LC	No
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B. Clarke	LC	No
COMMELINACEAE	<i>Commelina erecta</i> L.	LC	No
COMMELINACEAE	<i>Commelina livingstonii</i> C.B. Clarke	LC	No
CONVOLVULACEAE	<i>Evolvulus alsinoides</i> (L.) L.	LC	No
CONVOLVULACEAE	<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	LC	No
CONVOLVULACEAE	<i>Ipomoea magnusiana</i> Schinz	LC	No
CONVOLVULACEAE	<i>Ipomoea oblongata</i> E.Mey. ex Choisy	LC	No
CYPERACEAE	<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B. Clarke	LC	No
CYPERACEAE	<i>Cyperus longus</i> L. var. <i>tenuiflorus</i> (Rottb.) Boeck.	LC	No
CYPERACEAE	<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC	No
CYPERACEAE	<i>Kyllinga alba</i> Nees	LC	No
CYPERACEAE	<i>Pycreus mundii</i> Nees	LC	No
DIPSACACEAE	<i>Cephalaria zeyheriana</i> Szabó	LC	No
DIPSACACEAE	<i>Scabiosa columbaria</i> L.	LC	No
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC	No
EBENACEAE	<i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	LC	No
EBENACEAE	<i>Euclea undulata</i> Thunb.	LC	No
ELATINACEAE	<i>Bergia decumbens</i> Planch. ex Harv.	LC	No
ERIOSPERMACEAE	<i>Eriospermum flagelliforme</i> (Baker) J.C. Manning	LC	No
EUPHORBIACEAE	<i>Acalypha glabrata</i> Thunb. var. <i>pilosa</i> Pax	LC	No
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>franksiae</i> Prain	LC	No
EUPHORBIACEAE	<i>Croton gratissimus</i> Burch. var. <i>gratissimus</i>	LC	No
EUPHORBIACEAE	<i>Dalechampia capensis</i> A. Spreng.	LC	No
EUPHORBIACEAE	<i>Jatropha zeyheri</i> Sond.	LC	No
EUPHORBIACEAE	<i>Spirostachys africana</i> Sond.	LC	No





Family	Species	Threat status	SA Endemic
EUPHORBIACEAE	<i>Tragia rupestris</i> Sond.	LC	No
FABACEAE	<i>Acacia galpinii</i> Burt Davy	LC	No
FABACEAE	<i>Acacia karroo</i> Hayne	LC	No
FABACEAE	<i>Acacia robusta</i> Burch. subsp. <i>robusta</i>	LC	No
FABACEAE	<i>Acacia senegal</i> (L.) Willd. var. <i>rostrata</i> Brenan	LC	No
FABACEAE	<i>Alysicarpus zeyheri</i> Harv.	LC	No
FABACEAE	<i>Bauhinia galpinii</i> N.E.Br.	LC	No
FABACEAE	<i>Caesalpinia gilliesii</i> (Wall. ex Hook.) D.Dietr.	Not Evaluated	No
FABACEAE	<i>Chamaecrista biensis</i> (Steyaert) Lock	LC	No
FABACEAE	<i>Dalbergia sissoo</i> Roxb. ex . DC.	Not Evaluated	No
FABACEAE	<i>Eriosema psoraleoides</i> (Lam.) G.Don	LC	No
FABACEAE	<i>Indigofera daleoides</i> Benth. ex Harv. var. <i>daleoides</i>	LC	No
FABACEAE	<i>Indigofera vicioides</i> Jaub. & Spach var. <i>vicioides</i>	LC	No
FABACEAE	<i>Listia heterophylla</i> E.Mey.	LC	No
FABACEAE	<i>Rhynchosia confusa</i> Burt Davy	Not Evaluated	No
FABACEAE	<i>Rhynchosia densiflora</i> (Roth) DC. subsp. <i>chrysadenia</i> (Taub.) Verdc.	LC	No
FABACEAE	<i>Rhynchosia minima</i> (L.) DC. var. <i>prostrata</i> (Harv.) Meikle	LC	No
FABACEAE	<i>Sesbania bispinosa</i> (Jacq.) W.Wight var. <i>bispinosa</i>	Not Evaluated	No
FABACEAE	<i>Stylosanthes fruticosa</i> (Retz.) Alston	LC	No
FABACEAE	<i>Vigna vexillata</i> (L.) A.Rich. var. <i>vexillata</i>	LC	No
FABACEAE	<i>Zornia milneana</i> Mohlenbr.	LC	No
GENTIANACEAE	<i>Chironia palustris</i> Burch. subsp. <i>transvaalensis</i> (Gilg) I.Verd.	LC	No
GENTIANACEAE	<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>humilis</i> (Gilg) I.Verd.	LC	No
GERANIACEAE	<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	LC	No
HYACINTHACEAE	<i>Albuca glauca</i> Baker	LC	No
HYACINTHACEAE	<i>Drimia intricata</i> (Baker) J.C.Manning & Goldblatt	LC	No
HYACINTHACEAE	<i>Ledebouria leptophylla</i> (Baker) S.Venter	LC	No
HYPERICACEAE	<i>Hypericum aethiopicum</i> Thunb. subsp. <i>sonderi</i> (Bredell) N.Robson	LC	No
ICACINACEAE	<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC	No
LAMIACEAE	<i>Ocimum americanum</i> L. var. <i>americanum</i>	LC	No
LAMIACEAE	<i>Rothea hirsuta</i> (Hochst.) R.Fern.	LC	No
LAMIACEAE	<i>Rothea louwalbertsii</i> (P.P.J.Herman) P.P.J.Herman & Retief	LC	No



Family	Species	Threat status	SA Endemic
LAMIACEAE	<i>Salvia reflexa</i> Hornem.	Not Evaluated	No
LAMIACEAE	<i>Salvia runcinata</i> L.f.	LC	No
LAMIACEAE	<i>Teucrium trifidum</i> Retz.	LC	No
MALPIGHIACEAE	<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>galphimiifolius</i> (A.Juss.) P.D.de Villiers & D.J.Botha	LC	No
MALPIGHIACEAE	<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC	No
MALVACEAE	<i>Grewia flavescens</i> Juss.	LC	No
MALVACEAE	<i>Grewia monticola</i> Sond.	LC	No
MALVACEAE	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC	No
MALVACEAE	<i>Grewia retinervis</i> Burret	LC	No
MALVACEAE	<i>Hermannia burkei</i> Burt Davy	LC	No
MALVACEAE	<i>Hermannia cernua</i> Thunb.	LC	No
MALVACEAE	<i>Hermannia depressa</i> N.E.Br.	LC	No
MALVACEAE	<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	LC	No
MALVACEAE	<i>Hibiscus calyphyllus</i> Cav.	LC	No
MALVACEAE	<i>Hibiscus microcarpus</i> Garcke	LC	No
MALVACEAE	<i>Melhania prostrata</i> DC.	LC	No
MALVACEAE	<i>Sida cordifolia</i> L. subsp. <i>cordifolia</i>	LC	No
MALVACEAE	<i>Triumfetta sonderi</i> Ficalho & Hiern	LC	No
MALVACEAE	<i>Waltheria indica</i> L.	LC	No
MELIACEAE	<i>Turraea obtusifolia</i> Hochst.	LC	No
MYROTHAMNACEAE	<i>Myrothamnus flabellifolius</i> Welw.	DDT	No
OLEACEAE	<i>Menodora heterophylla</i> Moric. ex DC. var. <i>australis</i> Steyerm.	LC	No
OLEACEAE	<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	LC	No
OROBANCHACEAE	<i>Cycnium adonense</i> E.Mey. ex Benth.	LC	No
OROBANCHACEAE	<i>Striga asiatica</i> (L.) Kuntze	LC	No
OROBANCHACEAE	<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	No
OROBANCHACEAE	<i>Striga elegans</i> Benth.	LC	No
PAPAVERACEAE	<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Not Evaluated	No
PEDALIACEAE	<i>Dicerocaryum senecioides</i> (Klotzsch) Abels	LC	No
PEDALIACEAE	<i>Pterodiscus luridus</i> Hook.f.	LC	No
PHYLLANTHACEAE	<i>Bridelia mollis</i> Hutch.	LC	No



Family	Species	Threat status	SA Endemic
PHYLLANTHACEAE	<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i>	LC	No
PHYLLANTHACEAE	<i>Phyllanthus incurvus</i> Thunb.	LC	No
PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i> L.	LC	No
PHYSICIACEAE	<i>Pyxine petricola</i> Nyl. var. <i>petricola</i>		No
POACEAE	<i>Antheophora pubescens</i> Nees	LC	No
POACEAE	<i>Aristida bipartita</i> (Nees) Trin. & Rupr.	LC	No
POACEAE	<i>Aristida canescens</i> Henrard subsp. <i>canescens</i>	LC	No
POACEAE	<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	LC	No
POACEAE	<i>Aristida congesta</i> Roem. & Schult. subsp. <i>congesta</i>	LC	No
POACEAE	<i>Bewsia biflora</i> (Hack.) Gooss.	LC	No
POACEAE	<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	LC	No
POACEAE	<i>Bothriochloa insculpta</i> (Hochst. ex A.Rich.) A.Camus	LC	No
POACEAE	<i>Brachiaria nigropedata</i> (Ficalho & Hiern) Stapf	LC	No
POACEAE	<i>Cenchrus ciliaris</i> L.	LC	No
POACEAE	<i>Chrysopogon serrulatus</i> Trin.	LC	No
POACEAE	<i>Cymbopogon pospischilii</i> (K.Schum.) C.E.Hubb.	Not Evaluated	No
POACEAE	<i>Cynodon hirsutus</i> Stent	LC	No
POACEAE	<i>Digitaria argyrograpta</i> (Nees) Stapf	LC	No
POACEAE	<i>Digitaria eriantha</i> Steud.	LC	No
POACEAE	<i>Diheteropogon amplexens</i> (Nees) Clayton var. <i>amplexens</i>	LC	No
POACEAE	<i>Elionurus muticus</i> (Spreng.) Kunth	LC	No
POACEAE	<i>Enneapogon scoparius</i> Stapf	LC	No
POACEAE	<i>Eragrostis chloromelas</i> Steud.	LC	No
POACEAE	<i>Eragrostis curvula</i> (Schrad.) Nees	LC	No
POACEAE	<i>Eragrostis gummiflua</i> Nees	LC	No
POACEAE	<i>Eragrostis racemosa</i> (Thunb.) Steud.	LC	No
POACEAE	<i>Eragrostis rigidior</i> Pilg.	LC	No
POACEAE	<i>Eragrostis rotifer</i> Rendle	LC	No
POACEAE	<i>Eragrostis superba</i> Peyr.	LC	No
POACEAE	<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	LC	No
POACEAE	<i>Fingerhuthia africana</i> Lehm.	LC	No
POACEAE	<i>Heteropogon contortus</i> (L.) Roem. & Schult.	LC	No
POACEAE	<i>Hyparrhenia anamesa</i> Clayton	LC	No
POACEAE	<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton	LC	No



<b>Family</b>	<b>Species</b>	<b>Threat status</b>	<b>SA Endemic</b>
POACEAE	<i>Ischaemum afrum</i> (J.F.Gmel.) Dandy	LC	No
POACEAE	<i>Loudetia flavida</i> (Stapf) C.E.Hubb.	LC	No
POACEAE	<i>Loudetia simplex</i> (Nees) C.E.Hubb.	LC	No
POACEAE	<i>Melinis repens</i> (Willd.) Zizka subsp. <i>grandiflora</i> (Hochst.) Zizka	LC	No
POACEAE	<i>Panicum coloratum</i> L. var. <i>coloratum</i>	LC	No
POACEAE	<i>Panicum maximum</i> Jacq.	LC	No
POACEAE	<i>Perotis patens</i> Gand.	LC	No
POACEAE	<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	LC	No
POACEAE	<i>Schmidtia pappophoroides</i> Steud.	LC	No
POACEAE	<i>Setaria incrassata</i> (Hochst.) Hack.	LC	No





### Appendix C: Plant List

Scientific Name	Common Name	Ecological Status	Form
<i>Acacia mellifera</i>	Black thorn		Tree
<i>Acacia tortillis</i>	Umbrella thorn	Medicinal	Tree
<i>Aristida congesta congesta</i>	Tassel Tree-awn	Increaser 2 - Pioneer	Grass
<i>Asparagus larycinus</i>	Cluster leaved asparagus	Charm	Herb
<i>Asparagus suaveolens</i>			Herb
<i>Barleria bremekampii</i>			Shrub
<i>Boophane disticha</i>	<b>Poison bulb</b>	<b>Protected</b>	Herb
<i>Brachylaena rotundata</i>	Mountain Silver Oak		Tree
<i>Bridelia mollis</i>	Velvet sweetberry		Tree
<i>Cenchrus ciliaris</i>	Foxtail Buffalo grass	Subclimax climax Decreaser	Grass
<i>Combretum apiculatum</i>	Red Bushwillow		Tree
<i>Commiphora glandulosa</i>	Tall fire thorn Corkwood		Tree
<i>Croton gratissimus</i>	Lavender fever berry		Tree
<i>Dicerocaryum eriocarpum</i>	Devil's Thorn		Herb
<i>Dichrostachys cinerea</i>	Sickle bush	Medicinal	Tree
<i>Elionurus muticus</i>	Wire Grass	Increaser 3 - Climax	Grass
<i>Eragrostis rigidior</i>	Broad Curly leaf	Increaser 2 - Subclimax	Grass
<i>Flueggea virosa</i>	Whit Berry Bush		Tree
<i>Grewia flavescens</i>	Sandpaper Raisin		Tree
<i>Gymnospora senegalensis</i>	Red Spike Thorn	Medicinal	Shrub
<i>Hermannia sandersonii</i>			Herb
<i>Heteropyxis natalensis</i>	Lavender Tree		Tree
<i>Hibiscus aethiopicus</i>			Herb
<i>Kirkia acuminata</i>	White Kirkia		Tree
<i>Ledeboria spp.</i>			Herb
<i>Oleo europaea subs. africana</i>	African Olive		Tree
<i>Opuntia ficus-indica</i>	Sweet Prickly Pear	Alien Invasive*	Tree/Shrub
<i>Ozoroa paniculosa</i>	Common Resin Tree		Tree



Scientific Name	Common Name	Ecological Status	Form
<i>Pellaea calomelanos</i>			Fern
<i>Sansevieria hyacinthoides</i>	Mother in Law's tongue		Herb
<i>Scadoxus puniceus</i>	Paintbrush Lilly		Herb
<i>Sclerocarya birrea</i>	Marula	<b>Medicinal SA National tree list</b>	Tree
<i>Sida chrysantha</i>			Herb
<i>Solanum panduriforme</i>	Yellow Bitter-apple	Medicinal	Shrub
<i>Sporobolus africanus</i>	Ratstail dropseed	Subclimax increaser 3	Grass
<i>Strychnos madagascariensis</i>	Black Monkey Orabge		Tree
<i>Spirostachys africana</i>	Tambotie	<b>Protected Transvaal Ordinance</b>	Tree
<i>Tarchonanthus camphoratus</i>	Wild camphor bush	Medicinal	Tree
<i>Terminalia sericea</i>	Silver cluster leaf	Medicinal	Tree
<i>Trichoneura grandiglumis</i>	Small Rolling Grass	Increaser 2 - Subclimax	Grass
<i>Ximenia caffra</i>	Sourplum	Edible, traditional	Tree
<i>Ziziphus mucronata</i>	Buffalo thorn	Medicinal	Tree



### Appendix D: Expected Bird list

#	R6	Scientific Name	Common Name
3	188	<i>Peliperdix coqui</i>	Coqui Francolin
4	189	<i>Dendroperdix sephaena</i>	Crested Francolin
12	196	<i>Pternistis natalensis</i>	Natal Spurfowl
14	199	<i>Pternistis swainsonii</i>	Swainson's Spurfowl
20	203	<i>Numida meleagris</i>	Helmeted Guineafowl
22	99	<i>Dendrocygna viduata</i>	White-faced Duck
25	102	<i>Alopochen aegyptiaca</i>	Egyptian Goose
27	116	<i>Plectropterus gambensis</i>	Spur-winged Goose
33	104	<i>Anas undulata</i>	Yellow-billed Duck
36	108	<i>Anas erythrorhyncha</i>	Red-billed Teal
41	205	<i>Turnix sylvaticus</i>	Kurrichane Buttonquail
45	474	<i>Indicator indicator</i>	Greater Honeyguide
46	476	<i>Indicator minor</i>	Lesser Honeyguide
49	478	<i>Prodotiscus regulus</i>	Brown-backed Honeybird
51	481	<i>Campethera bennettii</i>	Bennett's Woodpecker
53	483	<i>Campethera abingoni</i>	Golden-tailed Woodpecker
57	486	<i>Dendropicos fuscescens</i>	Cardinal Woodpecker
58	487	<i>Dendropicos namaquus</i>	Bearded Woodpecker
65	470	<i>Pogoniulus chrysoconus</i>	Yellow-fronted Tinkerbird
67	465	<i>Tricholaema leucomelas</i>	Acacia Pied Barbet
68	464	<i>Lybius torquatus</i>	Black-collared Barbet
69	473	<i>Trachyphonus vaillantii</i>	Crested Barbet
71	458	<i>Tockus erythrorhynchus</i>	Red-billed Hornbill
73	459	<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill
76	457	<i>Tockus nasutus</i>	African Grey Hornbill
80	451	<i>Upupa africana</i>	African Hoopoe
81	452	<i>Phoeniculus purpureus</i>	Green Wood-Hoopoe
83	454	<i>Rhinopomastus cyanomelas</i>	Common Scimitarbill
85	446	<i>Coracias garrulus</i>	European Roller
86	447	<i>Coracias caudatus</i>	Lilac-breasted Roller
94	433	<i>Halcyon senegalensis</i>	Woodland Kingfisher
96	435	<i>Halcyon albiventris</i>	Brown-hooded Kingfisher
97	437	<i>Halcyon chelicuti</i>	Striped Kingfisher
100	443	<i>Merops bullockoides</i>	White-fronted Bee-eater
101	444	<i>Merops pusillus</i>	Little Bee-eater
107	438	<i>Merops apiaster</i>	European Bee-eater
110	424	<i>Colius striatus</i>	Speckled Mousebird
111	426	<i>Urocolius indicus</i>	Red-faced Mousebird
112	382	<i>Clamator jacobinus</i>	Jacobin Cuckoo
113	381	<i>Clamator levillantii</i>	Levillant's Cuckoo
116	377	<i>Cuculus solitarius</i>	Red-chested Cuckoo
117	378	<i>Cuculus clamosus</i>	Black Cuckoo
119	375	<i>Cuculus gularis</i>	African Cuckoo



#	R6	Scientific Name	Common Name
123	385	<i>Chrysococcyx klaas</i>	Klaas's Cuckoo
125	386	<i>Chrysococcyx caprius</i>	Diderick Cuckoo
131	391	<i>Centropus burchellii</i>	Burchell's Coucal
144	421	<i>Cypsiurus parvus</i>	African Palm-Swift
147	411	<i>Apus apus</i>	Common Swift
151	417	<i>Apus affinis</i>	Little Swift
152	416	<i>Apus horus</i>	Horus Swift
153	415	<i>Apus caffer</i>	White-rumped Swift
159	373	<i>Corythaixoides concolor</i>	Grey Go-away-bird
160	392	<i>Tyto alba</i>	Barn Owl
162	396	<i>Otus senegalensis</i>	African Scops-Owl
163	397	<i>Ptilopusus granti</i>	Southern White-faced Scops-Owl
165	401	<i>Bubo africanus</i>	Spotted Eagle-Owl
169	398	<i>Glaucidium perlatum</i>	Pearl-spotted Owlet
171	395	<i>Asio capensis</i>	Marsh Owl
172	405	<i>Caprimulgus pectoralis</i>	Fiery-necked Nightjar
173	408	<i>Caprimulgus tristigma</i>	Freckled Nightjar
176	406	<i>Caprimulgus rufigena</i>	Rufous-cheeked Nightjar
177	404	<i>Caprimulgus europaeus</i>	European Nightjar
179	348	<i>Columba livia</i>	Rock Dove
180	349	<i>Columba guinea</i>	Speckled Pigeon
185	355	<i>Streptopelia senegalensis</i>	Laughing Dove
187	354	<i>Streptopelia capicola</i>	Cape Turtle-Dove
188	352	<i>Streptopelia semitorquata</i>	Red-eyed Dove
189	358	<i>Turtur chalcospilos</i>	Emerald-spotted Wood-Dove
192	356	<i>Oena capensis</i>	Namaqua Dove
193	361	<i>Treron calvus</i>	African Green-Pigeon
197	237	<i>Lophotis ruficrista</i>	Red-crested Korhaan
199	941	<i>Afrotis afraoides</i>	Northern Black Korhaan
228	346	<i>Pterocles gutturalis</i>	Yellow-throated Sandgrouse
229	347	<i>Pterocles bicinctus</i>	Double-banded Sandgrouse
241	270	<i>Tringa nebularia</i>	Common Greenshank
245	266	<i>Tringa glareola</i>	Wood Sandpiper
247	264	<i>Actitis hypoleucos</i>	Common Sandpiper
252	274	<i>Calidris minuta</i>	Little Stint
268	240	<i>Actophilornis africanus</i>	African Jacana
272	297	<i>Burhinus capensis</i>	Spotted Thick-knee
275	295	<i>Himantopus himantopus</i>	Black-winged Stilt
282	248	<i>Charadrius pecuarius</i>	Kittlitz's Plover
283	249	<i>Charadrius tricollaris</i>	Three-banded Plover
291	258	<i>Vanellus armatus</i>	Blacksmith Lapwing
294	260	<i>Vanellus senegallus</i>	African Wattled Lapwing
297	255	<i>Vanellus coronatus</i>	Crowned Lapwing
303	300	<i>Cursorius temminckii</i>	Temminck's Courser





#	R6	Scientific Name	Common Name
348	127	<i>Elanus caeruleus</i>	Black-shouldered Kite
350	126	<i>Milvus [migrans] parasitus</i>	Yellow-billed Kite
351	148	<i>Haliaeetus vocifer</i>	African Fish-Eagle
356	123	<i>Gyps africanus</i>	White-backed Vulture
358	122	<i>Gyps coprotheres</i>	Cape Vulture
361	143	<i>Circaetus pectoralis</i>	Black-chested Snake-Eagle
362	142	<i>Circaetus cinereus</i>	Brown Snake-Eagle
371	169	<i>Polyboroides typus</i>	African Harrier-Hawk
375	161	<i>Melierax gabar</i>	Gabar Goshawk
377	159	<i>Accipiter badius</i>	Shikra
382	149	<i>Buteo vulpinus</i>	Steppe Buzzard
390	131	<i>Aquila verreauxii</i>	Verreaux's Eagle
391	137	<i>Aquila spilogaster</i>	African Hawk-Eagle
394	135	<i>Aquila wahlbergi</i>	Wahlberg's Eagle
398	118	<i>Sagittarius serpentarius</i>	Secretarybird
400	183	<i>Falco naumanni</i>	Lesser Kestrel
401	181	<i>Falco rupicolis</i>	Rock Kestrel
402	182	<i>Falco rupicoloides</i>	Greater Kestrel
407	180	<i>Falco amurensis</i>	Amur Falcon
412	172	<i>Falco biarmicus</i>	Lanner Falcon
426	58	<i>Phalacrocorax africanus</i>	Reed Cormorant
433	67	<i>Egretta garzetta</i>	Little Egret
439	62	<i>Ardea cinerea</i>	Grey Heron
440	63	<i>Ardea melanocephala</i>	Black-headed Heron
442	65	<i>Ardea purpurea</i>	Purple Heron
443	71	<i>Bubulcus ibis</i>	Cattle Egret
447	74	<i>Butorides striata</i>	Green-backed Heron
453	81	<i>Scopus umbretta</i>	Hamerkop
457	94	<i>Bostrychia hagedash</i>	Hadedda Ibis
459	91	<i>Threskiornis aethiopicus</i>	African Sacred Ibis
460	95	<i>Platalea alba</i>	African Spoonbill
537	545	<i>Oriolus larvatus</i>	Black-headed Oriole
539	541	<i>Dicrurus adsimilis</i>	Fork-tailed Drongo
541	710	<i>Terpsiphone viridis</i>	African Paradise-Flycatcher
543	741	<i>Nilaus afer</i>	Brubru
544	740	<i>Dryoscopus cubla</i>	Black-backed Puffback
546	744	<i>Tchagra senegalus</i>	Black-crowned Tchagra
547	743	<i>Tchagra australis</i>	Brown-crowned Tchagra
551	736	<i>Laniarius ferrugineus</i>	Southern Boubou
552	739	<i>Laniarius atrococcineus</i>	Crimson-breasted Shrike
554	748	<i>Telophorus sulfureopectus</i>	Orange-breasted Bush-Shrike
558	751	<i>Malaconotus blanchoti</i>	Grey-headed Bush-Shrike
559	753	<i>Prionops plumatus</i>	White-crested Helmet-Shrike
565	701	<i>Batis molitor</i>	Chinspot Batis



#	R6	Scientific Name	Common Name
571	548	<i>Corvus albus</i>	Pied Crow
573	733	<i>Lanius collurio</i>	Red-backed Shrike
575	731	<i>Lanius minor</i>	Lesser Grey Shrike
576	732	<i>Lanius collaris</i>	Common Fiscal
577	735	<i>Corvinella melanoleuca</i>	Magpie Shrike
581	538	<i>Campephaga flava</i>	Black Cuckooshrike
586	554	<i>Parus niger</i>	Southern Black Tit
591	552	<i>Parus cinerascens</i>	Ashy Tit
598	518	<i>Hirundo rustica</i>	Barn Swallow
600	520	<i>Hirundo albigularis</i>	White-throated Swallow
603	523	<i>Hirundo dimidiata</i>	Pearl-breasted Swallow
604	526	<i>Hirundo cucullata</i>	Greater Striped Swallow
605	527	<i>Hirundo abyssinica</i>	Lesser Striped Swallow
606	524	<i>Hirundo semirufa</i>	Red-breasted Swallow
610	529	<i>Hirundo fuligula</i>	Rock Martin
611	530	<i>Delichon urbicum</i>	Common House-Martin
615	568	<i>Pycnonotus tricolor</i>	Dark-capped Bulbul
626	706	<i>Stenostira scita</i>	Fairy Flycatcher
638	631	<i>Acrocephalus baeticatus</i>	African Reed-Warbler
639	633	<i>Acrocephalus palustris</i>	Marsh Warbler
643	635	<i>Acrocephalus gracilirostris</i>	Lesser Swamp-Warbler
645	625	<i>Hippolais icterina</i>	Icterine Warbler
647	653	<i>Eremomela icteropygialis</i>	Yellow-bellied Eremomela
650	656	<i>Eremomela usticollis</i>	Burnt-necked Eremomela
653	651	<i>Sylvietta rufescens</i>	Long-billed Crombec
655	643	<i>Phylloscopus trochilus</i>	Willow Warbler
661	563	<i>Turdoides bicolor</i>	Southern Pied Babbler
662	560	<i>Turdoides jardineii</i>	Arrow-marked Babbler
666	621	<i>Parisoma subcaeruleum</i>	Chestnut-vented Tit-Babbler
671	796	<i>Zosterops capensis</i>	Cape White-eye
675	679	<i>Cisticola aberrans</i>	Lazy Cisticola
676	672	<i>Cisticola chiniana</i>	Rattling Cisticola
683	677	<i>Cisticola tinniens</i>	Levaillant's Cisticola
685	681	<i>Cisticola fulvicapilla</i>	Neddicky
687	664	<i>Cisticola juncidis</i>	Zitting Cisticola
688	665	<i>Cisticola aridulus</i>	Desert Cisticola
692	683	<i>Prinia subflava</i>	Tawny-flanked Prinia
693	685	<i>Prinia flavicans</i>	Black-chested Prinia
706	948	<i>Camaroptera brevicaudata</i>	Grey-backed Camaroptera
707	658	<i>Calamonastes fasciolatus</i>	Barred Wren-Warbler
710	493	<i>Mirafra passerina</i>	Monotonous Lark
712	494	<i>Mirafra africana</i>	Rufous-naped Lark
713	496	<i>Mirafra rufocinnamomea</i>	Flappet Lark
717	498	<i>Calendulauda sabota</i>	Sabota Lark



#	R6	Scientific Name	Common Name
733	515	<i>Eremopterix leucotis</i>	Chestnut-backed Sparrowlark
735	507	<i>Calandrella cinerea</i>	Red-capped Lark
742	581	<i>Monticola rupestris</i>	Cape Rock-Thrush
748	580	<i>Psophocichla litsipsirupa</i>	Groundscraper Thrush
749	576	<i>Turdus libonyanus</i>	Kurrichane Thrush
755	695	<i>Bradornis mariquensis</i>	Marico Flycatcher
756	694	<i>Melaenornis pammelaina</i>	Southern Black Flycatcher
757	698	<i>Sigelus silens</i>	Fiscal Flycatcher
758	689	<i>Muscicapa striata</i>	Spotted Flycatcher
761	693	<i>Myioparus plumbeus</i>	Grey Tit-Flycatcher
767	601	<i>Cossypha caffra</i>	Cape Robin-Chat
768	602	<i>Cossypha humeralis</i>	White-throated Robin-Chat
776	613	<i>Cercotrichas leucophrys</i>	White-browed Scrub-Robin
777	615	<i>Cercotrichas paena</i>	Kalahari Scrub-Robin
782	596	<i>Saxicola torquatus</i>	African Stonechat
784	586	<i>Oenanthe monticola</i>	Mountain Wheatear
787	587	<i>Oenanthe pileata</i>	Capped Wheatear
792	589	<i>Cercomela familiaris</i>	Familiar Chat
793	595	<i>Myrmecocichla formicivora</i>	Anteating Chat
795	593	<i>Thamnolaea cinnamomeiventris</i>	Mocking Cliff-Chat
798	769	<i>Onychognathus morio</i>	Red-winged Starling
800	764	<i>Lamprotornis nitens</i>	Cape Glossy Starling
806	761	<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling
808	760	<i>Creatophora cinerea</i>	Wattled Starling
810	758	<i>Acridotheres tristis</i>	Common Myna
812	772	<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker
818	792	<i>Chalcomitra amethystina</i>	Amethyst Sunbird
828	787	<i>Cinnyris talatala</i>	White-bellied Sunbird
832	779	<i>Cinnyris mariquensis</i>	Marico Sunbird
837	806	<i>Sporopipes squamifrons</i>	Scaly-feathered Finch
838	799	<i>Plocepasser mahali</i>	White-browed Sparrow-Weaver
846	814	<i>Ploceus velatus</i>	Southern Masked-Weaver
847	811	<i>Ploceus cucullatus</i>	Village Weaver
851	819	<i>Anaplectes rubriceps</i>	Red-headed Weaver
854	821	<i>Quelea quelea</i>	Red-billed Quelea
857	824	<i>Euplectes orix</i>	Southern Red Bishop
861	829	<i>Euplectes albonotatus</i>	White-winged Widowbird
867	854	<i>Amandava subflava</i>	Orange-breasted Waxbill
868	852	<i>Ortygospiza atricollis</i>	African Quailfinch
869	856	<i>Amadina erythrocephala</i>	Red-headed Finch
870	855	<i>Amadina fasciata</i>	Cut-throat Finch
875	847	<i>Estrilda erythronotos</i>	Black-faced Waxbill
878	846	<i>Estrilda astrild</i>	Common Waxbill
880	845	<i>Granatina granatina</i>	Violet-eared Waxbill



#	R6	Scientific Name	Common Name
881	844	<i>Uraeginthus angolensis</i>	Blue Waxbill
884	834	<i>Pytilia melba</i>	Green-winged Pytilia
886	842	<i>Lagonosticta senegala</i>	Red-billed Firefinch
889	841	<i>Lagonosticta rhodopareia</i>	Jameson's Firefinch
890	857	<i>Spermestes cucullatus</i>	Bronze Mannikin
893	867	<i>Vidua chalybeata</i>	Village Indigobird
897	861	<i>Vidua regia</i>	Shaft-tailed Whydah
898	860	<i>Vidua macroura</i>	Pin-tailed Whydah
899	862	<i>Vidua paradisaea</i>	Long-tailed Paradise-Whydah
901	801	<i>Passer domesticus</i>	House Sparrow
902	802	<i>Passer motitensis</i>	Great Sparrow
903	803	<i>Passer melanurus</i>	Cape Sparrow
904	804	<i>Passer diffusus</i>	Southern Grey-headed Sparrow
906	805	<i>Petronia superciliaris</i>	Yellow-throated Petronia
908	713	<i>Motacilla capensis</i>	Cape Wagtail
915	727	<i>Macronyx capensis</i>	Cape Longclaw
920	716	<i>Anthus cinnamomeus</i>	African Pipit
923	719	<i>Anthus vaalensis</i>	Buffy Pipit
925	717	<i>Anthus similis</i>	Long-billed Pipit
935	870	<i>Serinus atrogularis</i>	Black-throated Canary
937	869	<i>Serinus mozambicus</i>	Yellow-fronted Canary
938	878	<i>Serinus flaviventris</i>	Yellow Canary
941	881	<i>Serinus gularis</i>	Streaky-headed Seedeater
948	886	<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting
950	884	<i>Emberiza flaviventris</i>	Golden-breasted Bunting



### Appendix E: Mammals Species Expected

Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<b>Macroscelidea: Macroscelididae</b>				
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant- shrew	Could occur.	In savanna and grassland with good cover and shrub.	Data Deficient
<i>Elephantulus myurus</i>	Eastern Rock Elephant- shrew	High, likely to occur.	Outcrops in savanna.	Least Concern
<b>Eulipotyphla: Erinaceidae</b>				
<i>Atelerix frontalis</i>	Southern African Hedgehog	High, likely to occur.	Varied, mainly dry habitat including urban gardens.	Near-threatened
<b>Eulipotyphla: Soricidae</b>				
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	High, likely to occur.	A wide habitat tolerance.	Data Deficient
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	High, likely to occur.	Vleis and wetlands within savanna.	Data Deficient
<i>Crocidura fuscomurina</i>	Tiny Musk Shrew	High, likely to occur.	A wide habitat tolerance.	Data Deficient
<i>Crocidura cyanea</i>	Reddish-Grey Musk Shrew	High, likely to occur.	Dry terrain among rocks in dense scrub and grass, in moist places and in hedges. Wet vleis with good grass cover.	Data Deficient
<i>Suncus lixus</i>	Greater Dwarf Shrew	Possible, could occur.	Broad habitat tolerance.	Data Deficient
<b>Chiroptera: Nycteridae</b>				
<i>Nycterus thebaica</i>	Egyptian Slit-faced Bat	High, likely to forage overhead.	Varied, roost in buildings and trees.	Least Concern
<b>Chiroptera: Vespertilionidae</b>				
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	Could occur during foraging bouts - unlikely to utilise site for roosting purposes.	Varied, but more restricted to lower-lying areas. Will utilise manmade structures for day and night roosts.	Near-threatened





Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<i>Neoromicia capensis</i>	Cape Serotine Bat	High, likely to forage overhead.	Variable. Commonly enters houses and readily visits lights.	Least Concern
<i>Scotophilus dinganii</i>	Yellow House Bat	High, likely to forage overhead.	Varied; roosts in a variety of cavities; widespread.	Least Concern
<b>Chiroptera: Molossidae</b>				
<i>Tadarida aegyptiaca</i>	Egyptian Free-Tailed Bat	High, likely to forage overhead.	Cosmopolitan, occurring in all vegetation types.	Least Concern
<b>Primates: Cercopithecidae</b>				
<i>Papio cynocephalus ursinus</i>	Savanna Baboon	High, likely to occur.	Widespread, although partial to broken terrain.	Least Concern
<i>Cercopithecus pygerythrus</i>	Vervet Monkey	High, likely to occur.	Widespread.	Least Concern
<b>Primates: Galagidae</b>				
<i>Galago moholi</i>	Southern Lesser Galago	High, likely to occur.	Wooded savanna, especially acacia woodland and riverine woodland.	Least Concern
<b>Lagomorpha: Leporidae</b>				
<i>Lepus saxatilis</i>	Shrub Hare	High, likely to occur (confirmed).	Savanna woodland and scrub with grass cover.	Least Concern
<i>Pronolagus randensis</i>	Jameson's Rock Rabbit	Low, absent on study site but could occur along the fence alignment where it is distal to human settlement areas.	Rocky habitat and isolated outcrops.	Least Concern
<b>Rodentia: Sciuridae</b>				
<i>Paraxerus cepapi</i>	Tree Squirrel	High, likely to occur.	Savanna woodland.	Least Concern
<b>Rodentia: Myoxidae</b>				
<i>Graphiurus murinus</i>	Woodland Dormouse	High, likely to occur.	Woodland areas.	Least Concern
<b>Rodentia: Pedetidae</b>				



Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<i>Pedetes capensis</i>	Springhare	High, likely to occur.	Open areas within savanna on sandy soils.	Least Concern
<b>Rodentia: Bathyergidae</b>				
<i>Cryptomys hottentotus</i>	African Mole-rat.	High, likely to occur.	Wide diversity of substrates, from sandy soil to heavier compacted types.	Least Concern
<b>Rodentia: Hystricidae</b>				
<i>Hystrix africaeaustralis</i>	Cape Porcupine	High, likely to occur.	Catholic but prefers broken country with hills and rocks.	Least Concern
<b>Rodentia: Thryonomyidae</b>				
<i>Thryonomys swinderianus</i>	Greater Cane-rat	High, likely to occur along the seasonal drainage line.	Reedbeds and dense vegetation near drainage lines.	Least Concern
<b>Rodentia: Muridae</b>				
<i>Saccostomus campestris</i>	Pouched Mouse	Likely to occur.	Catholic habitat requirements. Common in sandy substrate with scrub bush or cover in open woodland.	Least Concern
<i>Steatomys pratensis</i>	Fat Mouse	Likely to occur.	Partial to sandy soils in savanna and grassland.	Least Concern
<i>Dendromus melanotis</i>	Grey Climbing Mouse	High, could occur.	Stands of tall grasses (e.g. <i>Hyparrhenia</i> spp.) with bushes and other thick vegetation.	Least Concern
<i>Tatera leucogaster/brantsii</i> complex	Bushveld/Highveld Gerbil	High, likely to occur.	Savanna on sandy soils.	Data Deficient
<i>Acomys spinosissimus</i>	Spiny Mouse	High, likely to occur.	Rocky habitat	Least Concern
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	High, likely to occur.	Rocky habitat.	Least Concern
<i>Aethomys ineptus</i>	Tete Veld Rat	High, likely to occur.	Rocky habitat, in varied vegetation types but also partial to sandy soils.	Least Concern



Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<i>Rhabdomys pumilio</i>	Four-striped Grass Mouse	High, likely to occur.	Grassland and savanna with good grass cover.	Least Concern
<i>Lemniscomys rosalia</i>	Single-striped Mouse	High, likely to occur.	Tall grasslands.	Data Deficient
<i>Thallomys paedulus</i>	Acacia Rat	Could occur, however considered to occur in low densities due to low canopy height of woodland.	Widespread in savannas - partial to thorn trees.	Least Concern
<i>Mastomys coucha/natalensis</i>	Multimammate Mouse	High, likely to occur.	Wide habitat tolerance, including human habitation.	Least Concern
<i>Otomys angoniensis</i>	Angoni Vlei Rat	High, likely to occur along drainage line.	Grassland, abundant in moist habitats in damp soil along vleis, rivers and streams or on the fringes of a swamp.	Least Concern
<i>Otomys irroratus</i>	Vlei Rat	High, likely to occur along drainage line.	Grassland, abundant in moist habitats in damp soil along vleis, rivers and streams or on the fringes of a swamp.	Least Concern
<b>Carnivora: Canidae</b>				
<i>Canis mesomelas</i>	Black-Backed Jackal	High, likely to occur.	Wide habitat tolerance; arid, savanna and well watered regions. Absent from forests.	Least Concern
<b>Carnivora: Mustelidae</b>				
<i>Aonyx capensis</i>	Cape Clawless Otter	Medium, could occur along the seasonal drainage line.	Permanent rivers and streams with crustaceans and fish.	Least Concern
<i>Ictonyx striatus</i>	Striped Polecat	High, likely to occur.	Varied, from forest to grassland.	Least Concern
<i>Mellivora capensis</i>	Honey Badger	Medium, could occur.	Varied.	Near-threatened



Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<b>Carnivora: Herpestidae</b>				
<i>Mungos mungo</i>	Banded Mongoose	High, likely to occur.	Savannas.	Least Concern
<i>Galerella sanguinea</i>	Slender Mongoose	High, likely to occur.	Catholic habitat requirements, arid to more mesic regions. Cover in the form of holes in the ground, hollow logs or rocks are essential.	Least Concern
<i>Atilax paludinosus</i>	Marsh Mongoose	High, likely to occur.	Well-watered terrain in close association with streams, rivers, marshes, swamps,	Least Concern
			vleis, dams and tidal estuaries with reed cover or semi-aquatic grasses.	
<i>Ichneumia albicauda</i>	White-Tailed Mongoose	Moderate, could occur.	Savanna and grassland, also rural gardens.	Least Concern
<i>Cynictis penicillata</i>	Yellow Mongoose	High, likely to occur.	Open areas such as vleis and open grassland.	Least Concern
<b>Carnivora: Viverridae</b>				
<i>Genetta genetta</i>	Small-Spotted Genet	High, likely to occur.	Savanna, adapts well to rural gardens and urban areas.	Least Concern
<i>Genetta maculata</i>	Common Large-Spotted Genet	High, likely to occur.	Varied; adapts well to rural gardens and urban areas.	Least Concern
<i>Civettictis civetta</i>	African Civet	Likely to occur.	Wide habitat tolerance, but prefers dense vegetation.	Least Concern
<b>Carnivora: Hyaenidae</b>				
<i>Parahyaena brunnea</i>	Brown Hyaena	Likely to occur, especially in vicinity of landfill site. Known to occur in the area.	A savanna and grassland species, also sometimes penetrating urban areas.	Near-threatened (Near Threatened)
<b>Carnivora: Felidae</b>				



Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	Conservation Status
<i>Felis silvestris lybica</i>	African Wild Cat	High likely to occur	Varied, although cover is essential.	Least Concern
<i>Leptailurus serval</i>	Serval	Could occur in the tall grass along the drainage line.	Moist savanna with tall grass.	Near-threatened
<i>Caracal caracal</i>	Caracal	Could occur, probably absent due to human persecution.	Varied.	Least Concern
<b>Tubulidentata: Orycteropodidae</b>				
<i>Orycteropus afer</i>	Aardvark	Could occur - probably uncommon.	Open woodland with termitaria.	Least Concern
<b>Suiformes: Suidae</b>				
<i>Phacochoerus africanus</i>	Common Warthog	High, likely to occur.	Savanna areas with short grass cover and surface water.	Least Concern
<b>Ruminantia: Bovidae</b>				
<i>Strepsiceros zambesiensis</i> *	Zambezi Kudu	Could occur.	Savanna woodland.	Least Concern
<i>Tragelaphus sylvaticus</i> **	Cape Bushbuck	Could occur.	Forest, thickets and woodland.	Least Concern
<i>Raphicerus campestris</i>	Steenbok	High, likely to occur.	Drier savanna, grassland and shrublands.	Least Concern
<i>Sylvicapra grimmia</i>	Common Duiker	High, likely to occur.	Varied, all major biomes.	Least Concern





### Appendix F: Expected Amphibian Species

Name	Scientific	Vernacular Name	Occurrence	Habitat
<b>Bufonidae</b>				
	<i>Poyntonophrynus fenoulheti</i>	Northern Pygmy Toad	Could occur in rocky scenarios associated with the mountain bushveld on high elevations.	Bushveld and savanna, strongly associated with outcrops.
	<i>Amietophrynus garmani</i>	Eastern Olive Toad	High, likely to occur.	Vleis and pans in bushveld areas.
	<i>Amietophrynus poweri</i>	Western Olive Toad	High, likely to occur.	Vleis and pans in bushveld areas.
	<i>Amietophrynus gutturalis</i>	Guttural Toad	High, likely to occur.	Cosmopolitan, common in urban environments.
	<i>Schismaderma carens</i>	Red Toad	High, likely to occur.	Varied but prefers to breed within deep impoundments.
<b>Hyperoliidae</b>				
	<i>Kassina senegalensis</i>	Bubbling Kassina	High, likely to occur.	Inundated grassland and vleis.
<b>Microhylidae</b>				
	<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	High, likely to occur.	Bushveld vegetation but breed in temporary pools and shallow dams.
<b>Phrynobatrachidae</b>				
	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	Could occur during heavy rainfall - when dispersing.	Inundated grassy depressions.
<b>Ptychadenidae</b>				
	<i>Ptychadena anchietae</i>	Plain Grass Frog	Could occur during precipitation events.	Moist grassland bordering streams and ponds.



<b>Name</b>	<b>Scientific</b>	<b>Vernacular Name</b>	<b>Occurrence</b>	<b>Habitat</b>
	<i>Ptychadena mossambica</i>	Broad-banded Grass Frog	Could occur during precipitation events.	Moist grassland bordering streams and ponds.
<b>Pyxicephalidae</b>				
	<i>Amietia angolensis</i>	Common River Frog	Could occur along the drainage line.	Permanent rivers and streams.
	<i>Cacosternum boettgeri</i>	Boettger's Caco	High, likely to occur.	Marsh, vleis and inundated grassland.
	<i>Pyxicephalus adspersus</i>	Giant Bullfrog	Could occur when dispersing.	Seasonal depressions in grassland.
	<i>Pyxicephalus edulis</i>	Edible Bullfrog	Could occur when dispersing.	Seasonal depressions in woodland.
	<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	High, could occur.	Varied, breed in shallow water at the edges of dams and pools.
	<i>Tomopterna natalensis</i>	Natal Sand Frog	High, could occur.	Temporally rain filled pools.
<b>Pipidae</b>				
	<i>Xenopus laevis</i>	Common Platanna	Occurrence is based on the presence of permanent water.	Permanent ponds and rivers.
<b>Rhacophoridae</b>				
	<i>Chiromantis xerampelina</i>	Southern Foam Nest Frog	Low, probably absent on study site.	Permanent or seasonal bodies of water in bushveld.

### Appendix G: Reptile Species Expected

Scientific Name	Common Name	Occurrence	Habitat Description	Conservation Status
<b>Cheloniana</b>				
<i>Stigmochelys pardalis</i>	Leopard Tortoise	Likely to occur	Varied, from montane grassland to arid savanna.	
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	Likely to occur	Thornveld and <i>Burkea</i> savanna	
<b>Snakes</b>				
<i>Aparallactus capensis</i>	Cape Centipede Eater	High, likely to occur	Varied; including highveld and montane grassland, savanna and coastal bush; termitaria important.	
<i>Atractaspis bibronii</i>	Southern Stiletto Snake	High, could occur	Varied, but found under stones or in disused termitaria.	
<i>Atractaspis duerdeni</i>	Beaked Stiletto Snake	Could occur	Sandy soils in thornveld.	SA Endemic
<i>Bitis arietans arietans</i>	Puff Adder	High, likely to occur	Absent only from desert, dense forest and mountains.	
<i>Causus rhombeatus</i>	Rhombic Night Adder	High, likely to occur	Mesic savanna.	
<i>Crotaphopeltis hotamboeia</i>	Herald Snake	High, likely to occur	Savanna and open woodland.	
<i>Dasypeltis scabra</i>	Rhombic Egg Eater	High, likely to occur	Absent only from true desert and closed canopy.	
<i>Dispholidus typus</i>	Boomslang	High, likely to occur	Savanna	



Scientific Name	Common Name	Occurrence	Habitat Description	Conservation Status
<i>Dendroaspis polylepis</i>	Black Mamba	Could occur	Varied, prefers burrows, rock outcrops and savanna.	
<i>Boaedon capensis</i>	Brown House Snake	High, likely to occur	Common in highveld grassland and arid karroid regions, tolerant of urban sprawl.	
<i>Leptotyphlops incognitus</i>	Incognito Worm Snake	High. Likely to occur	Varied, from lowland forest to grassland.	
<i>Leptotyphlops s. scutifrons</i>	Peter's Worm Snake	High, likely to occur	Varied; grassland, coastal bush and mesic and arid savanna.	
<i>Lycophidion capense</i>	Cape Wolf Snake	High, likely to occur	Varied, grassland and savanna, entering coastal bush and fynbos.	
<i>Mehelya c. capensis</i>	Southern File Snake	Could occur	Savanna, but also forest and arid areas.	
<i>Naja annulifera</i>	Snouted Cobra	High, likely to occur	Mesic savanna and bushveld areas.	
<b><i>Naja mossambica</i></b>	<b>Mozambique Spitting Cobra</b>	High, likely to occur	Savanna.	
<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	High, likely to occur	Varied, coastal bush and mesic bushveld.	
<b><i>Philothamnus semivariegatus</i></b>	<b>Spotted Bush Snake</b>	High, likely to occur	Open forest or savanna, extending into arid regions.	
<i>Prosymna bivittata</i>	Two-striped Shovel-snout	Peripheral	<i>Acacia</i> savanna.	SA Endemic
<b><i>Psammophis brevirostris</i></b>	<b>Short-Snouted Whip Snake</b>	High, likely to occur	Varied; rocky and arid savanna.	



Scientific Name	Common Name	Occurrence	Habitat Description	Conservation Status
<b><i>Psammophis subtaeniatus</i></b>	<b>Western Yellow-bellied Sand Snake</b>	Could occur	Dry savanna and thornveld.	
<i>Psammophylax rhombeatus</i>	Spotted Skaapsteker	Medium, could occur	Highveld grassland and mesic thicket	
<b><i>Psammophylax tritaeniatus</i></b>	<b>Striped Skaapsteker</b>	High, likely to occur	Open grassland and savanna.	
<i>Pseudaspis cana</i>	Mole Snake	Could occur	Sandy scrubland in SW Cape, highveld grasslands, mountainous and desert regions.	
<i>Python natalensis</i>	Southern African Python	Could occur.	Open savanna, rocky areas and riverine scrub.	
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	High, likely to occur	Varied, semi-desert, coastal bush, fynbos and savanna.	SA Endemic
<i>Telescopus semiannulatus</i>	Eastern Tiger Snake	Could occur	Savanna and sandveld.	
<i>Typhlops bibronii</i>	Bibron's Blind Snake	High, could occur	Highveld and coastal grassland.	SA Endemic
<b>Lizards</b>				
<i>Agama aculeata distanti</i>	Ground Agama	High, likely to occur	Semi-desert to savanna.	SA Endemic
<i>Agama a. atra</i>	Southern Rock Agama	High, likely to occur	Outcrops in mountain grassland.	SA Endemic
<b><i>Acanthocercus atricollis</i></b>	<b>Southern Tree Agama</b>	Could occur.	Aboreal	
<b><i>Chamaeleo dilepis</i></b>	<b>Flap-necked Chameleon</b>	Likely to occur.	Woodland areas.	
<b><i>Cordylus vittifer</i></b>	<b>Transvaal Girdled Lizard</b>	High, likely to occur.	Rocky outcrops in mesic savanna	SA Endemic
<i>Chondrodactylus turneri</i>	Turner's Thick-toed Gecko	Could occur	Outcrops	





Scientific Name	Common Name	Occurrence	Habitat Description	Conservation Status
<b><i>Gerrhosaurus flavigularis</i></b>	<b>Yellow-throated Plated Lizard</b>	High, likely to occur	Varied; grassland, savanna, bushveld and low open coastal forest.	
<i>Ichnotropis squamulosa</i>	Common Rough-scaled Lizard	High, likely to occur	Mesic savanna.	
<b><i>Lygodactylus c. capensis</i></b>	<b>Common Dwarf Gecko</b>	High.	Well-wooded, savanna and sub-tropical thicket.	
<i>Nucras holubi</i>	Holub's Sandveld Lizard	Medium, could occur	Broken terrain.	
<b><i>Nucras intertexta</i></b>	<b>Spotted Sandveld Lizard</b>	High.	Arid savanna.	SA Endemic
<b><i>Pachydactylus affinis</i></b>	<b>Transvaal Thick-toad Gecko</b>	Could occur	Varied, in arid bushveld	SA Endemic
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-Eyed Skink	High.	Arid and mesic savanna.	
<i>Pedioplanis l. lineocellata</i>	Spotted Sand Lizard	Could occur.	Varies, arid and mesic savanna	SA Endemic
<b><i>Trachylepis capensis</i></b>	<b>Cape Skink</b>	High, likely to occur	Very varied.	
<b><i>Trachylepis punctatissima</i></b>	<b>Speckled Rock Skink</b>	High.	Rocky situations.	
<b><i>Trachylepis varia</i></b>	<b>Variable Skink</b>	High.	Varied: grassland to arid and mesic savanna.	
<b><i>Varanus albigularis</i></b>	<b>Rock Monitor</b>	Could occur	Arid savanna and broken terrain	
<b><i>Varanus niloticus</i></b>	<b>Water Monitor</b>	Could occur along the drainage line	Nearly always associated with wetland features	

Fauna and Flora Basic Assessment

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