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TERRESTRIAL ECOLOGY ASSESSMENT FOR TUTUKA POWER STATION DISPOSAL SITE EXTENSION

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REPORT

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Executive Summary

Zitholele Consulting appointed Golder Associates Africa (Pty) Ltd (GAA) Ecology Division to conduct the baseline ecological studies and ecological impact assessment for the planned extension of the existing waste disposal site at Tutuka Power Station, *circa* 20 km north-west of the town of Standerton in the Mpumalanga Province, South Africa.

The terms of reference for the Terrestrial Ecosystems Specialist Study are:

- To conduct a flora and fauna study of the site;
- To conduct a survey of threatened species (Red Data fauna and flora species) of the proposed affected study site;
- To conduct a fauna habitat assessment (including habitat potentially suitable for threatened species);
- To provide an indication of the relative conservation importance and ecological function of the study site;
- To assess the condition of the plant communities on the study site; and
- To assess the impacts of the proposed activity on the species and ecological integrity and processes of the study site.

In order to obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in any area, vegetation and faunal assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time and budget constraints, such long-term studies are not feasible and conclusions will be based on a single seasonal sampling bout undertaken in January 2010.

The physiognomy of the area is characterized by the dominance of the herbaceous component consisting predominantly of grass species, while the woody stratum is very poorly represented. This is very much what would be expected in this area due to the area falling within the Grassland Biome and Soweto Highveld Grassland vegetation type. A pristine species composition would dictate a slightly more diverse herbaceous stratum, but the occurrent species rather than the species diversity in this area are more obvious indicators of the historical impacts on the area.

Forbs and other herbs are moderately represented, but the dominance of many of these species also indicates the degraded status of the vegetation community. This is especially visible in the north-western quarter of the study area. A total of 58 plant species were identified during the site investigation. Herbs and graminoids (grasses) dominate the composition.

The following vegetation communities were identified during the study, and are named according to the area in which they occur, physiognomy and/or dominant floral species occurring within the vegetation communities:

- *Themeda triandra* grassland;
- *Themeda – Hyparrhenia mixed grassland* ;
- Natural Riparian Wetland;
- Artificial wetland associated with diggings;
- Existing waste disposal site.



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No Red Data species were recorded during the 2010 survey. According to the Mpumalanga Parks and Tourism Authority (MPTA) records only two Red Data plant species have been recorded in the 2629CC grid square and both of these species were found more than 20 km away from the study area.

A total of 34 arthropods, 3 reptiles, 4 amphibians, 31 birds and 4 mammal species were recorded during the 2010 surveys.

Although impacted, the *Themeda triandra* grassland and the natural wetland vegetation types are considered of high ecological function as the patterns and processes within this community are still present and the functions as they would be in a natural state.

The *Themeda-Hyparrhenia* grassland vegetation type can be considered as being of moderate ecological status as some of the patterns and processes in these areas have been diminished or eliminated by anthropogenic impacts. Further extensive impacts in these areas could cause rapid and perhaps irreversible degradation of these areas.

The artificial wetlands and existing waste disposal areas have low ecological function due to anthropogenic impacts. Natural patterns and processes in these areas have been severely reduced or, in extreme cases, almost completely eliminated. These areas can be considered as irreversibly or close to irreversibly degraded. Further impacts in these areas are unlikely to cause further degradation with regard to the vegetation, but some effects of degradation such as the invasion of exotic species may infiltrate the surrounding vegetation types.

The areas with high conservation importance are the *Themeda triandra* grassland and the natural wetland vegetation types due to the fact that these areas are the least impacted areas. These vegetation types also have far higher levels of biodiversity than the surrounding areas and the likelihood of Red Data species occurring in these areas is also considered moderate.

The *Themeda-Hyparrhenia* grassland vegetation type (which includes the previously cultivated areas and road reserves) can be considered as being of moderate conservation importance as, although invaded by some exotic species and disturbed in some areas, these vegetation types support a large number of species and are not severely degraded. The existence of Red Data in this community cannot be excluded outright and therefore in line with the precautionary principle these communities were classified as being of moderate conservation importance.

Due to the severely impacted state of the artificial wetlands and existing disposal area, these areas were classified as being of low conservation importance. These areas are however in close proximity to the areas of high conservation importance thereby creating edge effects into the areas of high conservation importance through a number of ecological (invasion of exotics, erosion etc.) and anthropogenic factors. These factors all reduce the connectivity of the areas of high conservation importance.



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Southern African mammals, species known to occur in the 2629CC grid square are highlighted



1.0 INTRODUCTION

Zitholele Consulting appointed Golder Associates Africa (Pty) Ltd (GAA) Ecology Division to conduct the baseline ecological studies and ecological impact assessment for the planned extension of the existing waste disposal site at Tutuka Power Station, *circa* 20 km north-west of the town of Standerton in the Mpumalanga Province, South Africa.

2.0 PROJECT DESCRIPTION

2.1 Background and location

Eskom is currently operating the Tutuka Power Station as part of its electricity generation network. Throughout the operational life of the Power Station, general waste, inclusive of garden waste and building rubble, is generated. This waste is disposed of in an authorised general waste disposal site within the Tutuka Power Station premises.

The current waste disposal site also provides disposal services to New Denmark Colliery, Thuthukani Township, Tutuka Power Station, selected contractors and some neighbouring farmers. This particular disposal site has, subsequent to its establishment, reached its capacity, and as of the end of October 2008, the waste has been transported to a waste disposal site at Kriel town, which is approximately 200 km away. The associated transportation costs are high and therefore an alternative, sustainable, means of waste disposal needs to be put in place.

To minimise the operational costs of the waste disposal, potential sites have been identified within the Tutuka Power Station premises, one of which is located immediately adjacent (contiguous) to the existing waste disposal site and would result in an extension of the existing domestic waste disposal site. Another proposed alternative to provision of disposal space was an amendment to the height limitation of the current waste disposal site. As a means to comply with the necessary legal requirements, the new / extended waste disposal site and waste disposal activities must be appropriately designed and licensed, in line with the requirements of the EIA and NEMWA legislation. The operators of Tutuka Power Station intend to increase the size of the waste disposal area situated to the west of the Tutuka power station from its present size of 3.2 ha to encompass a total land area of 10 - 15 ha. The area will also include other infrastructure such as roads and fences, for this reason an area of *circa* 48 ha was encompassed within the study area, which is shown in Figure 1.

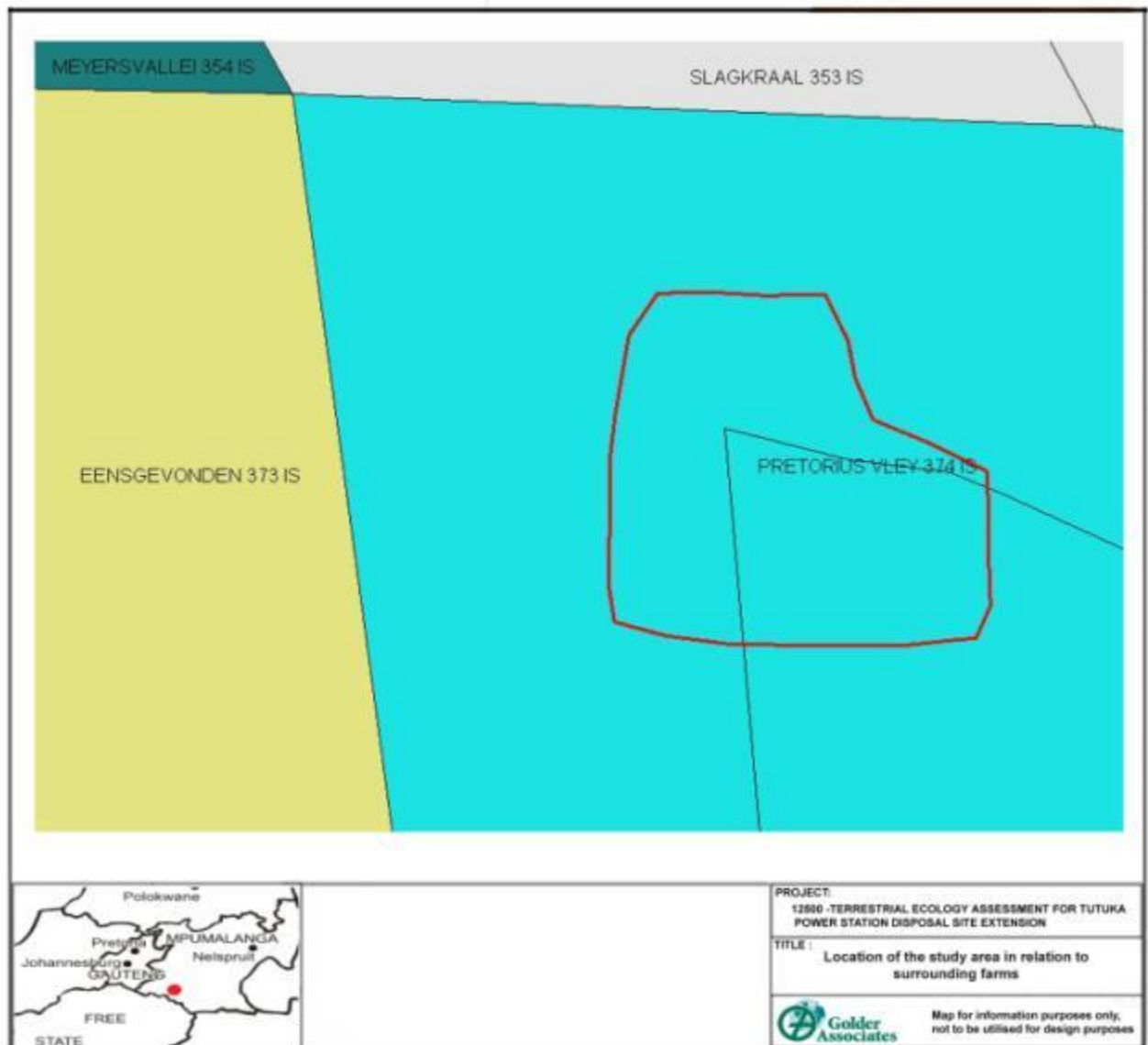


Figure 1: Study area encompassing the proposed extension of the waste disposal site.

3.0 TERMS OF REFERENCE

The terms of reference for the terrestrial ecosystems specialist study are:

- To conduct a flora and fauna study of the site;
- To conduct a survey of threatened species (Red Data fauna and flora species), of the proposed affected study site;
- To conduct a fauna habitat assessment (including habitat potentially suitable for threatened species);
- To provide an indication of the relative conservation importance and ecological function of the study site;
- To assess the condition of the plant communities on the study site; and



- To assess the impacts of the proposed activity on the species and ecological integrity and processes of the study site.

4.0 AIMS AND OBJECTIVES

The aims and objectives of the assessment of the impact on flora and fauna are:

- To present the client with broad descriptions of floristic and fauna elements occurring within the study area and to highlight sensitive biological and environmental attributes that may be adversely affected by the proposed development;
- To provide a broad description of the ecology of the site and surrounding areas;
- To identify and describe the biodiversity patterns at community and ecosystem level (plant and animal communities in the vicinity and threatened/vulnerable species and ecosystems), species level (Red Data Book species, presence of alien species) and significant landscape features;
- To make general comment on how biodiversity processes would be affected; and
- To identify potential impacts and make recommendations to prevent or mitigate these impacts.

5.0 SCOPE OF WORK

5.1 Flora Component

The scope of work comprises the following tasks:

- Conduct an initial desktop review of vegetation likely to occur on-site;
- Develop a species list of Red Data and protected plants according to the relevant literature for the IUCN and southern Africa;
- Conduct a detailed wet season survey (using standard scientific methodology), in order to:
 - Identify general vegetation types and communities on-site;
 - Identify dominant plant species;
 - Record Red Data and protected species;
 - Identify invader or exotic species;
 - Identify flora species with potential medicinal, cultural or commercial importance;
 - Identify sensitive landscapes and habitats including wetland and riparian habitats as these are often intricately linked to the surrounding terrestrial habitats;
 - Identify possible impacts of the proposed development during the operation of the mine.

5.2 Fauna Component

The tasks for the fauna component comprise the following:

- Conduct initial desktop review of fauna species likely to occur on-site
- Develop a species list of Red Data and protected animals according to the Southern African and IUCN protected and Red Data species lists



- Conduct a detailed wet season survey (using standard scientific methodology), in order to:
 - Identify terrestrial fauna linked to veld types and vegetation communities on-site, including:
 - Identify the dominant fauna species on-site, as well as invertebrates;
 - Record Red Data and protected fauna species;
 - Identify any exotic species; and
 - Identify possible impacts of the proposed development.

5.3 Limitations to the study

In order to obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in any area, vegetation and faunal assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time and budget constraints, such long-term studies are not feasible and conclusions will be based on a single seasonal sampling bout undertaken in January 2010. Problems with this method include the following:

- Longer term temporal changes in biodiversity are not taken into account during annual sampling bouts; and
- Variations in biodiversity due to longer term temporal animal movements, such as migrations, are not taken into account.

The report is based on the following assumptions:

- The accuracy of GPS points taken in the field is within 15m.
- The accuracy of delineations carried out on satellite imagery/digital orthophotos, is limited by the level of accuracy at which the client supplies them. GAA was not responsible for geo-rectifying imagery.
- Delineations and related spatial data generated by GAA can be supplied in GIS (shapefile) format only and will be for use in conceptual planning purposes only and not detailed design.
- The assessment of the impact of past activities on the ecosystems will be based on professional judgement.
- Historical data relating to terrestrial ecosystems provided to GAA by the client is assumed to be correct.
- Data and information obtained through official documents or websites, peer reviewed scientific articles and previous ecological studies are assumed to be correct.
- No review or correction of any data obtained by any means, other than the study itself, will be undertaken by GAA.
- It is noted that unusual environmental conditions (such as unusual high or low rainfall) may cause unusual states of biodiversity during the period of study, which may not normally exist.



6.0 METHODOLOGY

In order to enable characterisation of the environment, as well as of floral and faunal species that may be impacted on by the proposed mining activities, faunal and floral groups were investigated. These species were then later used to determine the possible magnitude of the impact of the proposed activities. The groups of species investigated included:

- Vegetation
- Arthropoda
- Avifauna
- Mammals
- Herpetofauna (Reptiles)
- Amphibia

All methods used were based on standard scientific investigative techniques. The “Precautionary Principle” was applied in this assessment (COMEST, 2005). According to Raffensperger & Tickner (1999), the precautionary principle is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action. The principle implies that there is a responsibility to intervene and protect the public from exposure to harm where scientific investigation discovers a plausible risk in the course of having screened for other suspected causes. The protections that mitigate suspected risks can be relaxed only if further scientific findings emerge that more robustly support an alternative explanation. In some legal systems, as in the law of the European Union, the precautionary principle is also a general and compulsory principle of law.

6.1 General floristic attributes

The vegetation assessment was based on a variation of the Braun-Blanquet method whereby vegetation is stratified by means of aerial/satellite imagery with physiognomic characteristics as a first approximation. Based on a RGB colour composite a supervised classification was done using 14 colour classes, these classes were run through a Spectral Angle Mapper (SAM) algorithm to produce the classified image. The image was subsequently analysed and compared with “ground-truthing” sample areas in the study area to test the validity of the image analysis. These representative areas were then surveyed by means of line-point transects for grasses, sedges and forbs, as well as belt transects for shrubs and trees. Data obtained from these surveys, were then subject to analysis in order to establish differences or similarities between observed units. Flora and fauna surveys were conducted in January 2010 and cognisance was taken of the following environmental attributes and general information:

- Biophysical environment (geology, topography, aspect, slope etc.);
- Regional vegetation;
- Current status of habitats;
- Red Data habitat suitability;
- Digital photographs;
- GPS reference points;
- Phytosociological data accumulated include the following:
- Plant species and growth forms;



- Dominant plant species;
- Cover abundance values; and
- Samples or digital images of unidentified plant species.

Three survey plots were identified within each of the vegetation types identified within the study area, giving a total of 9 sites in which vegetation surveys were conducted. Originally 20 random plots per community were selected using the aerial photography. These sites were then reduced in order to select three sufficiently spaced random plots within each community. In these plots 3x50 m belt transects were conducted in order to determine the diversity and abundance of tree and shrub species. Three 50 m point transects were conducted in order to determine the herbaceous species (graminoids, cyperoids and herbs) diversity and abundance. The desktop analysis of data was used to establish differences or similarities between vegetation communities, which were then described in terms of floristic species composition as well as driving environmental parameters. Results and species lists provided should be interpreted with the above mentioned survey limitations in mind.

6.2 Red Data floral assessment

Baseline PRECIS data for the 2629CC quarter degree grid square, was compared to the Mpumalanga Province Protected and Red Data plant species list to compile a list of Red Data plant species that may potentially occur within the study area.

A survey of this kind (instantaneous sampling bout or “snapshot” investigation) poses severe limitations to the identification of Red Data plant species. Therefore, emphasis was placed on the identification of habitat that would be suitable for sustaining Red Data plant species, by associating available habitat to known habitat requirements of Red Data plant species.

6.3 Floristic sensitivity analysis

Floristic sensitivity analysis was determined by subjectively assessing the ecological function and conservation importance of the vegetation, as defined in Table 1.

Table 1: Rating of ecological function and conservation importance.

	Ecological function	Conservation importance
High	Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystems integrity (e.g. pristine grasslands, pristine wetlands and pristine ridges).	Ecosystems with high species richness and usually provide suitable habitat for a number of threatened species. Usually termed ‘no-go’ areas and unsuitable for development, and should be protected.
Medium	Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem.	Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be allowed, provided the current species diversity is conserved.
Low	Degraded and highly disturbed systems with little or no ecological function.	Areas with little or no conservation potential and usually species poor (most species are usually exotic).



6.4 General faunal attributes

6.4.1 Arthropoda

Arthropods were surveyed by means of setting out pitfall traps, in selected areas within the various vegetation communities, and intensive transects making use of visual identification. Capture of species on the wing was also undertaken in order to aid identification, and this was done by means of sweep-netting. Identification of species was done to the lowest possible taxonomic level using Picker, *et al* (2002).

Suitable habitat was identified for scorpions, spiders and butterflies in order to select areas in which to sample by means of pitfall traps and visual identification, as well as to determine the possibility of the occurrences of Red Data or protected species of these taxa.

6.4.2 Reptilia

Suitable areas were identified and sampled using active search and capture methods. Searches were concentrated in rocky areas and disused ant hills were investigated for the presence of snakes. Snakes and other reptiles were identified visually and only captured if visual identification was hampered by swift-moving snakes or if the snake was obscured from view. Branch (1996) was used as an identification guide, where necessary.

6.4.3 Amphibia

Suitable areas for frogs were sampled by means of active search and capture and acoustic identification methods, especially at night when highest amphibian activity was expected. Areas were also netted for tadpoles and amphibian species identified by means of tadpoles. Carruthers (2001) was used to confirm identification where necessary.

6.4.4 Avifauna (birds)

Avifauna were surveyed by means of transects, point counts and visual identification and the calls of bird species were used to identify species. Where possible, visual identification was used to confirm call identification. Bird ranges were confirmed using Harrison, *et al* (1997a and b).

6.4.5 Mammalia

Visual sightings and ecological indications were used to identify the small mammal inhabitants of the study area. Scats were collected and used for identification of small nocturnal mammals. Stuart and Stuart (1993) and Smithers (1992) were used for identification purposes.

6.5 Red Data faunal assessment

The following parameters were used to assess the probability of occurrence of each Red Data species:

Habitat requirements (HR): Most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics in the study area was evaluated.

Habitat status (HS): The status or ecological condition of available habitat in the area was assessed. Often a high level of habitat degradation prevalent in a specific habitat will negate the potential presence of Red Data species (this is especially evident in wetland habitats).

Habitat linkage (HL): Movement between areas for breeding and feeding forms an essential part of the existence of many species. Connectivity of the study area to surrounding habitat and the adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area.

Probability of occurrence is presented in four categories, namely:

- Low;
- Medium;



- High; and
- Recorded.

In order to assess the status of Red Data fauna species in the study area, the following sources were used:

- South African Red Data Book – Reptiles and Amphibians (Branch, 1998).
- Red Data Book of the Mammals of South Africa (EWT, 2004).
- South African Red Data Book – Butterflies (Henning, S.F. and Henning, G.A, 1989).
- IUCN Red List Categories and Criteria (IUCN, 2008).
- IUCN Red List of Threatened Species (IUCN, 2008).
- Atlas and Red Data Book of the Frogs of South Africa (Minter, Burger, Harrison, Braack, Bishop and Kloepfer, 2004).
- South African Red Data Book – Terrestrial Mammals (Smithers, 1986).

6.6 Biodiversity impact evaluations

Any development in a natural or semi-natural system will impact on the environment, usually with adverse effects. This phase of the study assessed the significance of potential impacts of current and proposed future activities at the study site on the receiving wetland environment of the study area, and was intended to achieve the following:

- Describe and assess future impacts arising from activities on the fauna and flora of the wetlands of the study area.
- Recommend mitigation measures to address significant impact.
- Identify aspects which may require further study.

6.6.1 Assessment of significance

From a technical, conceptual or philosophical perspective the focus of impact assessment ultimately narrows down to a judgment on whether the predicted impacts are significant or not (DEAT, 2002). The concept of significance is at the core of impact identification, prediction, evaluation and decision-making (DEAT, 2002). The determination of significant impacts relates to the degree of change in the environmental resource measured against some standard or threshold (DEAT, 2002). This requires a definition of the magnitude, prevalence, duration, frequency and likelihood of potential change (DEAT, 2002). The following criteria have been proposed by the Department of Environmental Affairs and Tourism (DEAT, 2002) for the description of the magnitude and significance of impacts (DEAT, 2002).

The *consequence* of impacts can be derived by considering the following criteria:

- Extent or spatial scale of the impact.
- Intensity or severity of the impact.
- Duration of the impact.
- Potential for mitigation.
- Acceptability.
- Degree of certainty/probability.



- Status of the impact.
- Legal Requirements.

Describing the potential impact in terms of the above criteria provides a consistent and systematic basis for the comparison and application of judgments (DEAT, 2002). Calculation of the severity of the impact is based on the Department of Environmental Affairs' guideline document on EIA Regulations, April 1998.

Significance of Impact = Consequence (magnitude + duration + spatial scale) x Probability

Magnitude relates to how severe the impact is. Duration relates to how long the impact may be prevalent for and the spatial scale relates to the physical area that would be affected by the impact. Having ranked the severity, duration and spatial scale using the criteria outlined in Table 2 the overall consequence of impact can be determined by adding the individual scores assigned in the severity, duration and spatial scale. Overall probability of the impacts must then be determined. Probability refers to how likely it is that the impact may occur.

Table 2: Consequence and probability ranking.

Magnitude/Severity	Duration	Spatial Scale	Probability
10 - Very high/don't know	5 - Permanent	5 - International	5 - Definite/don't know
8 - High	4 - Long-term (impact ceases after operational life)	4 - National	4 - Highly probable
6 - Moderate	3 - Medium-term (5-15 years)	3 - Regional	3 - Medium probability
4 - Low	2 - Short-term (0-5 years)	2 - Local	2 - Low probability
2 - Minor	1 - Immediate	1- Site only	1 - Improbable
0 - None			0 - None

The maximum value, which can be obtained, is 100 significance points (SP). Environmental effects are rated as either of **High, Moderate, Low or No Impact** significance on the following basis:

- SP>60 Indicates high environmental significance
- SP 30 to 60 Indicates moderate environmental significance
- SP<30 Indicates low environmental significance
- SP = 0 Indicated no environmental impact

The descriptors for the ratings (DEAT, 2002) are as follows:

- High Of the highest order possible within the bounds of impacts that could occur, There is no possible mitigation that could offset the impact, or mitigation is difficult.
- Moderate Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Mitigation is both feasible and fairly easily possible



- Low Impact is of a low order and therefore likely to have little real effect. Mitigation is either easily achieved or little mitigation is required, or both.
- No impact Zero Impact

6.6.2 Development of mitigation measures

The quantitative accuracy and precision of impact predictions is particularly important for prescribing mitigation measures (DEAT, 2002). This is especially important for those impacts, pollutants or resources that require the setting of a site-specific discharge limit or need to be within legislated standards (DEAT, 2002). A common approach to describing mitigation measures for critical impacts is to specify a range of targets with predetermined acceptable range and an associated monitoring and evaluation plan (DEAT, 2002).

To ensure successful implementation, mitigation measures should be unambiguous statements of actions and requirements that are practical to execute (DEAT, 2002). A summary of the different approaches used to prescribe and design mitigation measures follows:

- Avoidance Mitigation by not carrying out the proposed action.
- Minimisation Mitigation by scaling down the magnitude of a development, re-orienting the layout of the project or employing technology to limit the undesirable environmental impact.
- Rectification Mitigation through the restoration of environments affected by the action.
- Reduction Mitigation by taking maintenance steps during the course of the action.

7.0 THE BIOPHYSICAL ENVIRONMENT

7.1 Location

The proposed development is located approximately 20 km north-east of Standerton in the Mpumalanga Province, South Africa (Figure 2). The operations are situated on the property of the Eskom Tutuka power station. The regional location of the study area is shown in Figure 2. This area falls within the Soweto Highveld Grassland vegetation type which, in turn, falls within the Grassland Biome (Figure 3).

The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZuluNatal and the Eastern Cape. The topography is mainly flat and rolling, but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.



TERRESTRIAL ECOLOGY ASSESSMENT

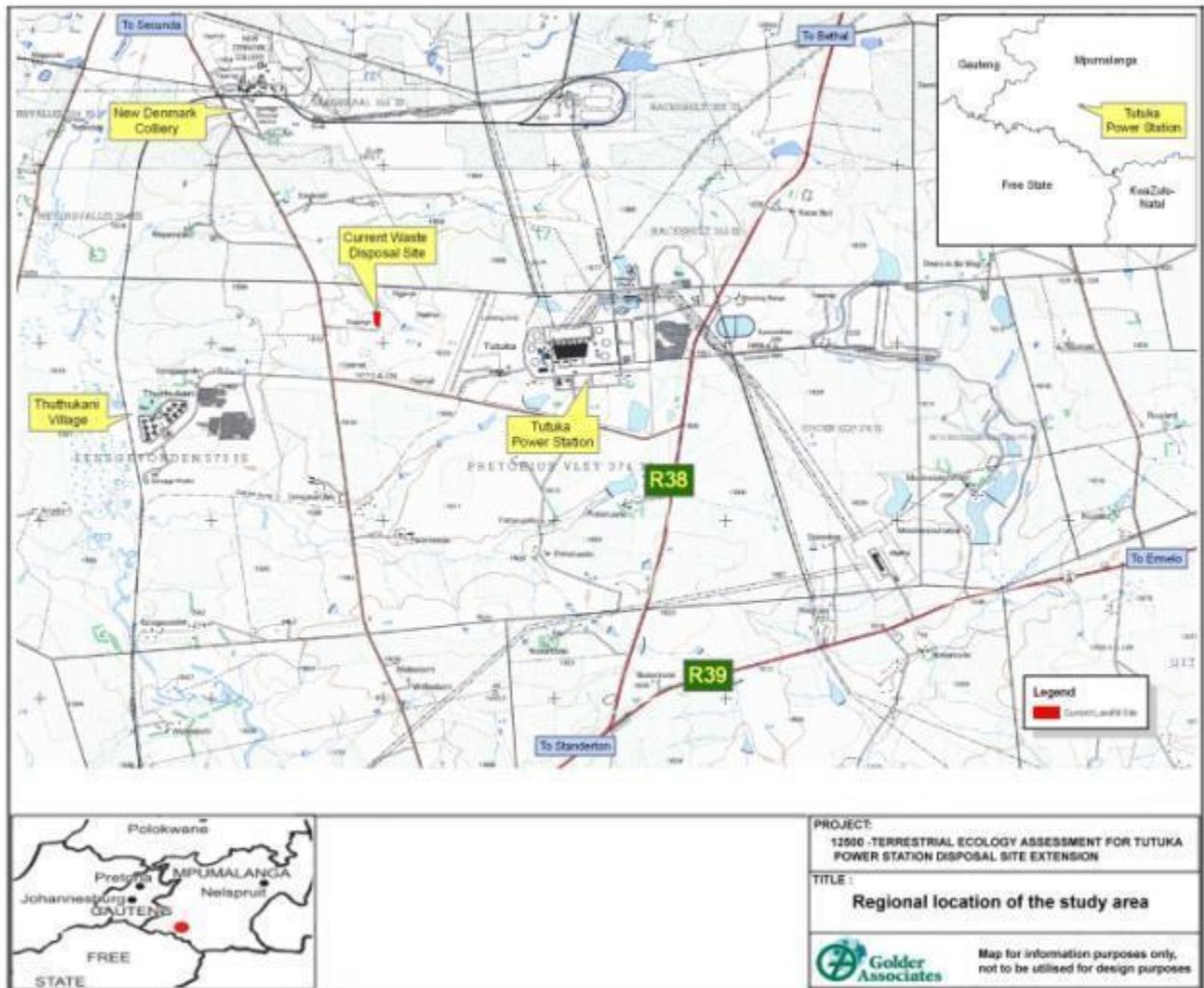


Figure 2: Regional location of the study area.

Grasslands (also known locally as Grassveld) are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

There are two categories of grass plants: sweet grasses have a lower fibre content, maintain their nutrients in the leaves in winter and are therefore palatable to stock. Sour grasses have a higher fibre content and tend to withdraw their nutrients from the leaves during winter so that they are unpalatable to stock. At higher rainfall and on more acidic soils, sour grasses prevail, with 625 mm per year taken as the level at which unpalatable grasses predominate. C4 ("warm season") grasses dominate throughout the biome, except at the highest altitudes where C3 ("cold season") grasses become prominent.

Grass plants tolerate grazing, fire, and even mowing, well: most produce new stems readily, using a wide variety of strategies. Overgrazing tends to increase the proportion of pioneer, creeping and annual grasses, and it is in the transition zones between sweet and sour grass dominance that careful management is required to maintain the abundance of sweet grasses. The Grassland Biome is the mainstay of dairy, beef and wool production in South Africa. Pastures may be augmented in wetter areas by the addition of legumes and sweet grasses.



The Grassland Biome is the cornerstone of the maize crop, and many grassland types have been converted to this crop. Sorghum, wheat and sunflowers are also farmed on a smaller scale.

Urbanization is a major additional influence on the loss of natural areas - the Witwatersrand is centred in this biome. The Grassland Biome is considered to have an extremely high biodiversity, second only to the Fynbos Biome. Rare plants are often found in the grasslands, especially in the escarpment area. These rare species are often endangered, comprising mainly endemic geophytes or dicotyledonous herbaceous plants. Very few grasses are rare or endangered. The scenic splendour of the escarpment region attracts many tourists.

7.2 Overview of the Highveld Grassland Ecoregion

The ecoregion draws its name from the high interior plateau known as the Highveld, and the expansive cover of species-rich communities of grasses. The ecoregion is bordered by the Drakensberg in the east, the arid Karoo and Kalahari in the west, and the low-lying bushveld to the north. The Highveld Plateau is fairly flat with elevations varying from 1,400 m to 1,800 m. The flat topography means that the landscape is traversed by many meandering rivers, with the grassland community historically playing an important role in natural water purification of the westward flowing rivers that originate on the Drakensberg escarpment (Davies and Day 1998). The functioning of this ecosystem has been disrupted in many areas by water transfer projects that have been built to supply greater Johannesburg with water (Davies and Day 1998).

The dominant vegetation comprises grasses, with geophytes and herbs also being well represented. Dominant and diagnostic grass species are *Hyparrhenia hirta* and *Sporobolus pyramidalis*. Non-grassy trees and forbs include *Acacia sieberiana*, *Rhus rehmanniana*, *Walafrida densiflora*, *Spermacoce natalensis*, *Kohautia cynanchica*, and *Phyllanthus glaucophyllus* (Bredenkamp et al. 1989; Coetzee et al. 1993; Eckhardt et al. 1993; Fuls et al. 1993; Cowling et al. 1997).

Relatively high rainfall maintains the grasslands during the summer months, with the mean annual range between 400 to 900 mm. Mean maximum temperatures range from 21 to 24 °C, and mean minimums range from 3 to 6 °C, with temperatures sometimes reaching 38 °C in the summer and –11 °C in the winter. Summer rainfall is not evenly distributed throughout the region, resulting in several different habitat types. Differences in habitat types are further accentuated by the variable soil characteristics of the region. Over most of the area sandstones and shales of the Karoo sequence are dominant. Deep red sand-loam soils dominate towards the cooler and wetter northeast, and transition to shallower lithosols in the extreme northeast (Low and Rebelo 1998).

Some dissent surrounds the number of diagnostic habitat types that comprise Highveld Grasslands. Several authors (White 1983; Acocks 1988; Low and Rebelo 1998) prefer detailed subdivision, and others advocate the aggregation of habitat types (Rutherford and Westfall, 1986). Here, the Highveld Grassland ecoregion is divided into three habitat types: (1) Kalahari/Karoo-highveld transition zone; (2) sweet grasslands; and (3) sour grasslands (see also Harrison et al. 1997). In the western half of the ecoregion, a gradual transition occurs from the Karoo/Kalahari-highveld transition zone to the grassland habitats of the Highveld. Shrubs and trees grow in the transition zone, although grasses still dominate. This ecotone borders the sweet grasslands, which occur predominately in areas with lower rainfall (Rutherford and Westfall 1986).

7.2.1 Biodiversity Features

Although highly fragmented, the Highveld contains the greatest expanse of remaining grassland in southern Africa. Analyses of pollen spores from the Winterberg escarpment suggest that grasses have dominated the floral community since at least the early Holocene (Meadows and Meadows 1988; Meadows and Linder 1993). At times, Highveld grassland types have expanded or contracted in response to climate change. During the Quaternary, grassland expanded in response to glacial events to the north. Global climate change may again alter the ecotonal nature of the Karoo/Kalahari-highveld grassland in the extreme west of the ecoregion, with arid-adapted species of the Karoo/Kalahari ecoregions encroaching onto sweet grassland. Despite the severely degraded nature of the once pristine Highveld Grassland, this ecoregion provides the



last remaining stronghold of several grassland species that have suffered major reductions in abundance in the grassland biome e.g. the Blue crane (*Anthropoides paradisea*) (Allan 1992).

Bird species richness is relatively high within this ecoregion (Harrison et al. 1997). However, Botha's lark (*Spizocorys fringillaris*) is the only bird species strictly endemic to the ecoregion, where it inhabits heavily grazed grassland. An additional six species of birds are near-endemics including Whitewinged flufftail (*Sarothrura ayresii*), Blue korhaan (*Eupodotis caerulescens*), Southern whitebellied korhaan (*Eupodotis cafra*), Rudd's lark (*Heteromira fra ruddi*), Melodious lark (*Mira fra cheniana*), Buff-streaked chat (*Oenanthe bifasciata*), and Yellow-breasted pipit (*Hemimacronyx chloris*) (Harrison et al. 1997).

This ecoregion contains a higher number of mammals, although only the Orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the Rough-haired golden mole (*Chrysospalax villosa*) is near-endemic. The ecoregion also supports populations of several large mammal species, some of which are rare in southern Africa (Stuart and Stuart 1995). Among these are the Brown hyena (*Hyaena brunnea*), African civet (*Civettictis civetta*), Leopard (*Panthera pardus*), Sable (*Hippotragus niger*), Pangolin (*Manis temminckii*), Honey badger (*Mellivora capensis*), Striped weasel (*Poecilogale albinucha*), Aardwolf (*Proteles cristatus*), Oribi (*Ourebia ourebi*), and Mountain zebra (*Equus zebra hartmannae*). Herds of large mammals, including Black wildebeest (*Connochaetes gnou*) and White rhino (*Ceratotherium simum*), used to occur here, but were extirpated by early settlers.

Relatively few reptile species occur within the ecoregion, mainly due to its cool climate. However, the ecoregion supports some of Africa's most characteristic reptile species, including Nile crocodile (*Crocodylus niloticus*), African rock-python (*Python sebae*), Water monitor (*Varanus niloticus*) and Rock monitor (*Varanus exanthematicus albigularis*). There are also two strict endemic reptiles: Giant girdled lizard (*Cordylus giganteus*), and Agama *distanti* (Branch 1998). Several additional reptile species are near-endemics, including Drakensberg rock gecko (*Afroendura niravia*), Giant spinytail lizard (*Cordylus giganteus*), and Breyer's whiptail (*Tetradactylus breyeri*) (Branch 1998). Twenty-nine amphibians occur within the ecoregion but none are endemic (Passmore and Carruthers 1995).

7.2.2 Current Status

The grassland habitat that has remained in a near-pristine state is found mostly in nature reserves. The main protected areas are Valei, Nooitgedacht Dam, Bronkhortspruitdam, Vaal Dam, Willem Pretorius, Rustfontein Dam and Koppies Dam Nature Reserves, and the Ermelo Game Park. Together with a number of smaller reserves, these currently conserve only 0.5 percent of the ecoregion. Even the areas of grassland habitat that have remained in a near-natural state are declining steadily in area and quality. The present state of fragmentation, together with anthropogenic changes planned for the coming years may lead to the extinction or near-extinction of some larger animal species, such as the Blue crane (*Anthropoides paradisea*) (Allan 1992).

7.2.3 Types and Severity of Threats

The Highveld Grassland has suffered extensive degradation. Because it is one of the best areas for farming in South Africa, large tracts of land have already been converted to agriculture, mainly for corn production. Urban expansion, fire, and overgrazing have led to increased fragmentation, as has coal mining and afforestation for stands of exotic trees, especially by species of *Eucalyptus* (Low and Rebelo, 1998; Cowling et al. 1997). Over several hundred years, particularly around towns, planted wattle (*Acacia mearnsii*) has become invasive, and is prone to rapid expansion up river watersheds. In the future, expanded surface activity associated with mining below the grassland may become a greater concern as companies develop new technology to make deep mining of coal more profitable (Mallett 1999).

The Highveld plays an important role in natural water purification, as the peat formed here has been shown to filter out 90 percent of the harmful chemicals in herbicides. Peat is also useful in absorbing various other pollutants, as a source of fuel, in horticulture, and for medicinal purposes. In South Africa, where clean water resources are already particularly valuable, this natural filter is being extracted from the Highveld at an unprecedented rate. Approximately 60 percent of locally extracted peat is used to grow mushrooms, while the remaining 40 percent comprises "environmentally friendly" potting soil and compost. Peat has an



extremely slow regeneration rate, increasing between 0.7 mm to 1.2 mm per year depending on environmental conditions (Dada 1999). Given its slow formation process, it is unlikely this resource will recover from the damage caused by its rapid removal. Hence, the Highveld's role as a natural filtration element for scarce water resources could be threatened. The preservation of this resource is imperative, and could be fulfilled by moderating or halting the harvesting of peat.

7.3 Vegetation and Associated Factors

7.3.1 Vegetation Type

According to Mucina and Rutherford (2006), the study area falls, entirely, within the Soweto Highveld Grassland vegetation type.

Soweto Highveld Grassland

VT52 *Themeda* veld (Turf Highveld) 56% (Ackocks 1953).LR 35 Moist Clay Highveld Grassland (51%) (Low & Rebelo 1996)

Distribution

Mpumalanga, Gauteng (and to a very small extent also in neighbouring Free State and North-West Province: in a broad band roughly delimited by the N1 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River (border with the Free State) in the south. It extends further westwards along the southern edge of the Johannesburg Dome (including part of Soweto) as far as the vicinity of Randfontein. In southern Gauteng it includes the surrounds of Vanderbijlpark and Vereeniging as well as Sasolburg in the northern Free State. Altitude 1420 – 1760m (Mucina and Rutherford, 2006).

Vegetation and Landscape Features

Gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover (Mucina and Rutherford, 2006).

Geology and Soils

Shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites which feature prominently in the area. In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant. Soils are deep, reddish on flat plains and are typically Ea, Ba and BB land types (Mucina and Rutherford, 2006).

Climate

Summer-rainfall region (Mean Annual Precipitation 662 mm). Cool-temperature climate with thermic continentality (high extremes between maximum summer and minimum winter temperatures, frequent occurrence of frost, large thermic diurnal differences, especially in autumn and spring (Mucina and Rutherford, 2006).

Important Taxa

Graminoids: *Andropogon appendiculatus* (d), *Brachiaria serrata* (d), *Cymbopogon pospischilii* (d), *Cynodon dactylon* (d), *Elionurus muticus* (d), *Eragrostis capensis* (d), *E. chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. planiculmis* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Setaria nigrirostris* (d), *S. sphacelata* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Andropogon schirensis*, *Aristida adscensionis*, *A. biartita*, *A. congesta*, *A. junciformis* subsp. *galpinii*, *Cymbopogon caesius*, *Digitaria diagonalis*, *Diheteropogon amplexans*, *Eragrostis micrantha*, *E. superba*, *Harporchloa falx*, *Microchloa caffra*, *Paspalum dilatatum*, Herbs: *Hermannia depressa* (d), *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Euryops gilfillanii*, *Geigeria aspera* var. *aspera*, *Graderia subintegra*, *Haplocarpha scaposa*, *Helichrysum miconiifolium*, *H. nudifolium* var. *nudifolium*, *H. rugulosum*, *Hibiscus pusillus*, *Justicia*



anagalloides, *Lippia scaberrima*, *Rynchosia effusa*, *Schistostephium crataegifolium*, *Selago densiflora*, *Senecio coronatus*, *Vernonia oligocephala*, *Wahlenbergia undulata*. Geophytic Herbs: *Haemanthus humilis* subsp. *hirsutus*, *H. montanus*. Herbaceous Climber: *Rynchosia totta*. Low Shrubs: *Anthospermum hispidulum*, *A. rigidum* subsp. *pumilum*, *Berkheya annectens*, *Felicia muricata*, *Ziziphus zeyheriana* (Mucina and Rutherford, 2006).

Conservation

This vegetation type is considered endangered with a target 24%. Only a handful of patches statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site). Almost half of the area already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams, (Grootdraai, Leeuwkuil, Trichardtsfontein, Vaal, Willem Brummer) Erosion is generally very low (93%) (Mucina and Rutherford, 2006).

8.0 FLORAL ASSESSMENT

8.1 Floral Species Composition

PRECIS information presented by SANBI indicates the presence of 70 species for the quarter degree grid square 2629CC in which the study area is situated (Appendix B). The floristic species diversity of the study area can be considered moderate for the region. A total of 58 species were identified during the site investigation (Appendix B). This relatively low diversity alludes to the general absence of topographical and environmental diversity that result in the development of various communities and hence diverse species composition. The moderate diversity also alludes to previous disturbance in the area by farming activities as well as the use of soil material from the borrow pits within the study area.

A plant species list is provided in Appendix B, this list includes all species known to occur in the relevant grid square (2629CC) based on the Precis Data, but also includes species recorded that were not present in the Precis database. Appendix B also indicates which species were recorded during the surveys. Although the plant species diversity may appear moderate, it is relatively low when compared to the total number of species known to occur in the area. It must be noted, however, that the species recorded in the grid square range over a number of different vegetation communities, of which only five were recorded within the study area.

Grass species within the study area show moderate to high diversity, indicating some historical grazing pressure. The river and temporal wetland to the north-east as well as the borrow pits in the north-west show a significant increase in hydrophilic species, although the borrow pit area shows severe colonisation by invasive species, mainly *Datura ferox*.

Although a large proportion of the species recorded are indigenous there were a large number of exotic species occurring in the area. In areas of higher anthropogenic disturbances, exotic species become more prevalent.

8.2 Vegetation Communities

The study area is characterised by very clayey, black vertic or near vertic, mostly of montmorillonitic clays. A river and associated temporal wetland runs across the north-eastern corner of the study area. Rocky outcrops appear absent from the area and a large portion of the study area is characterised by borrow pits which have been colonised by some wetland vegetation, due to the fact that they are inundated during the wet season. Natural topography of the area is relatively flat, sloping slightly downhill towards the river and associated wetland to the north-east of the study area. Anthropogenic disturbance has altered the natural topography in the north-western quarter of the study area where, what appears to be borrow pits, cause large depressions. Grass species within the study area show moderate to high diversity, indicating some historical grazing pressure. The river and temporal wetland to the north-east as well as the borrow pits in the



north-west show a significant increase in hydrophilic species, although the borrow pit area shows severe colonisation by invasive species, mainly *Datura ferox*.

Based on physiognomy, moisture regime, rockiness, slope and soil properties, four vegetation communities were recognised (Figure 3). Although these communities were recorded as such, there is some variation within these communities, due to influences such as historical overgrazing and other anthropogenic impacts.

The vegetation is representative of the regional vegetation with some variation due to slope, moisture, soil type and anthropogenic disturbance. Management (mainly in the sense of causing disturbance) in the area has a significant effect on determining the status of the grassland.

The physiognomy of the area is characterized by the dominance of the herbaceous component (>80%) consisting predominantly of grass species, while the woody stratum is very poorly represented (<10%). This is very much what would be expected in this area due to the area falling within the Grassland Biome and Soweto Highveld Grassland vegetation type. A pristine species composition would dictate a slightly more diverse herbaceous stratum, but the occurrence of species rather than the species diversity in this area are a more obvious indicator of the historical impacts of the area.

Forbs and other herbs are moderately represented (38%), but the dominance of many of these species also indicates the degraded status of the vegetation. This is especially visible in the north-western quarter of the study area. A total of 58 plant families were identified during the site investigation. Herbs (53%) and Graminoids (43%) (grasses) dominate the composition.

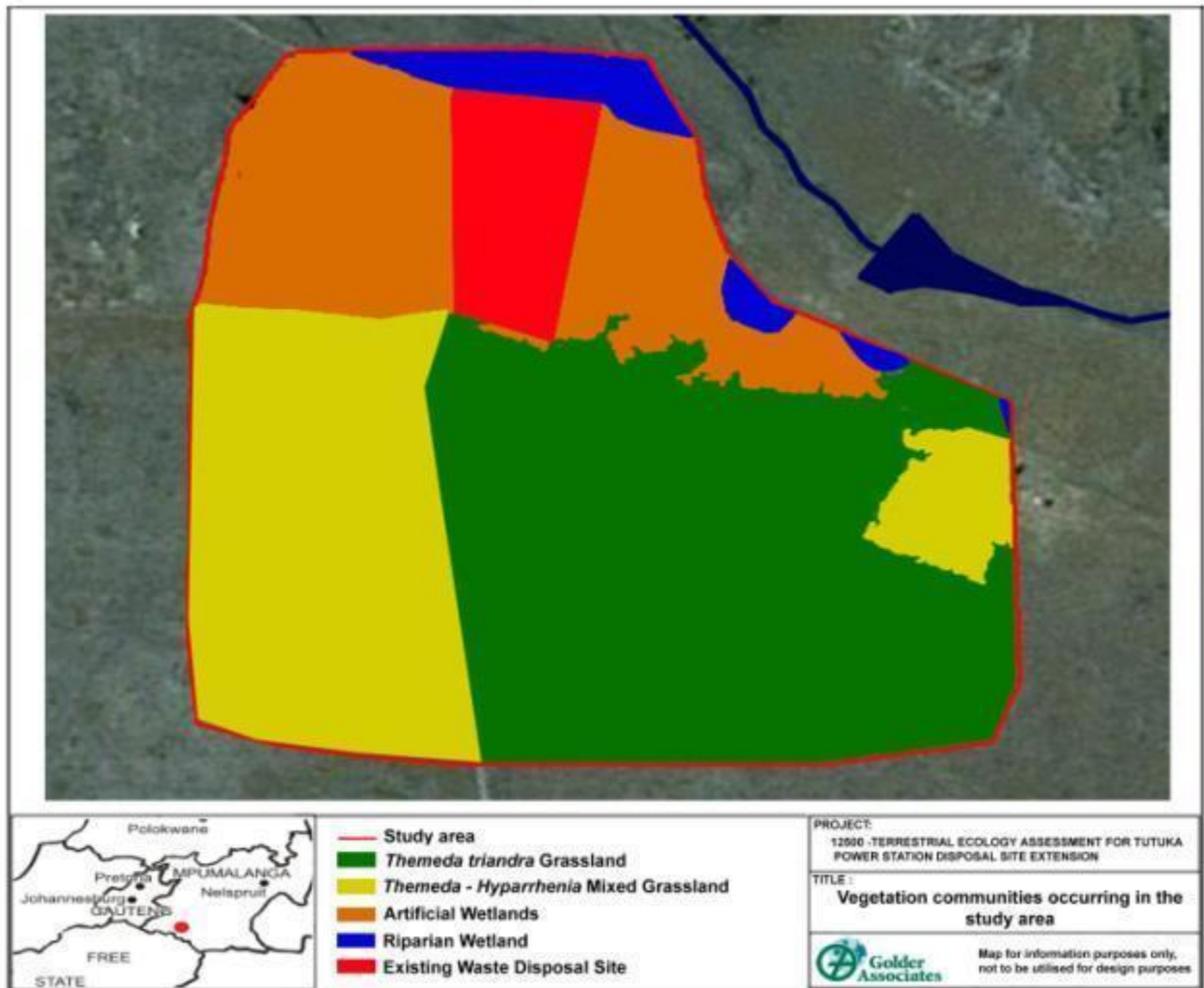


Figure 3: Map indicating the study area and associated vegetation communities.

The following vegetation communities (Figure 3) were identified during the study, and are named according to the area in which they occur, physiognomy and/or dominant floral species occurring within the vegetation communities:

- Themeda triandra grassland;
- Themeda – Hyparrhenia mixed grassland ;
- Natural Riparian Wetland;
- Artificial wetland associated with diggings;
- Existing waste disposal site.

8.2.1 Themeda triandra grassland

This vegetation community covers the majority of the study area and occurs mostly in the south-eastern quarter of the study area. The substrate of this vegetation community, although no geological studies were done as part of the ecological study, can be characterised as dark clay by visual observation for the purpose of this study.



TERRESTRIAL ECOLOGY ASSESSMENT

The most common grasses on the plains belong to the genera *Themeda*, *Eragrostis*, *Heteropogon*, *Aristida*, *Digitaria*, *Tristachya* and *Elionurus*. A number of herbs, especially *Asteraceae* are also found. Invasive species occurring in this area are, *inter alia*, *Cirsium vulgare* and *Datura ferox*.

Woody species are absent throughout the entire study area, but woody species are expected in this vegetation type although these are often dominated by exotics such as *Eucalyptus* spp and *Acacia mearnsii*.

A total of 30 plant species were found to occur in this vegetation community (Table 3). Of these species 13 were classified as graminoids and 16 as herbs. Furthermore, one climber was also identified. The *Themeda triandra* grassland vegetation community is dominated by grass species and woody layers are greatly reduced when compared with other vegetation types, this is however characteristic of communities in the grassland biome.

Table 3: List of floral species occurring in the *Themeda triandra* grassland vegetation community.

Family	Naturalised	Species	Lifecycle	Growth forms
ACANTHACEAE		<i>Chaetacanthus costatus</i>	Annual	Herb
ACANTHACEAE		<i>Crabbea acaulis</i>	Annual	Herb
ANTHERICACEAE		<i>Chlorophytum fasciculatum</i>	Perennial	Herb
ASTERACEAE		<i>Berkheya onopordifolia</i>	Perennial	Herb
ASTERACEAE		<i>Berkheya pinnatifida</i>	Perennial	Herb
ASTERACEAE		<i>Pseudognaphalium luteo-album</i>	Annual	Herb
ASTERACEAE		<i>Schistostephium crataegifolium</i>	Perennial	Herb
CONVOLVULACEAE		<i>Evolvulus alsinoides.</i>	Annual	Herb
EUPHORBIACEAE		<i>Chamaesyce inaequilatera</i>	Perennial	Herb
LAMIACEAE		<i>Salvia repens</i>	Perennial	Herb
MALVACEAE		<i>Hermannia depressa</i>	Perennial	Herb
MALVACEAE	*	<i>Hibiscus trionum</i>	Annual	Herb
POACEAE		<i>Aristida bipartita</i>	Annual	Graminoid
POACEAE		<i>Aristida congesta</i>	Annual	Graminoid
POACEAE		<i>Cynodon dactylon</i>	Perennial	Graminoid
POACEAE		<i>Digitaria eriantha</i>	Perennial	Graminoid
POACEAE		<i>Elionurus muticus</i>	Perennial	Graminoid
POACEAE		<i>Eragrostis curvula</i>	Perennial	Graminoid
POACEAE		<i>Eragrostis racemosa</i>	Perennial	Graminoid
POACEAE		<i>Heteropogon contortus</i>	Perennial	Graminoid
POACEAE		<i>Leersia hexandra</i>	Perennial	Graminoid
POACEAE		<i>Panicum coloratum</i>	Annual	Graminoid
POACEAE		<i>Setaria sphacelata</i>	Annual	Graminoid
POACEAE		<i>Themeda triandra</i>	Annual	Graminoid
POACEAE		<i>Hyparrhenia hirta</i>	Perennial	Graminoid
SCROPHULARIACEAE		<i>Jamesbrittenia aurantiaca</i>	Perennial	Herb
ASTERACEAE	*	<i>Cirsium vulgare</i>	Annual	Herb



Family	Naturalised	Species	Lifecycle	Growth forms
SOLANACEAE	*	<i>Solanum sisymbriifolium</i>	Perennial	Herb
VERBENACEAE	*	<i>Verbena bonariensis</i>	Annual	Herb
CONVOLVULACEAE	*	<i>Ipomoea purpurea</i>	Annual	Climber

The area is currently grazed by cattle. No utilisation of tree and plant species for fuel, crafts or medicinal/traditional purposes was evident during the survey, However this does probably occur due to the close proximity of the township to the west of the study area. Grazing pressure in this vegetation community can be considered as low to moderate.

No Red Data species were recorded during the study although the habitat is considered moderately suitable for the presence of Red Data species. This vegetation type is well represented in the region.

Table 4: Growth forms of species occurring in the *Themeda triandra* grassland vegetation community.

Growth form	Number	Percentage
Herb	16	53.3
Geophyte	0	0.0
Succulent	0	0.0
Hydrophyte	0	0.0
Parasite	0	0.0
Cyperoid	0	0.0
Helophyte	0	0.0
Shrub	0	0.0
Graminoid	13	43.3
Climber	1	3.3
Total	30	100.0

Sensitivity aspects

- This variation is situated within a very large habitat type making it a less important area for conservation of biodiversity;
- The vegetation of the area is moderately disturbed;
- Species diversity is moderate;
- Floristic status of this variation is moderate;
- Suitability of Red Data flora and faunal species is moderate;
- No floral Red Data species were recorded during the survey, but the possibility of Red Data species occurring in this vegetation type cannot be ruled out;
- Likely impacts on the vegetation will be insignificant to moderately significant on a local scale;
- Ecological function of this community is high; and
- The Conservation importance of this community is moderate to high due possibility of occurrence of Red Data species or protected species.



8.2.2 *Themeda – Hyparrhenia mixed grassland*

The disturbed grassland or other disturbed areas such as road reserves or fallow fields, not cultivated for some years, are usually *Hyparrhenia* dominated. However, while *Hyparrhenia* – is present in this vegetation unit, it is not dominant. This grassland is a result of historical disturbance as a result of over-grazing, sand mining and crop cultivation. This grassland mostly has low species richness, with only a few other species able to establish or survive in the shade of the dense sward of taller grass. Most of these species are relict pioneers or early seral species. The most prominent species include the grasses *Cynodon dactylon*, *Eragrostis plana*, *E. racemosa*, *E. curvula* and *E. capensis*. Herbaceous species such as *Anthospermum rigidum*, *Conyza podocephala*, *Crabbea angustifolia* and *Helichrysum rugulosum* are present. Alien species such as *Verbena bonariensis* have also invaded this vegetation unit.

The area delineated as *Themeda – Hyparrhenia* mixed grassland occurs to the far eastern and western parts of the study area. The substrate of this area does not differ from the surrounding areas and, although no geological studies were done as part of this specific study, is characterised by dark clay. The area is currently grazed by cattle, although the most perturbation of the area is due to the area being used for the purposes of crop cultivation, grazing or sand mining at some stage in the past. A number of exotic species occur in this area, but for the most part do not dominate the vegetation communities. Many of the species occurring in this vegetation type are similar to that of the surrounding grassland, but the occurrence of these species is greatly reduced due to historic perturbation.

A total of 25 plant species were recorded in this vegetation community. Of these 13 species were classified as grasses, 11 as herbs, 7 and one as a climber. This site was also the site at which the highest number of annual species was recorded due to the fact that competition in the previously cleared areas is lower than that in the other vegetation types.

The area has been considerably impacted upon by previous management practises, and although the invasion of exotic species is limited, a considerable amount of species diversity change is evident.

Diveristy is poor in this vegetation type, indicating that the area has been extensively disturbed in recent times. The species composition of this vegetation community is presented in Table 5. This community can be described as secondary vegetation.

Invasive species occurring in this area are, *inter alia*, *Verbena bonariensis*, *Bidens pilosa* and *Tagetes minuta*.

Table 5: List of floral species occurring in the *Themeda – Hyparrhenia* mixed grassland vegetation community.

Family	Naturalised	Species	Lifecycle	Growth forms
ASTERACEAE		Berkheya pinnatifida	Perennial	Herb
FABACEAE		Trifolium africanum var. africanum	Perennial	Herb
MALVACEAE		Hermannia depressa	Perennial	Herb
MALVACEAE	*	Hibiscus trionum	Annual	Herb
POACEAE		Aristida bipartita	Annual	Graminoid
POACEAE		Aristida congesta	Annual	Graminoid
POACEAE		Brachiaria serrata	Perennial	Graminoid
POACEAE		Cynodon dactylon	Perennial	Graminoid
POACEAE		Elionurus muticus	Perennial	Graminoid
POACEAE		Eragrostis chloromelas	Perennial	Graminoid
POACEAE		Eragrostis curvula	Perennial	Graminoid



Family	Naturalised	Species	Lifecycle	Growth forms
POACEAE		Heteropogon contortus	Perennial	Graminoid
POACEAE		Panicum coloratum	Annual	Graminoid
POACEAE		Setaria nigrirostris	Annual	Graminoid
POACEAE		Setaria sphacelata	Annual	Graminoid
POACEAE		Themeda triandra	Annual	Graminoid
POACEAE		Hyparrhenia hirta	Perennial	Graminoid
SOLANACEAE	*	Datura stramonium	Annual	Herb
ASTERACEAE	*	Cirsium vulgare	Annual	Herb
SOLANACEAE	*	Solanum sisymbriifolium	Perennial	Herb
VERBENACEAE	*	Verbena bonariensis	Annual	Herb
VERBENACEAE	*	Verbena brasiliensis	Annual	Herb
CONVOLVULACEAE	*	Ipomoea purpurea	Annual	Climber
ASTERACEAE	*	Bidens pilosa	Annual	Herb
ASTERACEAE	*	Tagetes minuta	Annual	Herb

Grazing pressure in this vegetation community can be considered as moderate. No Red Data species were recorded during the study, and the habitat is considered unsuitable for the presence of Red Data species. This vegetation type is well represented in the general region.

Table 6: Growth forms of species occurring in the *Themeda – Hyparrhenia* mixed grassland vegetation community.

Growth form	Number	Percentage
Herb	11	44
Geophyte	0	0
Succulent	0	0
Hydrophyte	0	0
Parasite	0	0
Cyperoid	0	0
Helophyte	0	0
Shrub	0	0
Graminoid	13	52
Climber	1	4
Total	25	100

Sensitivity aspects

- This variation is situated within a very small area;
- The vegetation of the area is highly disturbed, and can be classified as secondary vegetation;
- Species diversity is low;



- Floristic status of this variation is low;
- Suitability for Red Data flora and faunal species is low;
- No Red Data floral species were recorded and it is unlikely that Red Data species will be present in this vegetation community;
- Likely impacts on the vegetation will be insignificant on a local scale;
- Ecological function of this community is moderate to low; and
- Conservation importance of this community is moderate to low.

8.2.3 Natural riparian wetland

Wetland and riparian communities are seasonally wet areas that occur in sandy areas where water seeps into low lying drainage lines after rains. In this study such a wetland was found to the north-east of the study area. These areas are usually covered by hygrophytes such as sedges and reeds. The dominant sedge in the study area is *Cyperus fastigiatus*. Sometimes bulrush (*Typha capensis*) and reeds (*Phragmites australis*) also occur.

Wetlands are of a more permanent nature and occur in low-lying areas such as tributaries of streams and rivers. Wetlands are typically found in flat landscapes or shallow depressions filled with (temporary) water bodies supporting zoned systems of aquatic and hydrophilous (water loving) vegetation of temporarily flooded grasslands and ephemeral herblands. Typical plants are the *Crinum bulbispermum*, *Typha capensis* and reeds *Phragmites australis*, sedges such as the *Cyperus* and *Bulbostylis* genera also occur. These wetlands are one of the most sensitive vegetation units found in the region and have been extensively modified by mining and industrial activities in the region.

A total of 20 plant species were recorded in this vegetation community. Of these species 7 were classified as grasses, 4 as sedges and 8 as herbs. The grass layer is species poor and contains relatively low biomass possibly due to historic overgrazing and the competition by hardier species.

The species composition of this vegetation community is presented in Table 7. Although not very high in species diversity, possibly due to overgrazing, the community is representative of this type of vegetation. This vegetation community can be considered as an example of lightly disturbed natural vegetation.

Invasive species occurring in this area make up 40% of the total number of species, but are ,however, not high in abundance and are, *inter alia*, *Cirsium vulgare*, *Datura ferox* and *Xanthium strumarium*.

Table 7: List of floral species occurring in the Natural Riparian Wetland vegetation community.

Family	Naturalised	Species	Lifecycle	Growth forms
ASTERACEAE		<i>Berkheya pinnatifida</i>	Perennial	Herb
CYPERACEAE		<i>Abildgaardia ovata</i>	Perennial	Cyperoid
CYPERACEAE		<i>Bulbostylis contexta</i>	Annual	Cyperoid
CYPERACEAE		<i>Bulbostylis humilis</i>	Annual	Cyperoid
CYPERACEAE		<i>Cyperus fastigiatus</i>	Perennial	Cyperoid
POACEAE		<i>Brachiaria serrata</i>	Perennial	Graminoid
POACEAE		<i>Cynodon dactylon</i>	Perennial	Graminoid
POACEAE		<i>Microchloa caffra</i>	Annual	Graminoid
POACEAE		<i>Panicum coloratum</i>	Annual	Graminoid
POACEAE		<i>Setaria incrassata</i>	Annual	Graminoid



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Family	Naturalised	Species	Lifecycle	Growth forms
POACEAE		<i>Setaria sphacelata</i>	Annual	Graminoid
POACEAE		<i>Hyparrhenia hirta</i>	Perennial	Graminoid
POLYGONACEAE	*	<i>Persicaria amphibia</i>	Perennial	Hydrophyte
SOLANACEAE	*	<i>Datura ferox</i>	Annual	Herb
SOLANACEAE	*	<i>Datura stramonium</i>	Annual	Herb
ASTERACEAE	*	<i>Cirsium vulgare</i>	Annual	Herb
SOLANACEAE	*	<i>Solanum sisymbriifolium</i>	Perennial	Herb
VERBENACEAE	*	<i>Verbena bonariensis</i>	Annual	Herb
ASTERACEAE	*	<i>Tagetes minuta</i>	Annual	Herb
ASTERACEAE	*	<i>Xanthium strumarium</i>	Annual	Herb

Grazing pressure in this vegetation community can be considered as historically average to high, due to the accessibility of the area, as well as proximity to permanent water and the palatability of the vegetation itself. At present the area does not appear to be overgrazed.

No Red Data species were recorded during the study. This habitat is considered moderately suitable for the presence of Red Data species. This vegetation type is well represented in the general region.

Table 8: Growth forms of species occurring in the Natural Riparian Wetland vegetation community.

Growth form	Number	Percentage
Herb	8	40
Geophyte	0	0
Succulent	0	0
Hydrophyte	1	5
Parasite	0	0
Cyperoid	4	20
Helophyte	0	0
Shrub	0	0
Graminoid	7	35
Climber	0	0
Total	20	100

Sensitivity aspects

- The vegetation of the area is lightly disturbed;
- Species diversity is low;
- Floristic status of this vegetation community is moderate;
- Suitability for Red Data flora and faunal species is moderate;
- No floral Red Data species were recorded during the study;
- Likely impacts on the vegetation will be moderately significant on a local scale;



- Ecological function of this community is high although some degradation, due to overgrazing and other anthropogenic impacts, has occurred; and
- The conservation importance of this community is high as this vegetation community is characterised as a wetland community.

8.2.4 Artificial wetland associated with diggings

These isolated patches of standing water appear to be seasonal and therefore only form after good rainfall events within manmade excavations. They can currently be regarded as artificial wetlands, but interpretations from historic aerial photographs may contribute to a better understanding of their nature and origin. Artificial wetlands are any type of wetland constructed by man. The main type of wetland included in this group is dams and weirs. These wetlands are not included in the definition of a wetland as supplied by DWAF (DWAF 2003a), it is however included under the RAMSAR wetland definition. This area appears in the Mpumalanga Parks and Tourism Association Conservation Plan as an important and necessary area. This area is, however, heavily disturbed and dominated by exotic species, mainly *Datura ferox* which forms dense stands in the area. Very little natural vegetation occurs in this area and the few indigenous species are pioneer grasses and some annual species. This area may have been mistakenly identified as a wetland area from aerial or satellite photographs during the compilation of the MTPA C-plan. Species include *Bulbostylis contexta*, *Cyperus fastigiatus*, *Aristida bipartita*, *Panicum coloratum*, *Hyparrhenia hirta*, *Datura ferox*, *Datura stramonium*, *Cirsium vulgare*, *Solanum sisymbriifolium*, *Verbena bonariensis*, *Cannabis sativa* and *Xanthium strumarium*.

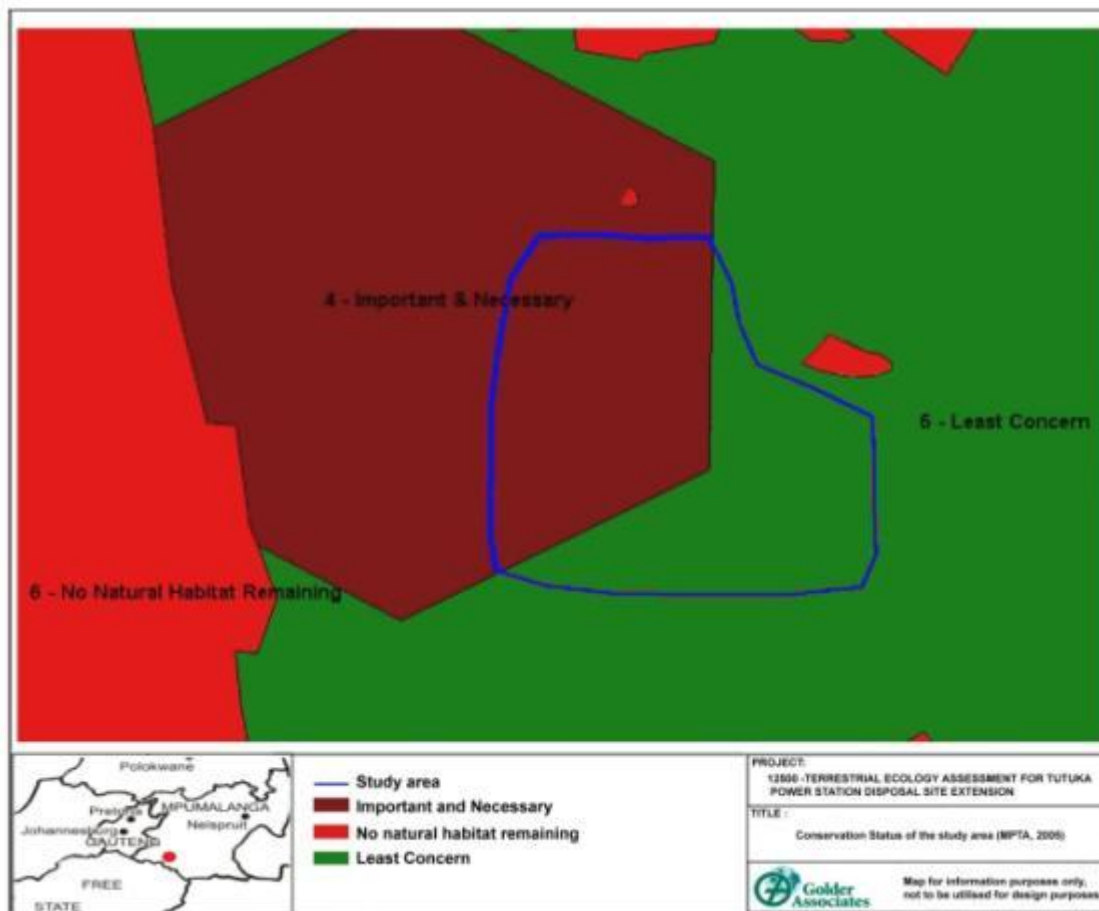


Figure 4: Conservation status of the study area according to the Mpumalanga Parks and Tourism Association (MPTA, 2005)



The area has been considerably perturbed by historical impacts, and is severely invaded by exotic species type.

A total of only 14 plant species were recorded in this vegetation community, indicating the inhibiting effect of the previous impacts and exotic species in this vegetation community. Of these species, 3 were classified as grasses, 2 as cyperoids and 9 as herbs.

The species composition of this vegetation community is presented in Table 9.

Table 9: List of floral species occurring in the artificial wetland vegetation community.

Family	Naturalised	Species	Lifecycle	Growth forms
CYPERACEAE		<i>Bulbostylis contexta</i>	Annual	Cyperoid
CYPERACEAE		<i>Cyperus fastigiatus</i>	Perennial	Cyperoid
POACEAE		<i>Aristida bipartita</i>	Annual	Graminoid
POACEAE		<i>Panicum coloratum</i>	Annual	Graminoid
POACEAE		<i>Hyparrhenia hirta</i>	Perennial	Graminoid
SOLANACEAE	*	<i>Datura ferox</i>	Annual	Herb
SOLANACEAE	*	<i>Datura stramonium</i>	Annual	Herb
ASTERACEAE	*	<i>Cirsium vulgare</i>	Annual	Herb
SOLANACEAE	*	<i>Solanum sisymbriifolium</i>	Perennial	Herb
VERBENACEAE	*	<i>Verbena bonariensis</i>	Annual	Herb
CANNABACEAE	*	<i>Cannabis sativa</i>	Annual	Herb
ASTERACEAE	*	<i>Bidens pilosa</i>	Annual	Herb
ASTERACEAE	*	<i>Tagetes minuta</i>	Annual	Herb
ASTERACEAE	*	<i>Xanthium strumarium</i>	Annual	Herb

Grazing pressure in this vegetation community was low, due to the unpalatability of the species occurring in the area, as well as the fact that pressure in the general area is greatly reduced from the historical impact, although the area may have been under very high grazing pressure in the past.

No Red Data species were recorded during the study. The habitat is considered poorly suited for the presence of Red Data species; therefore it is highly unlikely that any Red Data species occur within this vegetation community.

Table 10: Growth forms of species occurring in the artificial wetland vegetation community.

Growth form	Number	Percentage
Herb	9	64.3
Geophyte	0	0.0
Succulent	0	0.0
Hydrophyte	0	0.0
Parasite	0	0.0
Cyperoid	2	14.3
Helophyte	0	0.0
Shrub	0	0.0
Graminoid	3	21.4



Growth form	Number	Percentage
Climber	0	0.0
Total	14	100.0

Sensitivity aspects

- This vegetation community is situated within a severely impacted habitat type making it unimportant for conservation of biodiversity;
- Disturbance in this vegetation type is, and has historically been, severe;
- Species diversity is low;
- Floristic status of this vegetation community is very low;
- Suitability for Red Data flora and faunal species is low;
- No floral Red Data species are likely to occur in this vegetation community;
- Impacts of the development on this vegetation community will be insignificant;
- Ecological function of this community is low;
- The conservation importance of this community is low.

8.2.5 Existing waste disposal site

The existing waste disposal site was only scanned for the presence of Red Data species and protected species and a short list made of observed species. The reason for this is that this area can be considered as completely transformed and therefore not part of the natural vegetation of the area. The fact that this area is currently impacted in the same way that the future development will impact the surrounding area leads to the natural conclusion that this area cannot be further impacted by the development.

The area is considered as completely transformed by historical impacts, and is severely invaded by exotic vegetation species.

A total of only 15 plant species were found to occur in this vegetation community, indicating the inhibiting effect of the previous impacts and exotic species in this vegetation community. Of these species, 3 were classified as grasses, 3 as cyperoids and 9 as herbs.

It was difficult to identify dominant species in this vegetation community as no particular species, or group of species dominate the area. Six of the nine species recorded in this vegetation community are exotic, further alluding to the disturbed nature of this area.

Table 11: List of floral species occurring in the existing waste disposal site.

Family	Naturalised	Species	Lifecycle	Growth forms
ASTERACEAE		Berkheya pinnatifida	Perennial	Herb
ASTERACEAE		Schistostephium crataegifolium	Perennial	Herb
GISEKIACEAE		Gisekia pharnacioides var. pharnacioides	Annual	Herb
POACEAE		Aristida bipartita	Annual	Graminoid
POACEAE		Aristida congesta	Annual	Graminoid
POACEAE		Cynodon dactylon	Perennial	Graminoid



Family	Naturalised	Species	Lifecycle	Growth forms
POACEAE		Heteropogon contortus	Perennial	Graminoid
POACEAE		Panicum coloratum	Annual	Graminoid
POACEAE		Hyparrhenia hirta	Perennial	Graminoid
SOLANACEAE	*	Datura ferox	Annual	Herb
ASTERACEAE	*	Cirsium vulgare	Annual	Herb
SOLANACEAE	*	Solanum sisymbriifolium	Perennial	Herb
CANNABACEAE	*	Cannabis sativa	Annual	Herb
ASTERACEAE	*	Bidens pilosa	Annual	Herb
ASTERACEAE	*	Tagetes minuta	Annual	Herb

Present grazing pressure in this vegetation community can be considered as low, with the area being utilised as a waste disposal site and few if any palatable species occurring there. The grasses that do occur in this area are also sparse making this area unattractive for any grazers in the area.

No Red Data species were recorded during the study and, due to transformation of the habitat, it is considered poorly suited for Red Data species.

Table 12: Growth forms of species occurring in the existing waste disposal site.

Growth form	Number	Percentage
Herb	9	60
Geophyte	0	0
Succulent	0	0
Hydrophyte	0	0
Parasite	0	0
Cyperoid	0	0
Helophyte	0	0
Shrub	0	0
Graminoid	6	40
Climber	0	0
Total	15	100

Sensitivity aspects

- The vegetation of the area can be considered as completely transformed;
- Low species diversity;
- Floristic status of this vegetation community is low;
- Suitability of Red Data flora and faunal species is low;
- If impacts were to occur in this vegetation type they would be insignificant as the area is currently impacted by a similar activity;
- Ecological function of this community is low;



- The Conservation importance of this community is low.

8.3 Red Data Floral Assessment

The Red Data plant species list for the 2629CC grid square obtained from the Mpumalanga Tourism and Parks Agency MPTA, shows only one species of concern recorded in the relevant grid square. The species recorded is the Near –threatened *Gladiolus robertsoniae* which was recorded on the farm Grootverlangen 409 IS which is approximately 21 km from the study site and at the Vaal Station in Standerton itself, approximately 20 km from the study site (Figure 5). This species was not found within the study area but, although very unlikely its presence cannot be dismissed based on a single survey of the area.

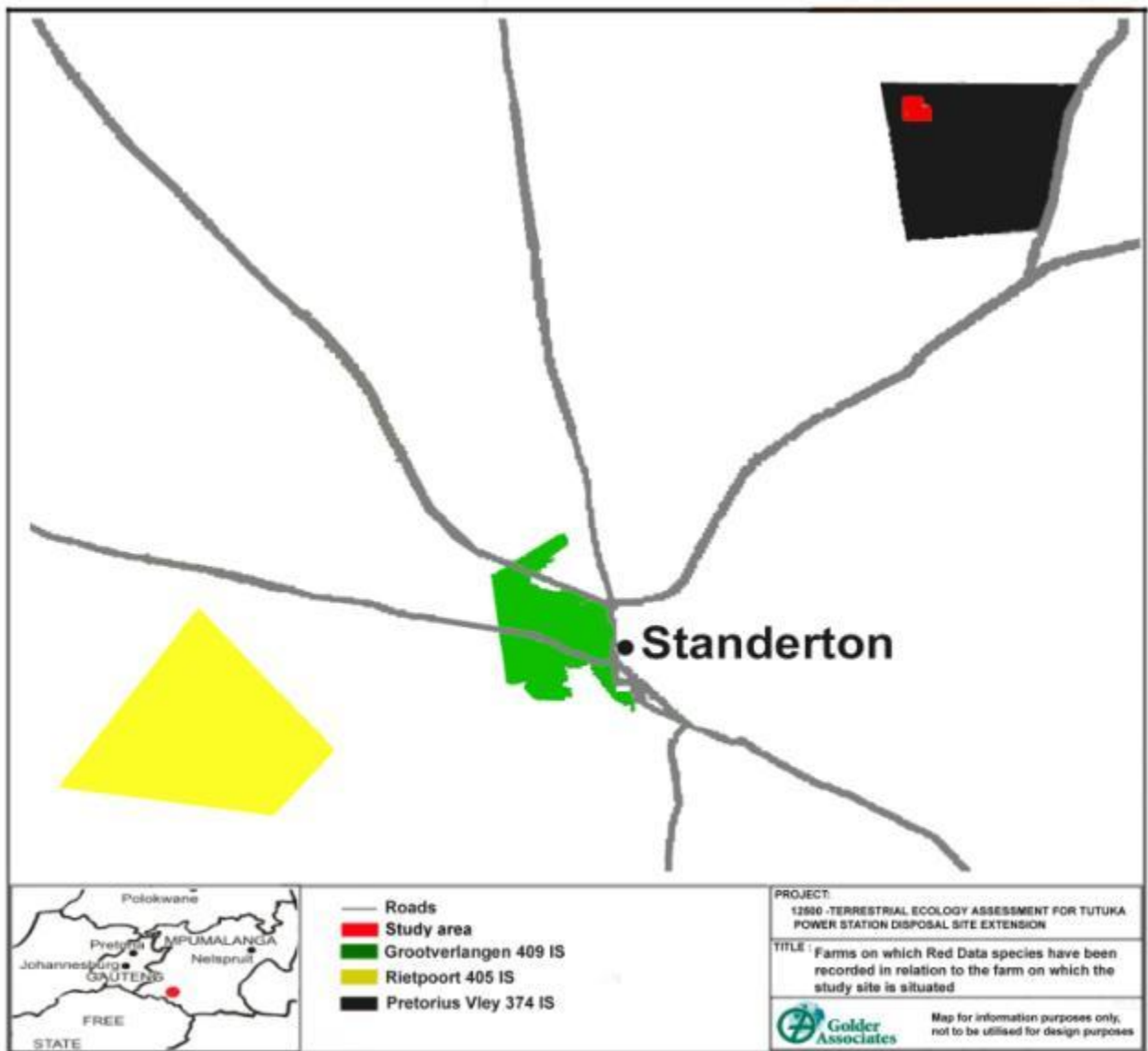


Figure 5: Locations of recorded Red Data species in relation to the study area.



9.0 FAUNAL ASSESSMENT

The faunal assessment was conducted in January 2010.

9.1 Recorded Faunal Species

9.1.1 Arthropoda

A total of 34 arthropods were recorded during the survey and are listed in (Table 13). Only 1 species of Lepidoptera (Table 13) was recorded and 31 species of other arthropods. The low floral diversity in the majority of the area as well as the late season survey may be responsible for reduced arthropod diversity during the time of the survey. All of the species recorded during the survey were common savanna species and are not restricted in terms of habitat or distribution.

Table 13: Arthropod species recorded during the 2007 surveys.

Superclass	Class	Order	Family	Genus	Species	Common Name
	Insecta	Isoptera	Termitidae	<i>Trinervitermes</i>		
				<i>Amitermis</i>	<i>hastatus</i>	
		Mantodea	Hymenopodidae	<i>Harpagomantis</i>	<i>tricolor</i>	
				Mantidae	<i>Sphodromantis</i>	<i>gastrica</i>
		Dermaptera	Libiduridae	<i>Labidura</i>	<i>riparia</i>	
		Orthoptera	Bradyporidae	<i>Hetrodes</i>	<i>pupus</i>	
				Tettigonidae	<i>Phaneroptera</i>	
			Gryllidae	<i>Gryllus</i>	<i>bimaculatus</i>	
			Pamphagidae	<i>Hoplolopha</i>		
			Pyrgomorphidae	<i>Phymateus</i>	<i>morbillosus</i>	
			Acrididae	<i>Acrida</i>	<i>acuminata</i>	
				<i>Locustana</i>	<i>pardalina</i>	
			Hemiptera	Reduviidae	<i>Etrichodia</i>	<i>crux</i>
		Alydidae		<i>Mirperus</i>	<i>faculus</i>	
		Pyrrhocoridae		<i>Scantius</i>	<i>fosteri</i>	
		Nemopteridae		<i>Nemia</i>	<i>costalis</i>	
		Coleoptera	Melirydae			
				<i>Melyris</i>		
			Tennebrionidae	<i>Psammodes</i>	<i>striatus</i>	
				<i>Stenocara</i>	<i>dentata</i>	
		Diptera	Tabanidae	<i>Tabanus</i>	<i>taeniatus</i>	
			Bombyliidae	<i>Exoprosopa</i>		
			Calliphoridae	<i>Chrysomya</i>	<i>chloropyga</i>	
				<i>Chrysomya</i>	<i>albiceps</i>	
		Lepidoptera	Saturniidae	<i>Bunaea</i>	<i>alcinoe</i>	



Superclass	Class	Order	Family	Genus	Species	Common Name
		Hymenoptera	Apidae	<i>Apis</i>	<i>mellifera</i>	
			Formicidae	<i>Tetraponera</i>		
				<i>Messor</i>	<i>capensis</i>	
				<i>Camponotus</i>	<i>fulvopilosus</i>	
		Scorpiones	Buthidae			
		Araneae	Arachnidae			
Myriapodia						Centipede
						Millipede

9.1.2 Reptilia

A total of 38 reptile species are known to occur within the study area (Appendix C). Of these 38 species, only one, *Homoroselaps lacteus*, is listed as a Red Data species, this species is also not listed nationally, but is recorded according to the MPTA species listings as Near-threatened. Eight of the 38 possibly occurring species 10 are listed as endemic (Appendix C). Only three reptilian species were recorded during the 2010 surveys (Table 14). None of the recorded species are restricted in terms of habitat and distribution, or classified as Red Data Species. It is likely that more species could occur in the area but due to the shy nature of the taxon it is usually impossible to record all taxon in an area during a study of as limited time as this. The confidence in the data collected during this study is such that it is felt that it accurately indicates the majority of the species occurring in this specific study area. It is therefore unlikely that, even with a longer term study, many more species of reptiles would be recorded.

Table 14: Reptile species recorded during the 2010 survey.

BIOLOGICAL NAME	COMMON NAME	RED DATA STATUS
<i>Lamprophis fuliginosus</i>	Brown House Snake	NL
<i>Bitis arietans</i>	Puff Adder	NL
<i>Mabuya striata</i>	Striped Skink	NL

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

9.1.3 Amphibia

A total of 16 amphibian species are known to occur within the region in which the study was conducted (Appendix D). Of these 16 species, none are listed as a Red Data species. Of the 16 possibly occurring species, ten are listed as endemic (Appendix D). None of the recorded species is restricted in terms of habitat and distribution (Table 15); none are classified as Red Data Species. Four species of amphibians were recorded as occurring within the study area these are listed in Table 15. These species are not



restricted in terms of habitat or distribution and none of the species recorded are classified as Red Data species.

Table 15: Amphibian species recorded during the 2010 survey.

SPECIES	ENDEMIC STATUS	RED DATA STATUS
<i>Schismaderma carens</i>	0	NL
<i>Kassina senegalensis</i>	0	NL
<i>Afrana fuscigula</i>	1	NL
<i>Bufo garmani</i>	0	NL

Species list for the region spanning South Africa, Lesotho and Swaziland. Endemic status:

0 indicates no endemism to southern Africa

1 indicates endemism to southern Africa;

2 indicates endemism to the region (South Africa, Lesotho and Swaziland).

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

9.1.4 Aves

A number of species of birds are known to occur in the grid square in which the study area is situated (Appendix E). Thirty species were recorded in the study area during the survey (Table 16). Although this is a considerable number of species, it is less than one third of the 368 species known to occur in the grid square. The bird community in the study area is dominated by grassland bird species, especially, graivorous grass nesting species. The reason for this is that the habitat is most suited for these species and the absence of tree and shrub nesting can be attributed to the lack of the vegetation growth forms in the area. Of the 30 recorded species, three are listed as Red Data species (Table 16). With the exception of waterfowl, waders and other species associated with waterbodies or rivers, bird guilds are well distributed indicating good diversity of habitat in the study area as a whole.

Table 16: Avifaunal species recorded during the 2010 survey.

Roberts No.	Common Name	Biological Name	Red Data Status
62	Heron Grey	<i>Ardea cinerea</i>	
71	Egret Cattle	<i>Bubulcus ibis</i>	
94	Ibis Hadeda	<i>Bostrychia hagedash</i>	
255	Plover Crowned	<i>Vanellus coronatus</i>	
258	Plover Blacksmith	<i>Vanellus armatus</i>	
356	Dove Namaqua	<i>Oena capensis</i>	
493	Lark Monotonous	<i>Mirafra passerina</i>	
494	Lark Rufousnaped	<i>Mirafra africana</i>	



Roberts No.	Common Name	Biological Name	Red Data Status
497	Lark Fawncoloured	<i>Mirafra africanoides</i>	
498	Lark Sabota	<i>Mirafra sabota</i>	
507	Lark Redcapped	<i>Calandrella cinerea</i>	
589	Chat Familiar	<i>Cercomela familiaris</i>	
595	Chat Anteating	<i>Myrmecocichla formicivora</i>	
601	Robin Cape	<i>Cossypha caffra</i>	
615	Robin Kalahari	<i>Cercotrichas paena</i>	
664	Cisticola Fantailed	<i>Cisticola juncidis</i>	
665	Cisticola Desert	<i>Cisticola aridulus</i>	
681	Neddicky	<i>Cisticola fulvicapillus</i>	
713	Wagtail Cape	<i>Motacilla capensis</i>	
716	Pipit Grassveld	<i>Anthus cinnamomeus</i>	
723	Pipit Bushveld	<i>Anthus caffer</i>	
743	Tchagra Threestreaked	<i>Tchagra australis</i>	
760	Starling Wattled	<i>Creatophora cinerea</i>	
764	Starling Glossy	<i>Lamprotornis nitens</i>	
779	Sunbird Marico	<i>Nectarinia mariquensis</i>	
803	Sparrow Cape	<i>Passer melanurus</i>	
804	Sparrow Southern Greyheaded	<i>Passer diffusus</i>	
814	Weaver Masked	<i>Ploceusvelatus</i>	
824	Bishop Red	<i>Euplectes orix</i>	
826	Bishop Golden	<i>Euplectes afer</i>	

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

9.1.5 Mammalia

Three hundred and ninety-nine indigenous mammal species occur in southern Africa (Appendix F), of these 66 species historically occur in the region in which the study area occurs. Of these 16 species are locally extinct and only four species were recorded during the survey. Of the remaining 46 species, 16 have a high probability of occurrence, 8 have a moderate probability of occurrence and 22 a low probability of occurrence. Many of these species are restricted in range to formally and informally protected areas.

Mammal species diversity was low with only four species recorded (Table 17). The reasons for the low mammalian species diversity may be degradation of habitat in the study area due to anthropogenic impacts



such as grazing, overutilisation of natural resources and the disposal of waste. *Mus musculus* and *Rattus rattus* were not recorded. These species are often attracted to waste disposal areas and may be present in the area.

All the mammal species found during the study are common species that occur in a wide range of habitats, none of the species recorded are classified as Red Data species.

Table 17: Mammal species recorded during the 2010 survey.

BIOLOGICAL NAME	COMMON NAME	RED DATA
<i>Lepus saxatillis</i>	Scrub Hare	NL
<i>Hystrix africaeaustralis</i>	Cape Porcupine	NL
<i>Rhabdomys pumilio</i>	Four-striped Grass Mouse	NL
<i>Mastomys natalensis</i>	Natal Multimammate Mouse	NL

The relevant IUCN status categories are:

Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)
Near Threatened (NT)
Data Deficient (DD)
Least Concern (LC)
All species without a category are shown as Not Listed (NL)

9.2 Red Data Faunal Species

According to the Red Data faunal species data from the MPTA only one Red Data faunal species has been recorded in the 2629CC quarter degree square and that is *Homoroselaps lacteus* (Spotted harlequin snake). This species was however recorded on the farm Rietpoort 405 IS approximately 29 km from the site (Figure 5), and probability of occurrence in the study area is considered low.

10.0 ECOLOGICAL FUNCTION

The precautionary principle was applied throughout the determination of the ecological function of the vegetation types and in instances where the ecological function was found to be borderline between two categories; the community was classified in the higher category.

The variations in ecological function occurring within the study site are shown in Figure 6. Although impacted, the *Themeda triandra* grassland and the natural wetland vegetation types are considered of high ecological function as the patterns and processes within this community are still present and they function as they would in a natural state.

The *Themeda-Hyparrhenia* grassland vegetation type can be considered as being of moderate ecological status as some of the patterns and processes in these areas have been diminished or eliminated by anthropogenic impacts. Further extensive impacts in these areas could cause rapid and perhaps irreversible degradation of these areas.

The artificial wetlands and existing disposal areas have low ecological function due to anthropogenic impacts. Natural patterns and processes in these areas have been severely reduced or, in extreme cases, almost completely eliminated. These areas can be considered as irreversibly or close to irreversibly degraded. Further impacts in these areas are unlikely to cause further degradation with regard to the vegetation, but some effects of degradation such as the invasion of exotic species may infiltrate the surrounding vegetation types.

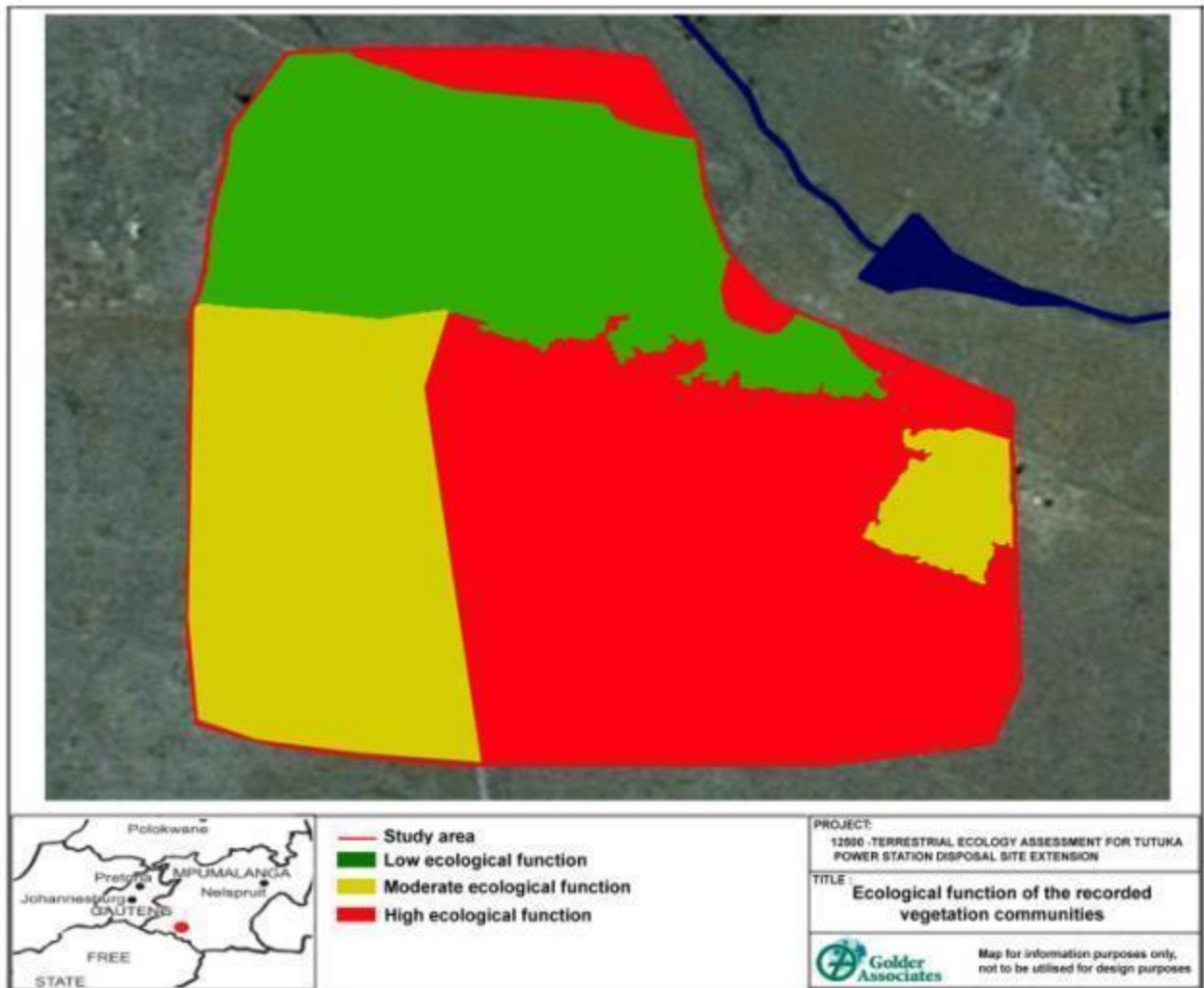


Figure 6: Ecological function of the study area.

11.0 CONSERVATION IMPORTANCE

The precautionary principle was applied throughout the determination of the conservation importance of the vegetation types and in instances where the conservation importance was found to be borderline between two categories; the community was classified in the higher category

The variation in conservation importance of the different vegetation types within the study area is shown in Figure 7. The areas with high conservation importance are the *Themeda triandra* grassland and the natural wetland vegetation types; due to the fact that these areas are the least impacted areas. These vegetation types also have higher levels of biodiversity than the surrounding areas and the likelihood of Red Data species occurring in these areas is considered moderate.

The *Themeda-Hyparrhenia* grassland (which includes the previously cultivated areas and road reserves) can be considered as being of moderate conservation importance as, although invaded by some exotic species and disturbed in some areas, these vegetation types support a large number of species and are not severely degraded. The existence of Red Data in this community cannot be excluded outright and therefore in line with the precautionary principle these communities were classified as being of moderate conservation importance (Figure 7).



TERRESTRIAL ECOLOGY ASSESSMENT

Due to the severe impacts, the artificial wetlands and existing disposal areas are classified as being of low conservation importance. These areas are in close proximity to areas of high conservation importance thereby creating edge effects into the areas of high conservation importance through a number of ecological (invasion of exotics, erosion etc.) and anthropogenic factors. These factors all reduce the connectivity of the areas of high conservation importance.

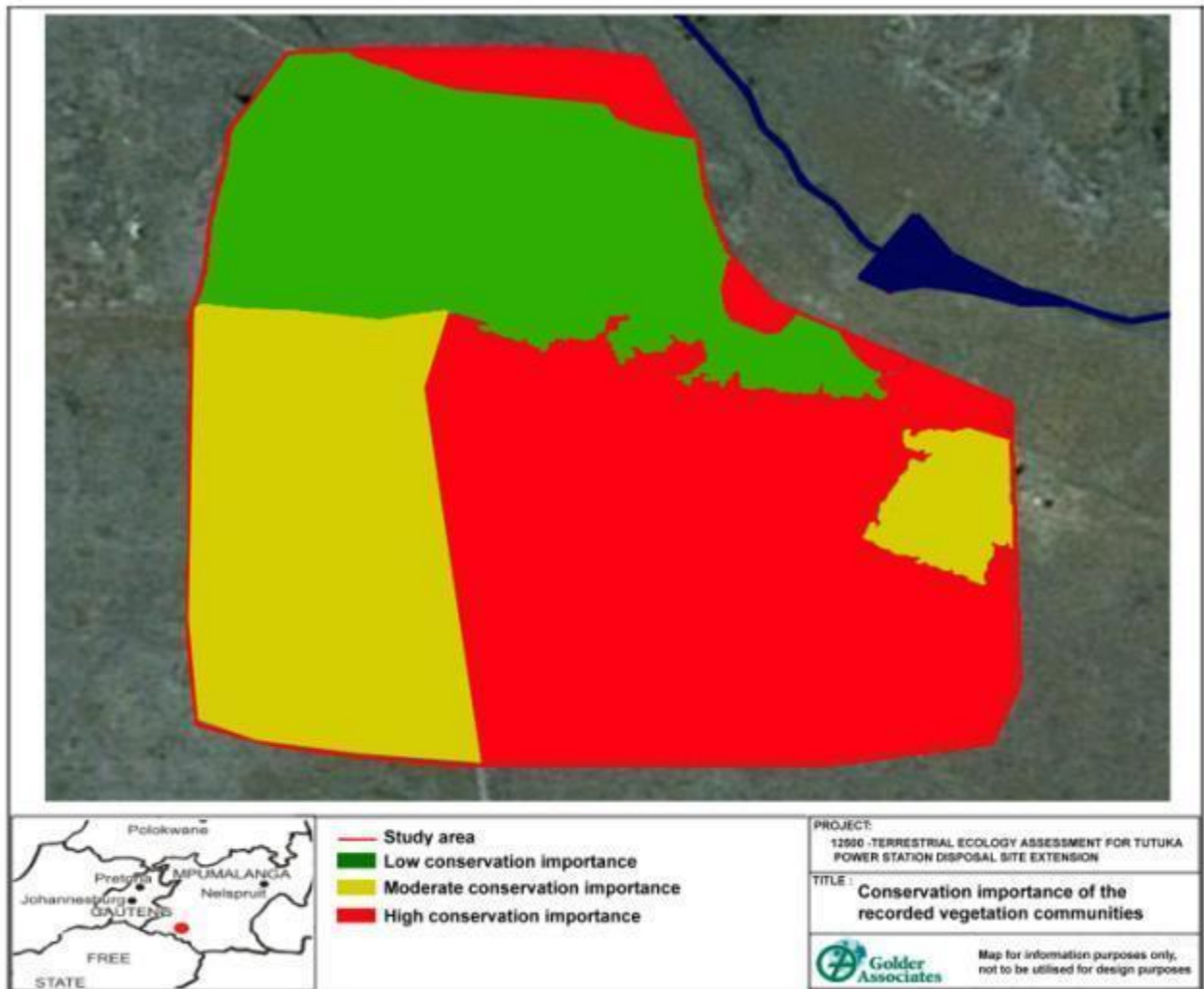


Figure 7: Conservation importance of the study area.



12.0 BIODIVERSITY IMPACT ASSESSMENT

Table 18: Biodiversity impact evaluation.

	Impacts	Themeda triandra Grassland					
		Themeda triandra Grassland	Impact before mitigation	Reasoning	Mitigation	Impact after mitigation	Reasoning
Waste Site	% of total area impacted	<30%					
	Type of impacts	Clearing of vegetation	High	This vegetation type comprises the highest conservation importance and ecological integrity of all the vegetation types in the study area. Vegetation removal must therefore be considered as a high impact.	Keep vegetation clearing to a minimum, translocation of any protected species that may occur in the area will have to be investigated.	Low	No destruction of protected species, very little loss of vegetation.
		Reduction of subterranean water flow	Moderate	The topography slopes slightly downward towards the floodplain. Compaction of soil may reduce subterranean water flow	Minimum compaction of the soil will reduce the impact the compaction has on the subterranean water flow.	Low	Minimal affect on subterranean flow
		Habitat degradation due to spillage of harmful or toxic substance.	High	Due to the protected species occurring in the area, spillage of toxic substances must be assumed to have a high impact.	Special precautions must be put in place in order to reduce the probability of spillage. Action plans need to be put in place in order to effectively clean up spills.	Low	Minimised pollution through good management



TERRESTRIAL ECOLOGY ASSESSMENT

		Disturbance of biodiversity due to vibration and noise.	High	The vegetation type in this area is limited and differs significantly from the surrounding vegetation types. It can therefore be assumed to harbour significantly different fauna species. If these species are excluded from this area due to noise and vibration there is no similar vegetation for them to migrate to.	Unnecessary noise must be kept to a minimum, precautions can be put in place to minimise vibration and noise during construction	Moderate	Noise and vibration are unlikely to be greatly reduced during construction but postconstruction noise and vibration can be reduced.
		Habitat degradation due to dust blown from exposed ground.	Moderate	Dust may affect vegetation including protected species, but the soil type in this region is less prone to causing dust than in other regions.	Measure such as wetting of roads and work areas can keep dust production to a minimum	Low	Dust can be controlled effectively
		Inhibition of local migration routes due to obstruction by infrastructure	Moderate	Infrastructure will hamper the migration routes of fauna especially smaller faunal species	Build infrastructure so as to have a minimal effect migration routes	Low	With no obstructions migration routes will not be significantly affected
Roads	% of total area impacted	<10%					
	Type of impacts	Clearing of vegetation	High	This vegetation type comprises the highest conservation importance and ecological integrity of all the vegetation types in the study area. Vegetation removal must therefore be considered as a high impact.	Use existing roads and keep the construction of roads to a minimum	Low	Road construction kept to a minimum



TERRESTRIAL ECOLOGY ASSESSMENT

		Habitat degradation due to spillage of harmful or toxic substance.	High	This vegetation type comprises the highest conservation importance and ecological integrity of all the vegetation types, spillage of toxic substances must be assumed to have a high impact.	Special precautions must be put in place in order to reduce the probability of spillage. Action plans need to be put in place in order to effectively clean up spills.	Low	Minimised pollution through good management
		Disturbance of biodiversity due to vibration and noise.	High	This vegetation type comprises the highest conservation importance and ecological integrity of all the vegetation types and is most likely to harbour significantly different fauna species.	Unnecessary noise must be kept to a minimum, precautions can be put in place to minimise vibration and noise during construction	Moderate	Noise and vibration are unlikely to be greatly reduced during construction but postconstruction noise and vibration can be reduced.
		Habitat degradation due to dust blown from exposed ground.	Moderate	Dust may affect vegetation including protected species, but the soil type in this region is less prone to causing dust than in other regions.	Measure such as wetting of roads and work areas can keep dust production to a minimum	Low	Dust can be controlled effectively
		Effect on local migrations	Moderate	Roads are known to affect species during local migrations, due to mortalities when crossing roads to a larger extent than roads being a physical barrier to species	Care taken when driving on roads and a low speed limit on roads as well as the effective enforcement of the speed limit will limit this impact	Low	Implementation of recommended mitigation measures will greatly reduce the significance of this impact



TERRESTRIAL ECOLOGY ASSESSMENT

		Increased access to previously inaccessible areas.	High	Roads are utilised by people in order to access previously inaccessible areas in order to utilise available resources. In areas which were previously inaccessible the impact of utilisation of flora and poaching of fauna can have significant effects.	Education of the workforce and a ban on hunting by the workforce as well as control of unauthorised access can reduce the impacts significantly. A ban on dogs in the area will also reduce poaching.	Low	Reduction of utilisation and poaching due to restrictive measures
	Impacts	Themeda triandra Grassland					
		Themeda triandra Grassland	Impact before mitigation	Reasoning	Mitigation	Impact after mitigation	Reasoning
	% of total area impacted	<30%					
Waste Site	Type of impacts	Clearing of vegetation	Moderate	Although unlikely, this vegetation type may harbor Red Data or Protected species. Vegetation removal must therefore be considered as a high impact.	Keep vegetation clearing to a minimum, translocate any protected species that may occur in the area will have to be investigated.	Low	No destruction of protected species, very little loss of vegetation.
		Reduction of subterranean water flow	Moderate	The topography slopes slightly downward towards the floodplain. Compaction of soil may reduce subterranean water flow	Minimum compaction of the soil will reduce the impact the compaction has on the subterranean water flow.	Low	Minimal affect on subterranean flow



TERRESTRIAL ECOLOGY ASSESSMENT

		Habitat degradation due to spillage of harmful or toxic substance.	Moderate	Due to the possible impacts of harmful substance on species occurring in the area, spillage of toxic substances must be assumed to have a moderate impact.	Special precautions must be put in place in order to reduce the probability of spillage. Action plans need to be put in place in order to effectively clean up spills.	Low	Minimised pollution through good management
		Disturbance of biodiversity due to vibration and noise.	Low	It is unlikely that any protected or red data faunal species occur in this area that will be significantly affected by noise.	Unnecessary noise must be kept to a minimum, precautions can be put in place to minimise vibration and noise during construction	Low	Noise and vibration are unlikely to be greatly reduced during construction but postconstruction noise and vibration can be reduced.
		Habitat degradation due to dust blown from exposed ground.	High	Dust may affect vegetation including protected species in surrounding areas, but the soil type in this region is less prone to causing dust than in other regions.	Measure such as wetting of roads and work areas can keep dust production to a minimum	Low	Dust can be controlled effectively
		Inhibition of local migration routes due to obstruction by infrastructure	Moderate	Infrastructure will hamper the migration routes of fauna especially smaller faunal species	Build infrastructure so as to have a minimal effect migration routes	Low	With no obstructions migration routes will not be significantly affected
Roads	% of total area impacted	<10%					
	Type of impacts	Clearing of vegetation	Moderate	Vegetation removal will completely transform existing habitats. Vegetation removal must therefore be considered as a moderate impact.	Use existing roads and keep the construction of roads to a minimum	Low	Road construction kept to a minimum



TERRESTRIAL ECOLOGY ASSESSMENT

		Habitat degradation due to spillage of harmful or toxic substance.	High	Spillage of toxic substances may affect surrounding areas and must be assumed to have a high impact.	Special precautions must be put in place in order to reduce the probability of spillage. Action plans need to be put in place in order to effectively clean up spills.	Low	Minimised pollution through good management
		Disturbance of biodiversity due to vibration and noise.	Moderate	Small mammals and birds may vacate the area due to the vibration and noise in the area and must therefore be considered as a moderate impact.	Unnecessary noise must be kept to a minimum, precautions can be put in place to minimise vibration and noise during construction	Low	Noise and vibration are unlikely to be greatly reduced during construction but postconstruction noise and vibration can be reduced.
		Habitat degradation due to dust blown from exposed ground.	Moderate	Dust may affect adjacent vegetation including protected species, but the soil type in this region is less prone to causing dust than in other regions.	Measure such as wetting of roads and work areas can keep dust production to a minimum	Low	Dust can be controlled effectively
		Effect on local migrations	Moderate	Roads are known to affect species during local migrations, due to mortalities when crossing roads to a larger extent than roads being a physical barrier to species	Care taken when driving on roads and a low speed limit on roads as well as the effective enforcement of the speed limit will limit this impact	Low	Implementation of recommended mitigation measures will greatly reduce this impact



TERRESTRIAL ECOLOGY ASSESSMENT

		Increased access to previously inaccessible areas.	Moderate	Roads are utilised by people in order to access previously inaccessible areas in order to utilised these areas. In areas which were previously inaccessible the impact of utilisation of flora and poaching of fauna can have significant effects.	Education of the workforce and a ban on hunting by the workforce as well as control of unauthorised access can reduce the impacts significantly. Control of unauthorized firearms and dogs in the area will also reduce poaching.	Low	Reduction of utilisation and poaching due to restrictive measures
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13.0 DISCUSSION

The physiognomy of the area is characterized by the dominance of the herbaceous component consisting predominantly of grass species, while the woody stratum is very poorly represented. This is very much what would be expected in this area due to the area falling within the Grassland Biome and Soweto Highveld Grassland vegetation type. A pristine species composition would dictate a slightly more diverse herbaceous stratum, but the occurrence of species rather than the species diversity in this area are an obvious indicator of the historical impacts on the area.

Forbs and other herbs are moderately represented, but the dominance of many of these species also indicates the degraded status of the vegetation. This is especially visible in the north-western quarter of the study area. A total of 58 plant species were identified during the site investigation. Herbs and graminoids (grasses) dominate the composition.

The following vegetation communities (Figure 3) were identified during the study, and are named according to the area in which they occur, physiognomy and/or dominant floral species occurring within the vegetation communities:

- *Themeda triandra* grassland;
- *Themeda – Hyparrhenia mixed grassland* ;
- Natural Riparian Wetland;
- Artificial wetland associated with diggings;
- Existing waste disposal site.

No Red Data plant species were recorded during the 2010 survey. According to the MPTA records only two Red Data plant species are known to occur in the 2629CC grid square and both of these species were found more than 20 km away from the study area.

A total of 34 arthropods, 3 reptiles, 4 amphibians, 31 birds and 4 mammal species were recorded during the 2010 surveys, None of these species are currently listed as Red Data species by the IUCN or as Protected species on a provincial level.

Although impacted, the *Themeda triandra* grassland and the natural wetland vegetation types are considered of high ecological function as the patterns and processes within this community are still present and the functions as they would in a natural state.

The *Themeda-Hyparrhenia* grassland vegetation type can be considered as being of moderate ecological status as some of the patterns and processes in these areas have been diminished or eliminated by anthropogenic impacts. Although impacts on the vegetation are envisaged to be insignificant on a local scale, due to the complex nature of ecological systems further extensive impacts in these areas could cause rapid and perhaps irreversible degradation of these areas.

The artificial wetlands and existing disposal areas have low ecological function due to anthropogenic impacts. Natural patterns and processes in these areas have been severely reduced or, in extreme cases, almost completely eliminated. These areas can be considered as irreversibly or close to irreversibly degraded. Further impacts in these areas are unlikely to cause further degradation with regard to the vegetation, but some effects of degradation such as the invasion of exotic species may infiltrate the surrounding vegetation types.

The areas with high conservation importance are the *Themeda triandra* grassland and the natural wetland vegetation types due to the fact that these areas are the least impacted areas. These vegetation types also have far higher levels of biodiversity than the surrounding areas and the likelihood of Red Data species occurring in these areas is considered moderate.



The *Themeda-Hyparrhenia* grassland vegetation type (which includes the previously cultivated areas and road reserves) can be considered as being of moderate conservation importance as, although invaded by some exotic species and disturbed in some areas, this vegetation types supports a large number of species and is not severely degraded. The existence of Red Data in this community cannot be excluded outright and therefore in line with the precautionary principle these communities were classified as being of moderate conservation importance.

Due to the severely impacted state of the the artificial wetlands and existing disposal areas, these areas were classified as being of low conservation importance. These areas are in close proximity to the areas of high conservation importance thereby creating edge effects into the areas of high conservation importance through a number of ecological (invasion of exotics, erosion etc.) and anthropogenic factors. These factors all reduce the connectivity of the areas of high conservation importance.

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APPENDIX A

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APPENDIX B

FLORAL SPECIES OCCURRING IN THE STUDY AREA



TERRESTRIAL ECOLOGY ASSESSMENT

Family	Naturalised	Species	Lifecycle	Growth forms
ACANTHACEAE		Chaetacanthus costatus	Annual	Herb
ACANTHACEAE		Crabbea acaulis	Annual	Herb
AMARYLLIDACEAE		Boophone disticha	Perennial	Geophyte
ANTHERICACEAE		Chlorophytum fasciculatum	Perennial	Herb
ASPHODELACEAE		Aloe ecklonis	Perennial	Succulent
ASPHODELACEAE		Kniphofia albescens	Perennial	Succulent
ASPHODELACEAE		Kniphofia typhoides	Perennial	Succulent
ASTERACEAE		Berkheya onopordifolia	Perennial	Herb
ASTERACEAE		Berkheya pinnatifida	Perennial	Herb
ASTERACEAE		Pseudognaphalium luteo-album	Annual	Herb
ASTERACEAE		Schistostephium crataegifolium	Perennial	Herb
ASTERACEAE	*	Cirsium vulgare	Annual	Herb
ASTERACEAE	*	Bidens pilosa	Annual	Herb
ASTERACEAE	*	Tagetes minuta	Annual	Herb
ASTERACEAE	*	Xanthium strumarium	Annual	Herb
AZOLLACEAE	*	Azolla filiculoides	Perennial	Hydrophyte
CANNABACEAE	*	Cannabis sativa	Annual	Herb
CONVOLVULACEAE	*	Cuscuta campestris	Annual	Parasite
CONVOLVULACEAE		Evolvulus alsinoides.	Annual	Herb
CONVOLVULACEAE	*	Ipomoea purpurea	Annual	Climber
CYPERACEAE		Abildgaardia ovata	Perennial	Cyperoid
CYPERACEAE		Bulbostylis contexta	Annual	Cyperoid
CYPERACEAE		Bulbostylis humilis	Annual	Cyperoid
CYPERACEAE		Cyperus fastigiatus	Perennial	Cyperoid
CYPERACEAE		Cyperus semitrifidus	Perennial	Cyperoid



TERRESTRIAL ECOLOGY ASSESSMENT

Family	Naturalised	Species	Lifecycle	Growth forms
EUPHORBIACEAE		Chamaesyce inaequilatera	Perennial	Herb
FABACEAE		Trifolium africanum var. africanum	Perennial	Herb
GISEKIACEAE		Gisekia pharnacioides var. pharnacioides	Annual	Herb
GREYIACEAE		Greyia sutherlandii	Perennial	Shrub
IRIDACEAE		Gladiolus robertsoniae	Perennial	Geophyte
JUNCACEAE		Juncus dregeanus subsp. dregeanus	Perennial	Helophyte
LAMIACEAE		Salvia repens	Perennial	Herb
MALVACEAE		Hermannia depressa	Perennial	Herb
MALVACEAE	*	Hibiscus trionum	Annual	Herb
MALVACEAE		Sida rhombifolia	Annual or biennial	Herb
POACEAE		Eragrostis plana	Perennial	Graminoid
POACEAE		Alloteropsis semialata	Perennial	Graminoid
POACEAE		Aristida bipartita	Annual	Graminoid
POACEAE		Aristida congesta	Annual	Graminoid
POACEAE		Brachiaria eruciformis	Annual	Graminoid
POACEAE		Brachiaria serrata	Perennial	Graminoid
POACEAE		Catalepis gracilis	Perennial	Graminoid
POACEAE		Chloris virgata	Perennial	Graminoid
POACEAE		Cynodon dactylon	Perennial	Graminoid
POACEAE		Digitaria eriantha	Perennial	Graminoid
POACEAE		Digitaria ternata	Perennial	Graminoid
POACEAE		Elionurus muticus	Perennial	Graminoid
POACEAE		Eragrostis capensis	Perennial	Graminoid
POACEAE		Eragrostis chloromelas	Perennial	Graminoid
POACEAE		Eragrostis curvula	Perennial	Graminoid
POACEAE		Eragrostis planiculmis	Perennial	Graminoid



TERRESTRIAL ECOLOGY ASSESSMENT

Family	Naturalised	Species	Lifecycle	Growth forms
POACEAE		Eragrostis racemosa	Perennial	Graminoid
POACEAE		Heteropogon contortus	Perennial	Graminoid
POACEAE		Leersia hexandra	Perennial	Graminoid
POACEAE		Microchloa caffra	Annual	Graminoid
POACEAE		Panicum coloratum	Annual	Graminoid
POACEAE		Panicum schinzii	Annual	Graminoid
POACEAE		Setaria incrassata	Annual	Graminoid
POACEAE		Setaria nigrirostris	Annual	Graminoid
POACEAE		Setaria sphacelata	Annual	Graminoid
POACEAE		Themeda triandra	Annual	Graminoid
POACEAE		Hyparrhenia hirta	Perennial	Graminoid
POLYGONACEAE	*	Persicaria amphibia	Perennial	Hydrophyte
RUBIACEAE		Anthospermum pumilum	Perennial	Herb
SCROPHULARIACEAE		Jamesbrittenia aurantiaca	Perennial	Herb
SOLANACEAE	*	Datura ferox	Annual	Herb
SOLANACEAE	*	Datura stramonium	Annual	Herb
SOLANACEAE	*	Solanum sisymbriifolium	Perennial	Herb
VERBENACEAE	*	Verbena bonariensis	Annual	Herb
VERBENACEAE	*	Verbena brasiliensis	Annual	Herb



APPENDIX C

**SOUTHERN AFRICAN HERPETOFAUNA, REPTILES
PREVIOUSLY RECORDED IN THE 2629CC GRID SQUARE ARE
HIGHLIGHTED**



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded	
Chelonii		Testudinae		<i>Homopus femoralis</i>	Greater Padloper	E			
				<i>Homopus areolatus</i>	Parrot-beaked Tortoise	E			
				<i>Homopus boulengeri</i>	Karooor Boulenger's Padloper	E			
				<i>Homopus signatus</i>	Speckled Padloper	E			
				<i>Homopus bergeri</i>	Nama or Berger's Padloper	E			
				<i>Geochelone pardalis</i>	Leopard Tortoise				
				<i>Chersina angulata</i>	Angulate Tortoise	E			
				<i>Psammobates oculifer</i>	Serrated or Kalahari Tent Tortoise	E			
				<i>Psammobates geometricus</i>	Geometric Tortoise	E			
				<i>Psamobates tentorius</i>	Tent Tortoise	E			
				<i>Kinixys belliana</i>	Bell's Hinged Tortoise				
				<i>Kinixys natalensis</i>	Natal Hinged Tortoise	E			
						Trionychidae		<i>Trionyx triunguis</i>	Nile Soft-shelled Terrapin
	<i>Cycloderma frenatum</i>	Zambezi Soft-shelled Terrapin							
			Emydidae		<i>Trachemys scripta</i>	American Red-eared Terrapin	Introduced		
		Pleurodira	Pelomedusidae		<i>Pelomedusa subrufa</i>	Marsh or Helmeted Terrapin			
					<i>Pelusios sinuatus</i>	Serrated Hinged Terrapin			
					<i>Pelusios subniger</i>	Pan Hinged Terrapin			
					<i>Pelusios bechuanicus</i>	Okavango Hinged Terrapin			
					<i>Pelusios rhodesianus</i>	Mashona Hinged Terrapin			
<i>Pelusios castanoides</i>					Eastern Hinged Terrapin				



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
Squamata	Serpentes (Ophidia)	Tryphlopidae		<i>Ramphotyphlops braminus</i>	Flower-pot Snakes	Introduced		
				<i>Typhlops obtusus</i>	Slender Blind Snake			
				<i>Typhlops fomasinii</i>	Fornasini's Blind Snake	E		
				<i>Typhlops boylei</i>	Boyle's Blind Snake	E		
				<i>Typhlops bibronii</i>	Bibron's Blind Snake	E		
				<i>Typhlops lalandei</i>	Delalande's Blind Snake	E		
				<i>Typhlops schinzi</i>	Beaked Blind Snake	E		
				<i>Typhlops schleglii</i>	Schlegel's Blind Snake			
		Leptotyphlopidae		<i>Leptotyphlops longicaudus</i>	Lont-tailed Thread Snake			
				<i>Leptotyphlops nigricans</i>	Black Thread Snake			
				<i>Leptotyphlops gracilior</i>	Slender Thread Snake	E		
				<i>Leptotyphlops conjunctus</i>	Cape Thread Snake			
				<i>Leptotyphlops scutifrons</i>	Peter's Thread Snake			
				<i>Leptotyphlops telloi</i>	Tello's Thread Snake	E		
				<i>Leptotyphlops distanti</i>	Distant's Thread Snake	E		
				<i>Leptotyphlops occidentalis</i>	Western Thread Snake	E		
		Boidae		<i>Python anchietae</i>	Anchieta's Dwarf Python			
				<i>Python sebae</i>	African Rock Python		VU	
		Colubridae	Boadontinae	<i>Lycodonomorphus laevissimus</i>	Dusky-bellied Water Snake	E		
				<i>Lycodonomorphus leleupi</i>	Mulanje Water Snake			
				<i>Lycodonomorphus rufulus</i>	Common Brown Water Snake	E		
				<i>Lycodonomorphus whytii</i>	Whyte's Water Snake			
				<i>Lamprophis fuliginosus</i>	Brown House Snake			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Lamprophis inornatus</i>	Olive House Snake	E		
				<i>Lamprophis guttatus</i>	Spotted House Snake	E		
				<i>Lamprophis aurora</i>	Aurora House Snake	E		
				<i>Lamprophis fiskii</i>	Fisk's House Snake	E		
				<i>Lamprophis fuscus</i>	Yellow-bellied House Snake	E		
				<i>Lamprophis swazicus</i>	Swazi Rock Snake	E		
				<i>Lycophidion capense</i>	Cape Wolf Snake			
				<i>Lycophidion variegatum</i>	Variegated Wolf Snake	E		
				<i>Lycophidion hellmichi</i>	Hellmich's Wolf Snake			
				<i>Lycophidion semiannule</i>	Eastern Wolf Snake			
				<i>Cryptolycus nanus</i>	Dwarf Wolf Snake	E		
				<i>Mehelya capensis</i>	Cape File Snake			
				<i>Mehelya vemayi</i>	Angola File Snake			
				<i>Mehelya nyassae</i>	Black File Snake			
				<i>Duberria lutrix</i>	Common Slug Eater			
				<i>Duberria variegata</i>	Variegated or Spotted Slug Eater	E		
				<i>Pseudoaspis cana</i>	Mole Snake			
				<i>Natriciteres variegata</i>	Forest Marsh Snake			
				<i>Natriciteres olivacea</i>	Olive Marsh Snakes			
				<i>Limnophis bicolor</i>	Striped Swamp Snake			
				<i>Pythonodipsas carinata</i>	Western Keeled Snake			
				<i>Amplorhinus multimaculatus</i>	Many-spotted Snake	E		
				<i>Prosymna janii</i>	Mozambique Shovel-snout	E		
				<i>Prosymna sundevali</i>	Sundevall's Shovel-snout	E		
				<i>Prosymna bivittata</i>	Two-striped Shovel-snout	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Prosymna angolensis</i>	Angola Shovel-snout			
				<i>Prosymna frontalis</i>	South-western Shovel-snout			
				<i>Prosymna ambigua</i>	East African Shovel-snout			
				<i>Prosymna visseri</i>	Visser's Shovel-snout			
				<i>Hemirhagerhis nototaenia</i>	Bark or Mopane Snake			
				<i>Rhamphiophis oxyrhynchus</i>	Rufus Beaked Snake			
				<i>Dipsina multimaculata</i>	Dwarf Beaked Snake	E		
				<i>Dromphis lineatus</i>	Lined Olympic Snake			
				<i>Psammophylax rhombeatus</i>	Spotted or Rhombic Skaapsteker			
				<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker			
				<i>Psammophylax variabilis</i>	Grey-bellied Grass Snake			
				<i>Psammophis trigrammus</i>	Western Sand Snake			
			Psammophinae	<i>Psammophis notostictus</i>	karoo Sand or Whip Snake			
				<i>Psammophis leightoni</i>	Cape, Namib and Fork-marked Sand Snake			
				<i>Psammophis jallae</i>	Jalla's Sand Snake			
				<i>Psammophis subtaeniatus</i>	Stripe-bellied Sand Snake			
				<i>Psammophis angolensis</i>	Dwarf Sand Snake			
				<i>Psammophis siblians</i>	Leopard and Short snouted Grass snakes			
				<i>Psammophis phillipsii</i>	Olive Grass Snake			
				<i>Psammophis crucifer</i>	Cross-marked or Montane Grass Snake	E		
			Atractaspidinae	<i>Atractaspis bibronii</i>	Southern or Bibron's Burrowing Asp			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Atractaspis congica</i>	Eastern Congo Burrowing Asp			
				<i>Atractaspis duerdeni</i>	Duerden's Burrowing Asp	E		
				<i>Aparallactus lunulatus</i>	Reticulated Centipede Eater			
				<i>Aparallactus guentheri</i>	Black Centipede Eater			
				<i>Aparallactus capensis</i>	Cape Centipede Eater			
				<i>Aparallactus nigriceps</i>	Mozambique Centipede Eater	E		
				<i>Macrelaps microlepdotus</i>	Natal Black Snake	E		
				<i>Amblyodipsas concolor</i>	Natal Purple-glossed Snake	E		
				<i>Amblyodipsas polylepis</i>	Common Purple-glossed Snake			
				<i>Amblyodipsas microphthalma</i>	Eastern Purple-glossed of White-lipped Snake	E		
				<i>Amblyodipsas ventrimaculata</i>	Kalahari Purple-glossed Snake			
				<i>Chilorhinophis gerardi</i>	Gerard's Black and Yellow Burrowing Snake			
				<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	E		
				<i>Homoreselaps dorsalis</i>	Striped Harlequin Snake	E		
				<i>Xenocalamus sabiensis</i>	Sabi Quill-snouted Snake	E		
				<i>Xenocalamus transvaalensis</i>	Transvaal Quill-snouted Snake	E	DD	
				<i>Xenocalamus bicolor</i>	Bicoloured Quill-snouted Snake			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Xenocalamus mechowii</i>	Elongate Quill-snouted Snake			
				<i>Meizodon semiomatus</i>	Semiornate Snake			
				<i>Philothamnus semivariiegatus</i>	Spotted Bush Snake			
				<i>Philothamnus ornatus</i>	Ornate Bush Snake			
				<i>Philothamnus angolensis</i>	Western Green Snake			
				<i>Philothamnus hoplogaster</i>	Green Water Snake			
				<i>Philothamnus natalensis</i>	Natal Green Snake	E		
				<i>Dasypeltis scabra</i>	Common or Rhombic Egg Eater			
				<i>Dasypeltis inomata</i>	Southern Brown Egg Eater	E		
				<i>Dasypeltis medici</i>	East African Egg Eater			
				<i>Crotaphopeltis hotamboeia</i>	Herald or Red-lipped Snake			
				<i>Crotaphopeltis barotseensis</i>	Barotse Water Snake			
				<i>Telescopus semiannulatus</i>	Eastern Tiger Snake			
				<i>Telescopus beetzii</i>	Namib Tiger Snake	E		
				<i>Dipsadoboa aulica</i>	Cross-barred or Marbled Tree Snake			
				<i>Dispholidus typus</i>	Boomslang			
				<i>Thelotornis capensis</i>	Bird or Twig Snake			
		Elapidae	Najinae	<i>Aspidelaps lubricus</i>	Coral Snake			
				<i>Aspidelaps scutatus</i>	Shield-nosed Snake	E		
				<i>Elapsoidea guentheri</i>	Gunther's Garter Snake			
				<i>Elapsoidea semiannulata</i>	Angolan and Boulenger's Garter Snakes			
				<i>Elapsoidea sunevalli</i>	Sundevall's Garter	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
					Snake			
				<i>Naja haje</i>	Egyptian Cobra			
				<i>Naja melanoleuca</i>	Forest Cobra			
				<i>Naja nivea</i>	Cape Cobra	E		
				<i>Naja mossambica</i>	Mozambique Spitting Cobra (M'fezi)			
				<i>Naja nigricollis</i>	Black-necked Spitting Cobra			
				<i>Hemachatus heamachatus</i>	Rinkhals	E		
				<i>Dendroaspis polylepis</i>	Black Mamba			
				<i>Dendroaspis angusticeps</i>	Green Mamba			
			Causinae	<i>Causus rhombeatus</i>	Common or Rhombic Night Adder			
				<i>Causus defilippii</i>	Snouted Night Adder			
				<i>Bitis arietans</i>	Puff Adder			
				<i>Bitis gabonica</i>	Gaboon Adder			
				<i>Bitis atropos</i>	Berg Adder	E		
				<i>Bitis cornuta</i>	Many-horned Adder	E		
				<i>Bitis caudalis</i>	Horned Adder			
			Viperinae	<i>Bitis xeropaga</i>	Desert Mountain Adder	E		
				<i>Bitis inomata</i>	Plain Mountain Adder	E		
				<i>Bitis shneideri</i>	Namaqua Dwarf Adder	E		
				<i>Bitis peringueyi</i>	Peringuey's Adder			
				<i>Atheris superciliaris</i>	Lowland Swamp Adder			
				<i>Chirindia langi</i>	Lang's Round-headed Worm Lizard	E		
	Amphisbaenia	Amphisbaenidae		<i>Chirindia swynnertoni</i>	Swynnerton's Round-headed Worm Lizard			
				<i>Zygaspis violacea</i>	Violet Round-headed Worm Lizard	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Zygaspis quadrifrons</i>	Kalahari Round-headed Worm Lizard			
				<i>Zygaspis niger</i>	Black Round-headed Worm Lizard			
				<i>Monopeltis anchietae</i>	Angolan Spade-snouted Worm Lizard			
				<i>Monopeltis leonhardi</i>	Leonhard's Spade-snouted Worm Lizard	E		
				<i>Monopeltis zambezensis</i>	Zambezi Spade-snouted Worm Lizard			
				<i>Monopeltis capensis</i>	Cape Spade-snouted Worm Lizard			
				<i>Monopeltis sphenorhynchus</i>	Slender Spade-snouted Worm Lizard			
				<i>Dalophia pistillum</i>	Blunt-tailed Worm Lizard			
				<i>Dalophia longicauda</i>	Long-tailed Worm Lizard			
	Sauria (Lacertillia)	Scincidae	Acontiinae	<i>Acontias breviceps</i>	Short-headed Legless Skink	E		
<i>Acontias gracilicauda</i>				Thin-tailed Legless Skink	E			
<i>Acontias lineatus</i>				Striped Legless Skink	E			
<i>Acontias litoralis</i>				Coastal Legless Skink	E			
<i>Acontias meleagris</i>				Cape Legless Skink	E			
<i>Acontias plumbeus</i>				Giant Legless Skink	E			
<i>Acontias percivali</i>				Percival's Legless Skink				
<i>Acontophiops lineatus</i>				Woodbush Legless Skink	E			
<i>Typhlosaurus aurantiacus</i>				Golden Blind Legless Skink	E			
<i>Typhlosaurus braini</i>				Brain's Blind Legless	E			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
					Skink			
				<i>Typhlosaurus caecus</i>	Cuvier's Blind Legless Skink	E		
				<i>Typhlosaurus cregoi</i>	Cregoi's Blind Legless Skink	E		
				<i>Typhlosaurus gariiepensis</i>	Gariiep Blind Legless Skink	E		
				<i>Typhlosaurus lineatus</i>	Stiped Blind Legless Skink			
				<i>Typhlosaurus lomii</i>	Lomi's Blind Legless Skink	E		
				<i>Typhlosaurus meyeri</i>	Meyer's Blind Legless Skink	E		
				<i>Typhlosaurus vermis</i>	Boulenger's Blind Legless Skink	E		
			Scincinae	<i>Proscelotes arnoldi</i>	Arnold's Skink			
				<i>Scelotes anguina</i>	Algoa Dwarf Burrowing Skink	E		
				<i>Scelotes arenicula</i>	Zululand Dwarf Burrowing Skink	E		
				<i>Scelotes bidigittatus</i>	Lowveld Dwarf Burrowing Skink	E		
				<i>Scelotes bipes</i>	Silvery Dwarf Burrowing Skink	E		
				<i>Scelotes sexlineatus</i>	Striped Dwarf Burrowing Skink	E		
				<i>Scelotes brevipes</i>	Hewitt's Dwarf Burrowing Skink	E		
				<i>Scelotes caffer</i>	Cape Dwarf Burrowing Skink	E		
				<i>Scelotes capensis</i>	Western Dwarf Burrowing Skink	E		
				<i>Scelotes gronovii</i>	Gronovi's Dwarf Burrowing Skink	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Scelotes guentheri</i>	Gunther's Dwarf Burrowing Skink	E		
				<i>Scelotes inornatus</i>	Smith's Dwarf Burrowing Skink	E		
				<i>Scelotes kasneri</i>	Kasner's Dwarf Burrowing Skink	E		
				<i>Scelotes limpopoensis</i>	Limpopo Dwarf Burrowing Skink	E		
				<i>Scelotes mira</i>	Montane Dwarf Burrowing Skink	E		
				<i>Sepsina alberti</i>	Albert's Burrowing Skink	E		
				<i>Sepsina angolensis</i>	Angola Burrowing Skink			
				<i>Typhlacontias bogerti</i>	Bogert's Burrowing Skink			
				<i>Typhlacontias brevipes</i>	FitzSimons's Burrowing Skink			
				<i>Typhlacontias gracilis</i>	Kalahari Burrowing Skink			
			Lygosomatiinae	<i>Cryptoblepharus boutonii</i>	Bouton's Skink			
				<i>Lygosoma afer</i>	Mozambique Writhing Skink			
				<i>Lygosoma sundevallii</i>	Sundevall's Writhing Skink			
				<i>Mabuya acutilabris</i>	Wedge-snouted Skink			
				<i>Mabuya binotata</i>	Ovambo Tree Skink			
				<i>Mabuya boulengeri</i>	Boulenger's Skink			
				<i>Mabuya capensis</i>	Cape Skink			
				<i>Mabuya chimbana</i>	Chimbana Skink			
				<i>Mabuya hoeschi</i>	Hoesch's Skink			
				<i>Mabuya homalocephala</i>	Red-sided Skink	E		
				<i>Mabuya quinquetaeniata</i>	Five-lined or Rainbow			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
					Skink			
				<i>Mabuya lacertiformis</i>	Bronze Rock Skink			
				<i>Mabuya laevis</i>	Angolan Blue-tailed Skink			
				<i>Mabuya maculilabris</i>	Speckled-lipped Skink			
				<i>Mabuya megalura</i>	Grass-top Skink			
				<i>Mabuya occidentalis</i>	Western Three-striped Skink			
				<i>Mabuya spilogaster</i>	Kalahari Tree Skink			
				<i>Mabuya striata</i>	Striped Skink			
				<i>Mabuya sulcata</i>	Western Rock Skink			
				<i>Mabuya varia</i>	Variable Skink			
				<i>Mabuya variegata</i>	Variegated Skink			
				<i>Panaspis wahlbergii</i>	Walberg's Snake-eyed Skink			
		Lacertidae		<i>Aporosaura anchietae</i>	Shovel-snouted Lizard			
				<i>Heliobolus lugubris</i>	Bushveld Lizard			
				<i>Holaspis guentheri</i>	Blue-tailed Tree Lizard			
				<i>Ichnotropis capensis</i>	Cape Rough-scaled Lizard			
				<i>Ichnotropis grandiceps</i>	Caprivi Rough-scaled Lizard	E		
				<i>Ichnotropis squamulosa</i>	Common Rough-scaled Lizard			
				<i>Lacerta australis</i>	Southern Rock Lizard	E		
				<i>Lacerta rupicola</i>	Soutpansberg Rock Lizard	E		
				<i>Meroles ctenodactylus</i>	Smith's Desert Lizard	E		
				<i>Meroles cuneirostris</i>	Wedge-snouted Desert Lizard	E		
				<i>Meroles knoxii</i>	Knox's Desert Lizard	E		
				<i>Meroles micropholidotus</i>	Small-scaled Desert	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
					Lizard			
				<i>Meroles reticulatus</i>	Reticulated Desert Lizard			
				<i>Meroles suborbitalis</i>	Spotted Desert Lizard	E		
				<i>Nucras caesicaudata</i>	Blue-tailed Sandveld Lizard	E		
				<i>Nucras intertexta</i>	Spotted Sandveld Lizard	E		
				<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	E		
				<i>Nucras taeniolata</i>	Ornate Sandveld Lizard			
				<i>Nucras tessellata</i>	Striped Sandveld Lizard			
				<i>Pedioplanis breviceps</i>	Short-headed Sand Lizard	E		
				<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	E		
				<i>Pedioplanis laticeps</i>	Cape Sand Lizard	E		
				<i>Pedioplanis lineocellata</i>	Spotted Sand Lizard	E		
				<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard			
				<i>Pedioplanis undata</i>	Western Sand Lizard			
				<i>Pedioplanis sp.</i>	Husab Sand Lizard	E		
				<i>Tropidosaura essexi</i>	Essex's Mountain Lizard	E		
				<i>Tropidosaura cottrelli</i>	Cottrell's Mountain Lizard	E		
				<i>Tropidosaura gularis</i>	Cape Mountain Lizard	E		
				<i>Tropidosaura montana</i>	Common Mountain Lizard	E		
		Cordylidae	Gerrhosaurinae	<i>Angolosaurus skoogi</i>	Desert Plated Lizard			
				<i>Cordylosaurus subtessellatus</i>	Dwarf Plated Lizard			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard			
				<i>Gerrhosaurus major</i>	Rough-scaled Plated Lizard			
				<i>Gerrhosaurus multineatus</i>	Kalahari Plated Lizard			
				<i>Gerrhosaurus nigrolineatus</i>	Black-lined Plated Lizard			
				<i>Gerrhosaurus typicus</i>	Namaqua Plated Lizard	E		
				<i>Gerrhosaurus validus</i>	Giant Plated Lizard			
				<i>Tetradactylus africanus</i>	African Long-tailed Seps	E		
				<i>Tetradactylus breyeri</i>	Breyer's Long-tailed Seps	E		
				<i>Tetradactylus eastwoodae</i>	Eastwood's Long-tailed Seps	E		
				<i>Tetradactylus seps</i>	Short-legged Seps	E		
				<i>Tetradactylus tetradactylus</i>	Common Long-tailed Seps	E		
				<i>Charmaesaura aenea</i>	Transvaal Grass Lizard	E		
				<i>Charmaesaura anguina</i>	Cape Grass Lizard			
				<i>Charmaesaura macrolepis</i>	Large-scaled Grass Lizard			
			Cordylinae	<i>Cordylus campbelli</i>	Campbell's Girdled Lizard	E		
			Cordylinae	<i>Cordylus cataphractus</i>	Armadillo Girdled Lizard	E		
			Cordylinae	<i>Cordylus coeruleopunctatus</i>	Blue-spotted Girdled Lizard	E		
			Cordylinae	<i>Cordylus cordylus</i>	Cape Girdled Lizard	E		
			Cordylinae	<i>Cordylus giganteus</i>	Giant Girdled Lizard or Sungazer	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Cordylus lawrenci</i>	Lawrence's Girdled Lizard	E		
				<i>Cordylus macropholis</i>	Large-scaled Girdled Lizard	E		
				<i>Cordylus mclachlani</i>	McLachlan's Girdled Lizard	E		
				<i>Cordylus minor</i>	Dwarf Girdled Lizard	E		
				<i>Cordylus namaquensis</i>	Namaqua Girdled Lizard	E		
				<i>Cordylus peersi</i>	Peers's Girdled Lizard	E		
				<i>Cordylus polyzous</i>	Karoo Girdled Lizard	E		
				<i>Cordylus jordani</i>	Jordan's Girdled Lizard	E		
				<i>Codylus pustulatus</i>	Herero Girdled Lizard	E		
				<i>Codylus rhodesianus</i>	Zimbabwe Girdled Lizard	E		
				<i>Cordylus tasmani</i>	Tasman's Girdled Lizard	E		
				<i>Cordylus tropidosternum</i>	Tropical Girdled Lizard			
				<i>Cordylus vittifer</i>	Transvaal Girdled Lizard			
				<i>Cordylus warreni</i>	Warren's Girdled Lizard	E		
				<i>Platysaurus capensis</i>	Cape Flat Lizard	E		
				<i>Platysaurus fitzsimonsi</i>	FitzSimon's Flat Lizard	E		
				<i>Platysaurus guttatus</i>	Dwarf Flat Lizard	E		
				<i>Platysaurus imperator</i>	Emperor Flat Lizard	E		
				<i>Platysaurus intermedius</i>	Common Flat Lizard			
				<i>Platysaurus ocellatus</i>	Ocellated Flat Lizard	E		
				<i>Platysaurus pungweensis</i>	Pungwe Flat Lizard	E		
				<i>Platysaurus relictus</i>	Relict Flat Lizard	E		
				<i>Platysaurus torquatus</i>	Striped Flat Lizard			
				<i>Pseudocordylus capensis</i>	Graceful Crag Lizard	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Pseudocordylus langi</i>	Lang's Crag Lizard	E		
				<i>Pseudocordylus melantous</i>	Drakensberg Crag Lizard	E		
				<i>Pseudocordylus spinosus</i>	Spiny Crag Lizard	E		
				<i>Pseudocordylus microlepidotus</i>	Cape Crag Lizard	E		
		Varanidae		<i>Varanus exanthermaticus</i>	Rock or White-throated Monitor			
		Varanidae		<i>Varanus niloticus</i>	Nile or Water Monitor			
		Agamidae		<i>Agama aculeata</i>	Ground Agama			
				<i>Agama anchietae</i>	Anchieta's Agama			
				<i>Agama atra</i>	Southern Rock Agama	E		
				<i>Agama etoshae</i>	Etosha Agama	E		
				<i>Agama hispida</i>	Spiny Agama	E		
				<i>Agama Kirkii</i>	Kirk's Rock Agama			
				<i>Agama mossambica</i>	Mozambique Agama			
				<i>Agama planiceps</i>	Namibian Rock Agama			
				<i>Agama atricollis</i>	Tree Agama			
				<i>Bradypodion caffrum</i>	Transkei Dwarf Chamaeleon	E		
		Chamaeleonidae		<i>Bradypodion damaranum</i>	Knysna Dwarf Chamaeleon	E		
				<i>Bradypodion dracomontanum</i>	Drakensberg Dwarf Chamaeleon	E		
				<i>Bradypodion gutturale</i>	Robertson Dwarf Chamaeleon	E		
				<i>Bradypodion karroicum</i>	Karoo Dwarf Chamaeleon	E		
				<i>Bradypodion melanocephalum</i>	Blackheaded Dwarf Chamaeleon	E		
				<i>Bradypodion nemorale</i>	Zululand Dwarf Chamaeleon	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Bradypodion pumilum</i>	Cape Dwarf Chamaeleon	E		
				<i>Bradypodion seratoi</i>	Serato's Dwarf Chamaeleon	E		
				<i>Bradypodion taeniabronchum</i>	Smith's Dwarf Chamaeleon	E		
				<i>Bradypodion thamnobates</i>	Natal Midlands Dwarf Chamaeleon	E		
				<i>Bradypodion transvaalense</i>	Transvaal Dwarf Chamaeleon	E		
				<i>Bradypodion ventrale</i>	Southern and Namaqua Dwarf Chamaeleons	E		
				<i>Chamaeleo dilepis</i>	Flap-neck Chamaeleon			
				<i>Chamaeleo namaquesis</i>	Namaqua Chamaeleon			
				<i>Rhampholeon marshalli</i>	Marshall's Leaf Chamaeleon	E		
		Gekkonidae		<i>Afroedura africana</i>	African Flat Gecko	E		
				<i>Afroedura amatolica</i>	Amatola Flat Gecko	E		
				<i>Afroedura hawequensis</i>	Hawequa Flat Gecko	E		
				<i>Afroedura karroica</i>	Karoo Flat Gecko	E		
				<i>Afroedura nivaria</i>	Mountain Flat Gecko	E		
				<i>Afroedura pondolia</i>	Pondo Flat Gecko	E		
				<i>Afroedura tembulica</i>	Tembe Flat Gecko	E		
				<i>Afroedura tansvaalica</i>	Transvaal Flat Gecko			
				<i>Chondrodactylus angulifer</i>	Giant Ground Gecko	E		
				<i>Colopus wahlbergii</i>	Kalahari Ground Gecko	E		
				<i>Hemidactylus mabouia</i>	Moreau's Tropical House Gecko			
				<i>Hemidactylus platycphalus</i>	Flat-headed Tropical			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
					House Gecko			
				<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko	E		
				<i>Homopholis mulleri</i>	Muller's Velvet Gecko			
				<i>Kaokogecko vanzyli</i>	Kaoko Web-footed Gecko			
				<i>Lygodactylus angolensis</i>	Angola Dwarf Gecko			
				<i>Lygodactylus bernaldi</i>	Bernard's Dwarf Gecko			
				<i>Lygodactylus bradfieldi</i>	Bradfield's Dwarf Gecko			
				<i>Lygodactylus capensis</i>	Cape Dwarf Gecko			
				<i>Lygodactylus chobiensis</i>	Chobe Dwarf Gecko			
				<i>Lygodactylus lawrencei</i>	Lawrence's Dwarf Gecko			
				<i>Lygodactylus methueni</i>	Methuen's Dwarf Gecko	E		
				<i>Lygodactylus ocellatus</i>	Spotted Dwarf Gecko	E		
				<i>Lygodactylus stevensoni</i>	Stevenson's Dwarf Gecko	E		
				<i>Narudasia festiva</i>	Festive Gecko	E		
				<i>Pachydactylus austeni</i>	Austin's Gecko	E		
				<i>Pachydactylus bicolor</i>	Velvety Gecko	E		
				<i>Pachydactylus bibronii</i>	Bibron's Gecko			
				<i>Pachydactylus capensis</i>	Cape Gecko			
				<i>Pachydactylus labialis</i>	Western Cape Gecko	E		
				<i>Pachydactylus caraculicus</i>	Angolan Banded Gecko			
				<i>Pachydactylus fasciatus</i>	Banded Gecko	E		
				<i>Pachydactylus geitjje</i>	Ocellated Gecko	E		
				<i>Pachydactylus kochii</i>	Koch's Gecko			
				<i>Pachydactylus laevigatus</i>	Button-scaled Gecko			



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Pachydactylus maculatus</i>	Spotted Gecko	E		
				<i>Pachydactylus oculatus</i>	Golden Spotted Gecko	E		
				<i>Pachydactylus mariquensis</i>	Marico Gecko	E		
				<i>Pachydactylus namaquensis</i>	Namaqua Gecko	E		
				<i>Pachydactylus oreophilus</i>	Kaokoveld Rock Gecko			
				<i>Pachydactylus gaiasensis</i>	Brandberg Gecko	E		
				<i>Pachydactylus punctatus</i>	Speckled Gecko			
				<i>Pachydactylus rugosus</i>	Rough-scaled Gecko	E		
				<i>Pachydactylus scutatus</i>	Large-scaled Gecko			
				<i>Pachydactylus serval</i>	Western Spotted Gecko	E		
				<i>Pachydactylus sansteyni</i>	San Steyn's Gecko	E		
				<i>Pachydactylus tetensis</i>	Tete Gecko			
				<i>Pachydactylus tigrinus</i>	Tiger Gecko	E		
				<i>Pachydactylus tsodiloensis</i>	Tsodilo Gecko	E		
				<i>Pachydactylus weberi</i>	Weber's Gecko	E		
				<i>Palmatogecko rangei</i>	Web-footed Gecko			
				<i>Phelsuma ocellata</i>	Namaqua Day Gecko	E		
				<i>Phyllodactylus lineatus</i>	Striped Leaf-toed Gecko	E		
				<i>Phyllodactylus microlepidotus</i>	Small-scaled Leaf-toed Gecko	E		
				<i>Phyllodactylus peringueyi</i>	Peringuey's Leaf-toed Gecko	E		
				<i>Phyllodactylus pophyreus</i>	Marble Leaf-toed Gecko	E		
				<i>Ptenopus carpi</i>	Carp's Barking Gecko	E		
				<i>Ptenopus garrulus</i>	Common Barking Gecko	E		



TERRESTRIAL ECOLOGY ASSESSMENT

ORDER	SUBORDER	FAMILY	SUBFAMILY	BIOLOGICAL NAME	COMMON NAME	ENDEMIC	Red Data	Recorded
				<i>Ptenopus kochi</i>	Koch's Barking Gecko	E		
				<i>Rhoptropus afer</i>	Namib Day Gecko			
				<i>Rhoptropus bamardi</i>	Barnard's Namib Day Gecko			
				<i>Rhoptropus biporosus</i>	Kaokoveld Namib Day Gecko	E		
				<i>Rhoptropus boultoni</i>	Boulton's Namib Day Gecko			
				<i>Rhoptropus bradfield</i>	Bradfield's Namib Day Gecko	E		
		Crocodylidae		<i>Crocodylus niloticus</i>	Nile Crocolile			

Species list for the region spanning South Africa, Lesotho and Swaziland. Endemic status:

E indicates no endemism to southern Africa

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

Shaded species indicate species known to occur within the study area



APPENDIX D

**SOUTHERN AFRICAN AMPHIBIAN SPECIES, SPECIES
RECORDED IN THE 2629CC GRID SQUARE ARE HIGHLIGHTED**



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	SPECIES	Endemic Status	Revised Status	Recorded
Bufonidae	<i>Bufo amatolicus</i>	2	NT	
	<i>Bufo angusticeps</i>	2	LC	
	<i>Bufo fenoulheti</i>	1	NL	
	<i>Bufo gariepensis</i>	2	NL	
	<i>Bufo garmani</i>	0	NL	
	<i>Bufo gutturalis</i>	0	NL	
	<i>Bufo maculatus</i>	0	NL	
	<i>Bufo pantherinus</i>	2	EN	
	<i>Bufo pardalis</i>	2	LC	
	<i>Bufo poweri</i>	1	NL	
	<i>Bufo rangeri</i>	2	NL	
	<i>Bufo robinsoni</i>	2	DD	
	<i>Bufo vertebralis</i>	2	NL	
	<i>Capensibufo rosei</i>	2	VU	
	<i>Capensibufo tradouwi</i>	2	NL	
	<i>Schismaderma carens</i>	0	NL	
	Heleophrynidae	<i>Heleophryne hewitti</i>	2	CR
<i>Heleophryne natalensis</i>		2	NL	
<i>Heleophryne purcelli</i>		2	NL	
<i>Heleophryne Regis</i>		2	NL	
<i>Heleophryne rosei</i>		2	CR	
Hemisotidae	<i>Hemisis guineensis</i>	0	NL	
	<i>Hemisis guttatus</i>	2	NT	
	<i>Hemisis marmoratus</i>	0	NL	
Hyperoliidae	<i>Afrixalus aureus</i>	1	NL	
	<i>Afrixalus delicatus</i>	1	NL	
	<i>Afrixalus fornasinii</i>	0	NL	
	<i>Afrixalus knysnae</i>	2	DD	
	<i>Afrixalus spinifrons</i>	2	NL	
	<i>Hyperolius argus</i>	0	NL	
	<i>Hyperolius horstockii</i>	2	NL	
	<i>Hyperolius marmoratus</i>	0	NL	
	<i>Hyperolius nasutus</i>	0	NL	
	<i>Hyperolius pickersgilli</i>	2	EN	
	<i>Hyperolius pusillus</i>	0	NL	
	<i>Hyperolius semidiscus</i>	2	NL	
	<i>Hyperolius tuberilinguis</i>	0	NL	
	<i>Kassina maculate</i>	0	NL	
	<i>Kassina senegalensis</i>	0	NL	
	<i>Leptopelis mossambicus</i>	1	NL	
	<i>Leptopelis natalensis</i>	2	NL	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	SPECIES	Endemic Status	Revised Status	Recorded
	<i>Leptopelis xenodactylus</i>	2	EN	
	<i>Semnodactylus wealii</i>	2	NL	
Microhylidae	<i>Breviceps acutirostris</i>	2	NL	
	<i>Breviceps adspersus</i>	0	NL	
	<i>Breviceps fuscus</i>	2	NL	
	<i>Breviceps gibbosus</i>	2	NT	
	<i>Breviceps macrops</i>	1	NT	
	<i>Breviceps montanus</i>	2	NL	
	<i>Breviceps mossambicus</i>	0	NL	
	<i>Breviceps namaquensis</i>	2	NL	
	<i>Breviceps rosei</i>	2	NL	
	<i>Breviceps sp. (sopranus)</i>	2	NL	
	<i>Breviceps sylvestris</i>	2	NT	
	<i>Breviceps verrucosus</i>	2	NL	
	<i>Phrynomantis annectens</i>	1	NL	
	<i>Phrynomantis bifasciatus</i>	0	NL	
	Pipidae	<i>Xenopus gilli</i>	2	EN
<i>Xenopus laevis</i>		0	NL	
<i>Xenopus muelleri</i>		0	NL	
Petropetedidae	<i>Anhydrophryne rattrayi</i>	2	NT	
	<i>Arthroleptella bicolor</i>	2	NL	
	<i>Arthroleptella drewesii</i>	2	NT	
	<i>Arthroleptella hewitti</i>	2	NL	
	<i>Arthroleptella lightfooti</i>	2	NT	
	<i>Arthroleptella ngongoniensis</i>	2	CR	
	<i>Arthroleptella landdrosia</i>	2	NT	
	<i>Arthroleptella villiersi</i>	2	NL	
	<i>Cacosternum boettgeri</i>	1	NL	
	<i>Cacosternum capense</i>	2	VU	
	<i>Cacosternum namaquense</i>	2	NL	
	<i>Cacosternum nanum</i>	2	NL	
	<i>Cacosternum striatum</i>	2	DD	
	<i>Microbatrachella capensis</i>	2	CR	
	<i>Natalobatrachus bonebergi</i>	2	EN	
	<i>Phrynobatrachus acridoides</i>	0	NL	
	<i>Phrynobatrachus mababiensis</i>	0	NL	
	<i>Phrynobatrachus natalensis</i>	0	NL	
<i>Poyntonion paludicola</i>	2	NT		
Ranidae	<i>Afrana angolensis</i>	0	NL	
	<i>Afrana dracomontana</i>	2	NL	
	<i>Afrana fuscigula</i>	1	NL	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	SPECIES	Endemic Status	Revised Status	Recorded
	<i>Afrana vandijki</i>	2	DD	
	<i>Amietia vertebralis</i>	2	NL	
	<i>Hildebrandtia ornata</i>	0	NL	
	<i>Ptychadena anchietae</i>	0	NL	
	<i>Ptychadena mascareniensis</i>	0	NL	
	<i>Ptychadena mossambica</i>	0	NL	
	<i>Ptychadena oxyrhynchus</i>	0	NL	
	<i>Ptychadena porosissima</i>	0	NL	
	<i>Ptychadena taenioscelis</i>	0	NL	
	<i>Ptychadena uzungwensis</i>	0	NL	
	<i>Pyxicephalus adspersus</i>	0	NT	
	<i>Pyxicephalus edulis</i>	0	NL	
	<i>Strongylopus bonaespei</i>	2	NL	
	<i>Strongylopus fasciatus</i>	1	NL	
	<i>Strongylopus grayii</i>	2	NL	
	<i>Strongylopus hymenopus</i>	2	NL	
	<i>Strongylopus springbokensis</i>	2	DD	
	<i>Strongylopus wageri</i>	2	NT	
	<i>Tomopterna cryptotis</i>	0	NL	
	<i>Tomopterna delalandii</i>	2	NL	
	<i>Tomopterna krugerensis</i>	1	NL	
	<i>Tomopterna marmorata</i>	1	NL	
<i>Tomopterna natalensis</i>	2	NL		
<i>Tomopterna tandyi</i>	0	NL		
Rhacophoridae	<i>Chiromantis xerampelina</i>	0	NL	

Species list for the region spanning South Africa, Lesotho and Swaziland. Endemic status:

0 indicates no endemism to southern Africa

1 indicates endemism to southern Africa;

2 indicates endemism to the region (South Africa, Lesotho and Swaziland).

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

Shaded species indicate species known to occur within the study area



APPENDIX E

AVIFAUNAL SPECIES KNOWN TO OCCUR IN THE 2629CC GRID SQUARE



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
245	Blacksmith Lapwing	<i>Vanellus armatus</i>
	(Bontkiewiet)	
84	Hadeda Ibis	<i>Bostrychia hagedash</i>
	(Hadeda)	
707	Common Fiscal	<i>Lanius collaris</i>
	(Fiskaallaksman)	
317	Laughing Dove	<i>Streptopelia senegalensis</i>
	(Rooiborsduifie)	
786	Cape Sparrow	<i>Passer melanurus</i>
	(Gewone Mossie)	
316	Cape Turtle-Dove	<i>Streptopelia capicola</i>
	(Gewone Tortelduif)	
803	Southern Masked-Weaver	<i>Ploceus velatus</i>
	(Swartkeelgeelvink)	
311	Speckled Pigeon	<i>Columba guinea</i>
	(Kransduif)	
502	Greater Striped Swallow	<i>Hirundo cucullata</i>
	(Grootstreepswael)	
940	Rock Dove	<i>Columba livia</i>
	(Tuinduif)	
808	Southern Red Bishop	<i>Euplectes orix</i>
	(Rooivink)	
61	Cattle Egret	<i>Bubulcus ibis</i>
	(Veereier)	
812	Yellow-crowned Bishop	<i>Euplectes afer</i>
	(Goudgeelvink)	
314	Red-eyed Dove	<i>Streptopelia semitorquata</i>
	(Grootringduif)	
96	Yellow-billed Duck	<i>Anas undulata</i>
	(Geelbekeend)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
242	Crowned Lapwing	<i>Vanellus coronatus</i>
	(Kroonkiewiet)	
734	Common Myna	<i>Acridotheres tristis</i>
	(Indiese Spreeu)	
784	House Sparrow	<i>Passer domesticus</i>
	(Huis mossie)	
89	Egyptian Goose	<i>Alopochen aegyptiacus</i>
	(Kol gans)	
55	Black-headed Heron	<i>Ardea melanocephala</i>
	(Swartkopreier)	
385	Little Swift	<i>Apus affinis</i>
	(Kleinwindswael)	
130	Black-shouldered Kite	<i>Elanus caeruleus</i>
	(Blouvalk)	
192	Helmeted Guinea fowl	<i>Numida meleagris</i>
	(Gewone Tarentaal)	
1104	Karoo Thrush	<i>Turdus smithi</i>
	(Geelbeklyster)	
818	Long-tailed Widowbird	<i>Euplectes progne</i>
	(Langstertflap)	
212	Red-knobbed Coot	<i>Fulica cristata</i>
	(Bleshoender)	
54	Grey Heron	<i>Ardea cinerea</i>
	(Bloureier)	
81	African Sacred Ibis	<i>Threskiomis aethiopicus</i>
	(Skoorsteenvêr)	
646	Levaillant's Cisticola	<i>Cisticola tinniens</i>
	(Vleitinkinkie)	
288	Grey-headed Gull	<i>Larus cirrocephalus</i>
	(Gryskopmeeu)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
703	Cape Longclaw	<i>Macronyx capensis</i>
	(Oranjekeelkalkoentjie)	
860	Black-throated Canary	<i>Crithagra atrogularis</i>
	(Bergkanarie)	
119	Amur Falcon	<i>Falco amurensis</i>
	(Oostelike Rooipootvalk)	
846	Pin-tailed Whydah	<i>Vidua macroura</i>
	(Koningrooibekkie)	
185	Swainson's Spurfowl	<i>Pternistis swainsonii</i>
	(Bosveldfisant)	
564	Mountain Wheatear	<i>Oenanthe monticola</i>
	(Bergwagter)	
52	African Darter	<i>Anhinga rufa</i>
	(Slanghalsvoël)	
686	Cape Wagtail	<i>Motacilla capensis</i>
	(Gewone Kwikkie)	
820	Red-headed Finch	<i>Amadina erythrocephala</i>
	(Rooikopvink)	
418	African Hoopoe	<i>Upupa africana</i>
	(Hoephoep)	
737	Cape Glossy Starling	<i>Lamprotornis nitens</i>
	(Kleinglansspreeu)	
88	Spur-winged Goose	<i>Plectropterus gambensis</i>
	(Wildemakou)	
50	Reed Cormorant	<i>Phalacrocorax africanus</i>
	(Rietduiker)	
780	White-browed Sparrow-Weaver	<i>Plocepasser mahali</i>
	(Koringvoël)	
6	Little Grebe	<i>Tachybaptus ruficollis</i>
	(Kleindobbertjie)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
692	African Pipit	<i>Anthus cinnamomeus</i>
	(Gewone Koester)	
576	African Stonechat	<i>Saxicola torquatus</i>
	(Gewone Bontrokkie)	
390	Speckled Mousebird	<i>Colius striatus</i>
	(Gevlekte Muisvoël)	
238	Three-banded Plover	<i>Charadrius tricollaris</i>
	(Driebandstrandkiewiet)	
85	African Spoonbill	<i>Platalea alba</i>
	(Lepelaar)	
495	White-throated Swallow	<i>Hirundo albigularis</i>
	(Witkeelswael)	
343	Red-chested Cuckoo	<i>Cuculus solitarius</i>
	(Piet-my-vrou)	
439	Crested Barbet	<i>Trachyphonus vaillantii</i>
	(Kuifkophoutkapper)	
504	South African Cliff-Swallow	<i>Hirundo spilodera</i>
	(Familieswael)	
797	Village Weaver	<i>Ploceus cucullatus</i>
	(Bontrugwewer)	
83	Glossy Ibis	<i>Plegadis falcinellus</i>
	(Glansibis)	
844	African Quailfinch	<i>Ortygospiza atricollis</i>
	(Gewone Kwartelvinkie)	
383	White-rumped Swift	<i>Apus caffer</i>
	(Witkruiswindswael)	
629	Zitting Cisticola	<i>Cisticola juncidis</i>
	(Landerykloppie)	
581	Cape Robin-Chat	<i>Cossypha caffra</i>
	(Gewone Janfrederik)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
493	Barn Swallow	<i>Hirundo rustica</i>
	(Europese Swael)	
814	White-winged Widowbird	<i>Euplectes albonotatus</i>
	(Witvlerkflap)	
488	Red-capped Lark	<i>Calandrella cinerea</i>
	(Rooikoplewerik)	
631	Cloud Cisticola	<i>Cisticola textrix</i>
	(Gevlekte Klopkloppie)	
94	Cape Shoveler	<i>Anas smithii</i>
	(Kaapse Slopeend)	
392	Red-faced Mousebird	<i>Urocolius indicus</i>
	(Rooiwangmuisvoël)	
97	Red-billed Teal	<i>Anas erythrorhyncha</i>
	(Rooibekeend)	
453	Red-throated Wryneck	<i>Jynx ruficollis</i>
	(Draaihals)	
47	White-breasted Cormorant	<i>Phalacrocorax carbo</i>
	(Witborsduiker)	
816	Fan-tailed Widowbird	<i>Euplectes axillaris</i>
	(Kortstertflap)	
805	Red-billed Quelea	<i>Quelea quelea</i>
	(Rooibekkwelea)	
223	Blue Korhaan	<i>Eupodotis caerulescens</i>
	(Bloukorhaan)	
250	African Snipe	<i>Gallinago nigripennis</i>
	(Afrikaanse Snip)	
843	Common Waxbill	<i>Estrilda astrild</i>
	(Rooibeksysie)	
522	Pied Crow	<i>Corvus albus</i>
	(Witborskraai)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
275	Spotted Thick-knee	<i>Burhinus capensis</i>
	(Gewone Dikkop)	
352	Diderick Cuckoo	<i>Chrysococcyx caprius</i>
	(Diederikkie)	
507	Common House-Martin	<i>Delichon urbicum</i>
	(Huisswael)	
189	Common Quail	<i>Coturnix coturnix</i>
	(Afrikaanse Kwartel)	
264	Wood Sandpiper	<i>Tringa glareola</i>
	(Bosruiter)	
545	Dark-capped Bulbul	<i>Pycnonotus tricolor</i>
	(Swartoogtiptol)	
490	Pink-billed Lark	<i>Spizocorys conirostris</i>
	(Pienkbeklewerik)	
1016	Mallard	<i>Anas platyrhynchos</i>
	(Groenkopeend)	
58	Great Egret	<i>Egretta alba</i>
	(Grootwitreier)	
210	Common Moorhen	<i>Gallinula chloropus</i>
	(Grootwaterhoender)	
102	Southern Pochard	<i>Netta erythrophthalma</i>
	(Bruineend)	
419	Green Wood-Hoopoe	<i>Phoeniculus purpureus</i>
	(Rooibekkekelaar)	
509	Brown-throated Martin	<i>Riparia paludicola</i>
	(Afrikaanse Oewerswael)	
635	Pale-crowned Cisticola	<i>Cisticola cinnamomeus</i>
	(Bleekkopklopkloppie)	
1172	Cape White-eye	<i>Zosterops virens</i>
	(Kaapse Glasogie)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
270	Black-winged Stilt	<i>Himantopus himantopus</i>
	(Rooipootelsie)	
361	Marsh Owl	<i>Asio capensis</i>
	(Vlei-uil)	
69	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>
	(Gewone Nagreier)	
866	Yellow Canary	<i>Crithagra flaviventris</i>
	(Geelkanarie)	
80	White Stork	<i>Ciconia ciconia</i>
	(Witooievaar)	
634	Wing-snapping Cisticola	<i>Cisticola ayresii</i>
	(Kleinste Klopkloppie)	
575	Anteater Chat	<i>Myrmecocichla formicivora</i>
	(Swartpiek)	
100	White-faced Duck	<i>Dendrocygna viduata</i>
	(Nonnetjie-eend)	
506	Rock Martin	<i>Hirundo fuligula</i>
	(Kransswael)	
253	Little Stint	<i>Calidris minuta</i>
	(Kleinstrandloper)	
431	Black-collared Barbet	<i>Lybius torquatus</i>
	(Rooikophoutkapper)	
1035	Northern Black Korhaan	<i>Afrotis afraoides</i>
	(Witvlerkkorhaan)	
154	Steppe Buzzard	<i>Buteo vulpinus</i>
	(Bruinjakkalsvoël)	
305	Whiskered Tern	<i>Chlidonias hybrida</i>
	(Witbaardsterretjie)	
60	Yellow-billed Egret	<i>Egretta intermedia</i>
	(Geelbekwitreier)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
523	Cape Crow	<i>Corvus capensis</i>
	(Swartkraai)	
263	Common Greenshank	<i>Tringa nebularia</i>
	(Groenpootruiter)	
72	Hamerkop	<i>Scopus umbretta</i>
	(Hamerkop)	
122	Greater Kestrel	<i>Falco rupicoloides</i>
	(Grootrooivalk)	
179	Orange River Francolin	<i>Scleroptila levaillantoides</i>
	(Kalaharipatrys)	
4142	Southern Grey-headed Sparrow	<i>Passer diffusus</i>
	(Gryskopmossie)	
318	Namaqua Dove	<i>Oena capensis</i>
	(Namakwaduifie)	
650	Black-chested Prinia	<i>Prinia flavicans</i>
	(Swartbandlangstertjie)	
56	Goliath Heron	<i>Ardea goliath</i>
	(Reusereier)	
510	Banded Martin	<i>Riparia cincta</i>
	(Gebande Oewerswael)	
76	Yellow-billed Stork	<i>Mycteria ibis</i>
	(Nimmersat)	
168	Pallid Harrier	<i>Circus macrourus</i>
	(Witborsvleivalk)	
1	Common Ostrich	<i>Struthio camelus</i>
	(Volstruis)	
98	Cape Teal	<i>Anas capensis</i>
	(Teeleend)	
568	Capped Wheatear	<i>Oenanthe pileata</i>
	(Hoeveldskaapwagter)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
751	Malachite Sunbird	<i>Nectarinia famosa</i>
	(Jangroentjie)	
654	Spotted Flycatcher	<i>Muscicapa striata</i>
	(Europese Vliei, 1/2 vanger)	
397	Malachite Kingfisher	<i>Alcedo cristata</i>
	(Kuifkopvisvanger)	
258	Common Sandpiper	<i>Actitis hypoleucos</i>
	(Gewone Ruiter)	
474	Spike-heeled Lark	<i>Chersomanes albofasciata</i>
	(Vlaktelewerik)	
123	Rock Kestrel	<i>Falco rupicolus</i>
	(Kransvalk)	
380	African Black Swift	<i>Apus barbatus</i>
	(Swartwindswael)	
359	Barn Owl	<i>Tyto alba</i>
	(Nonnetjie-uil)	
73	Marabou Stork	<i>Leptoptilos crumeniferus</i>
	(Maraboe)	
256	Ruff	<i>Philomachus pugnax</i>
	(Kemphaan)	
484	Chestnut-backed Sparrowlark	<i>Eremopterix leucotis</i>
	(Rooiruglewerik)	
503	Lesser Striped Swallow	<i>Hirundo abyssinica</i>
	(Kleinstreepswael)	
237	Kittlitz's Plover	<i>Charadrius pecuarius</i>
	(Geelborsstrandkiewiet)	
708	Red-backed Shrike	<i>Lanius collurio</i>
	(Rooiruglaksman)	
103	Maccoa Duck	<i>Oxyura maccoa</i>
	(Bloubekeend)	



TERRESTRIAL ECOLOGY ASSESSMENT

Ref No	Common Name (English and Afrikaans)	Biological Name
82	Southern Bald Ibis	<i>Geronticus calvus</i>
	(Kalkoenibis)	



APPENDIX F

SOUTHERN AFRICAN MAMMALS, SPECIES KNOWN TO OCCUR IN THE 2629CC GRID SQUARE ARE HIGHLIGHTED



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
CHRYSOCHLORIDAE (Golden Moles)	<i>Chrysopalax trevelyani</i>	Giant Golden Mole		0	EN
	<i>Chrysopalax villosus</i>	Rough-haired Golden Mole		0	VU
	<i>Chrytochloris wintoni</i>	De Winton's Golden Mole		0	CE
	<i>Chrytochloris zyli</i>	Van Zyl's Golden Mole		0	EN
	<i>Chrysochloris asiatica</i>	Cape Golden Mole		0	
	<i>Chrysochloris visagiei</i>	Visagie's Golden Mole		0	DD
	<i>Eremitalpa granti</i>	Grant's Golden Mole		0	
	<i>Carpitalpa arendsi</i>	Arend's Golden Mole		0	
	<i>Chlorotalpa duthieae</i>	Duthie's Golden Mole		0	NT
	<i>Chlorotalpa sclateri</i>	Sclater's Golden Mole		0	
	<i>Calcochloris obtusirostris</i>	Yellow Golden Mole		0	
	<i>Neamblysomus gunningi</i>	Gunning's Golden Mole		0	EN
	<i>Neamblysomus julianae</i>	Juliana's Golden Mole		0	VU
	<i>Amblysomus corriae</i>	Fynbos Golden Mole		0	NT
	<i>Amblysomus septentrionalis</i>	Highveld Golden Mole		1	NT
	<i>Amblysomus hottentotus</i>	Hottentot Golden Mole		0	
	<i>Amblysomus marleyi</i>	Marley's Golden Mole		0	NT
<i>Amblysomus robustus</i>	Robust Golden Mole		0	NT	
MACROSCOLIDIDAE (Sengis/Elephant Shrews)	<i>Petrodromus tetradactylus</i>	Four-toed Sengi		0	
	<i>Macroscelides proboscideus</i>	Round-eared Sengi		0	
	<i>Elephantulus fuscus</i>	Peters's Short-snouted Sengi		0	
	<i>Elephantulus brachyrhynchus</i>	Short-snouted Sengi		0	
	<i>Elephantulus rupestris</i>	Western Rock Sengi		0	
	<i>Elephantulus intufi</i>	Bushveld Sengi		0	
	<i>Elephantulus myurus</i>	Eastern Rock Sengi		1	
	<i>Elephantulus edwardii</i>	Cape Rock Sengi		0	
ERINACEIDAE (Hedgehogs)	<i>Atelerix frontalis</i>	Southern African Hedgehog		1	
SORICIDAE (Shrews)	<i>Mysorex longicaudatus</i>	Long-tailed Forest Shrew		0	VU
	<i>Mysorex cafer</i>	Dark-footed Forest Shrew		0	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Mysorex sclateri</i>	Sclater's Forest Shrew		0	NT
	<i>Mysorex varius</i>	Forest Shrew		0	
	<i>Crocidura occidentalis (olivieri)</i>	Giant Musk Shrew		0	
	<i>Crocidura mariquensis</i>	Swamp Musk Shrew		2	
	<i>Crocidura fuscomurina</i>	Tiny Musk Shrew		0	
	<i>Crocidura maquassiensis</i>	Maquassie Musk Shrew		0	
	<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew		3	
	<i>Crocidura silacea</i>	Lesser Grey Musk Shrew		0	
	<i>Crocidura flavescens</i>	Greater Red Musk Shrew		0	
	<i>Crocidura luna</i>	Greater Grey-brown Musk Shrew		0	
	<i>Crocidura hirta</i>	Lesser Red Musk Shrew		0	
	<i>Suncus lixus</i>	Greater Dwarf Shrew		0	
	<i>Suncus varilla</i>	Lesser Dwarf Shrew		0	
	<i>Suncus infinitesimus</i>	Least Dwarf Shrew		0	
	<i>Sylvisorex megalura</i>	Climbing Shrew		0	
PTEROPODIDAE (Fruit Bats)	<i>Eidolon helvum</i>	Straw-coloured Fruit-bat		0	NT
	<i>Rousettus aegyptiacus</i>	Egyptian Fruit-bat		0	
	<i>Lissonycteris angolensis</i>	Bocage's Fruit-bat		0	
	<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit-bat		0	
	<i>Epomophorus gambianus</i>	Gambian Epauletted Fruit-bat		0	
	<i>Epomophorus angolensis</i>	Angolan Epauletted Fruit-bat		0	
	<i>Epomops dobsonii</i>	Dobson's Fruit-bat		0	
EMBALLONURIDAE (Sheath-tailed and Tomb bats)	<i>Coleura afra</i>	African Sheath-tailed Bat		0	
	<i>Taphozous mauritianus</i>	Mauritian Tomb Bat		0	
	<i>Taphozous perforatus</i>	Egyptian Tomb Bat		0	
HIPPOSIDERIDAE (Trident and Leaf-nosed Bats)	<i>Hipposideros commersoni</i>	Commerson's Leaf-nosed Bat		0	
	<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat		0	
	<i>Cloeotis percivali</i>	Short-eared Trident Bat		0	
	<i>Triaenops persicus</i>	Persian Leaf-nosed Bat		0	
NYCTERIDAE (Slit-	<i>Nycteris hispida</i>	Hairy Slit-faced Bat		0	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
faced Bats)	<i>Nycteris grandis</i>	Large Slit-faced Bat		0	
	<i>Nycteris woodi</i>	Wood's Slit-faced Bat		0	
	<i>Nycteris macrotis</i>	Greater Slit-faced Bat		0	
	<i>Nycteris thebiaca</i>	Egyptian Slit-faced Bat		1	
	<i>Nycteris vinsoni</i>	Vinson's Slit-faced Bat		0	
RHINOLOPHIDAE (Horseshoe Bats)	<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat		0	
	<i>Rhinolophus fumigatus</i>	Ruppel's Horseshoe Bat		0	
	<i>Rhinolophus clivosus</i>	Geoffrey's Horseshoe Bat		1	
	<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat		1	
	<i>Rhinolophus landeri</i>	Lander's Horseshoe Bat		0	
	<i>Rhinolophus blasii</i>	Peak-saddle Horseshoe Bat		0	
	<i>Rhinolophus capensis</i>	Cape Horseshoe Bat		0	
	<i>Rhinolophus simulator</i>	Bushveld Horseshoe Bat		0	
	<i>Rhinolophus denti</i>	Dent's Horseshoe Bat		0	
	<i>Rhinolophus swinnyi</i>	Swinny's Horseshoe Bat		0	
VESPERTILIONIDAE (Vesper Bats)	<i>Miniopterus inflatus</i>	Greater Long-fingered Bat		0	
	<i>Miniopterus fraterculus</i>	Lesser Long-fingered Bat		0	
	<i>Miniopterus schreibersii</i>	Schrieber's Long-fingered Bat		1	
	<i>Myotis welwitschii</i>	Welwitch's Hairy Bat		0	
	<i>Cistugo seabrai</i>	Angolan Hairy Bat		0	
	<i>Cistugo lesueuri</i>	Lesueur's Hairy Bat		0	
	<i>Myotis tricolor</i>	Temminck's Hairy Bat		0	
	<i>Myotis bocagi</i>	Rufous Hairy Bat		0	
	<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat		0	
	<i>Neoromicia capensis</i>	Cape Serotine Bat		1	
	<i>Neoromicia nanus</i>	Banana Bat		0	
	<i>Neoromicia rendalii</i>	Rendall's Serotine Bat		0	
	<i>Neoromicia zuluensis</i>	Aloe Serotine Bat		0	
	<i>Hypsugo anchietai</i>	Anchietai's Pipistrelle		0	
<i>Pipistrellus hesperidus</i>	African Pipistrelle		1		



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Pipistrellus rusticus</i>	Rusty Pipistrelle		0	
	<i>Pipistrellus rueppelli</i>	Ruppell's Pipistrelle		0	
	<i>Glauconycteris variegata</i>	Butterfly Bat		0	
	<i>Laephotis namibensis</i>	Namib Long-eared Bat		0	
	<i>Laephotis botswanae</i>	Botswana Long-eared Bat		0	
	<i>Laephotis wintoni</i>	De Winton's Long-eared Bat		0	
	<i>Scotoecus albobfuscus</i>	Thomas's House Bat		0	DD
	<i>Nicticeinops schlieffenii</i>	Schlieffen's Bat		0	
	<i>Scotophilus nigrita</i>	Giant Yellow House Bat		0	
	<i>Scotophilus dinganii</i>	Yellow House Bat		0	
	<i>Scotophilus viridus</i>	Lesser Yellow House Bat		0	
	<i>Kerivoula argentata</i>	Damara Woolly Bat		0	
	<i>Kerivoula lanosa</i>	Lesser Woolly Bat		0	
MOLOSSIDAE (Free-tailed Bats)	<i>Otomops martiensseni</i>	Large-eared Free-tailed Bat		0	
	<i>Sauromys petrophyllus</i>	Flat-headed Free-tailed Bat		0	
	<i>Mormopterus acetabulosus</i>	Natal Free-tailed Bat		0	
	<i>Tadarida ventralis</i>	African Free-tailed Bat		0	
	<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat		1	
	<i>Tadarida lobata</i>	Kenyan Big-eared Free-tailed Bat		0	
	<i>Tadarida fulminans</i>	Madagascar Free-tailed Bat		0	
	<i>Chaerephon ansorgei</i>	Ansorge's Free-tailed Bat		0	
	<i>Chaerephon pumila</i>	Little Free-tailed Bat		0	
	<i>Chaerephon nigeriae</i>	Nigerian Free-tailed Bat		0	
	<i>Chaerephon chapini</i>	Pale (Chapin's) Free-tailed Bat		0	
	<i>Chaerephon bivittata</i>	Spotted Free-tailed Bat		0	
	<i>Mops condylurus</i>	Angola Free-tailed Bat		0	
	<i>Mops midas</i>	Midas Free-tailed Bat		0	
CERCOPITHECIDAE (Baboons and Monkeys)	<i>Papio cynocephalus ursinus</i>	Savanna Baboon		0	
	<i>Cercopithecus pygerythrus</i>	Vervet Monkey		0	
	<i>Cercopithecus albogularis</i>	Syke's Monkey		0	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
GALAGIDDAE (Galagos / Bushbabies)	<i>Otolemur (Galago) crassicaudatus</i>	Thick-tailed (Greater) Galago		0	
	<i>Galago moholi</i>	Southern Lesser Galago		0	
	<i>Galagoides granti</i>	Grant's Galago		0	
MANIDAE (Pangolins)	<i>Manis temminckii</i>	Ground Pangolin		0	
LEPORIDAE (Hares and Rabbits)	<i>Lepus capensis</i>	Cape Hare		0	
	<i>Lepus saxatillis</i>	Scrub Hare		4	
	<i>Pronolagus randensis</i>	Jameson's Red Rock Rabbit		0	
	<i>Pronolagus crassicaudatus</i>	Natal Red Rock Rabbit		0	
	<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Rabbit		0	
	<i>Pronolagus rupestris</i>	Smith's Red Rock Rabbit		0	
	<i>Bunolagus monticularis</i>	Riverine Rabbit		0	CE
SCIURIDAE (Squirrels)	<i>Xerus inauris</i>	Southern African Ground Squirrel		0	
	<i>Xerus princeps</i>	Damara Ground Squirrel		0	
	<i>Heliosciurus mutabilis</i>	Sun Squirrel		0	
	<i>Paraxerus palliatus</i>	Red Bush Squirrel		0	
	<i>Funisciurus congicus</i>	Striped Tree Squirrel		0	
	<i>Paraxerus cepapi</i>	Tree Squirrel		0	
	<i>Sciurus carolinensis</i>	Grey Squirrel (Introduced)		0	
MYOXIDAE (Dormice)	<i>Graphiurus ocularis</i>	Spectacled Dormouse		0	
	<i>Graphiurus platyops</i>	Rock Dormouse		0	
	<i>Graphiurus murinus</i>	Woodland Dormouse		0	
	<i>Graphiurus kelleni</i>	Lesser Savanna Dormouse		0	
PEDETIDAE (Springhares)	<i>Pedetes capensis</i>	Springhare		3	
BATHYERGIDAE (Rodent Moles / Mole Rats)	<i>Bathyergus suillus</i>	Cape Dune Mole-rat		0	
	<i>Bathyergus janetta</i>	Namaqua Dune Mole-rat		0	
	<i>Cryptomys hottentotus</i>	Common (African) Mole-rat		2	
	<i>Cryptomys damarensis</i>	Damara Mole-rat		0	
	<i>Cryptomys darlingi</i>	Mashona Mole-rat		0	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Georychus capensis</i>	Cape Mole-rat		0	
HYSTRICIDAE (Porcupine)	<i>Hystrix africaeaustralis</i>	Cape Porcupine		4	
THRYONOMYIDAE (Cane-rats)	<i>Thryonomys swinderianus</i>	Greater Cane-rat		0	
	<i>Thryonomys gregorianus</i>	Lesser Cane-rat		0	
PETROMURIDAE (Dassie Rat)	<i>Petromus typicus</i>	Dassie Rat		0	
MURIDAE (Rats and Mice)	<i>Zelotomys woosnami</i>	Woosnam's Desert Mouse		0	
	<i>Mystromys albicaudatus</i>	White-tailed Mouse		0	EN
	<i>Saccostomus campestris</i>	Pouched Mouse		0	
	<i>Cricetomys gambianus</i>	Gambian Giant Rat		0	
	<i>Steatomys pratensis</i>	Fat Mouse		0	
	<i>Steatomys parvus</i>	Tiny Fat Mouse		0	
	<i>Steatomys krebsii</i>	Krebb's Fat Mouse		0	
	<i>Dendromus nyikae</i>	Nyika Climbing Mouse		0	
	<i>Dendromus melanotis</i>	Grey Climbing Mouse		3	
	<i>Dendromus mesomelas</i>	Brant's Climbing Mouse		0	
	<i>Dendromus mystacalis</i>	Chestnut Climbing Mouse		0	
	<i>Malacothrix typica</i>	Gerbil Mouse		0	
	<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil		0	
	<i>Gerbillurus pæba</i>	Hairy-footed Gerbil		0	
	<i>Gerbillurus vullinus</i>	Brush-tailed Hairy-footed Gerbil		0	
	<i>Gerbillurus tytonis</i>	Dune Hairy-footed Gerbil		0	
	<i>Gerbillurus setzeri</i>	Stezer's Hairy-footed Gerbil		0	
	<i>Tatera leucogaster</i>	Bushveld Gerbil		0	
	<i>Tatera afra</i>	Cape Gerbil		0	
	<i>Tatera brantsii</i>	Highveld Gerbil		3	
<i>Tatera inclusa</i>	Gorongosa Gerbil		0		
<i>Acomys spinosissimus</i>	Spiny Mouse		0		
<i>Acomys subspinosus</i>	Cape Spiny Mouse		0		



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Michaelamys namaquensis</i>	Namaqua Rock Mouse		1	
	<i>Michaelamys granti</i>	Grant's Rock Mouse		0	
	<i>Aethomys chrysophilus</i>	Red Veld Rat		1	
	<i>Aethomys silindensis</i>	Silinda Rat		0	
	<i>Aethomys ineptus</i>	Tete Veld Rat		0	
	<i>Aethomys namaquensis</i>	Namaqua Rock Mouse		0	
	<i>Dasymys incomtus</i>	African Marsh Rat		0	
	<i>Rhabdomys pumilio</i>	Four-striped Grass Mouse		4	
	<i>Lemniscomys rosalia</i>	Single-striped Grass Mouse		0	
	<i>Mus setzeri</i>	Setzer's Pygmy Mouse		0	
	<i>Mus triton</i>	Grey-bellied Pygmy Mouse		0	
	<i>Mus indutus</i>	Desert Pygmy Mouse		0	
	<i>Mus minutoides</i>	Pygmy Mouse		3	
	<i>Mus neavei</i>	Neave's Pygmy Mouse		0	DD
	<i>Mus orangiae</i>	Free State Pygmy Mouse		0	
	<i>Mus musculus*</i>	House Mouse		3	
	<i>Thallomys paedulcus</i>	Acacia Rat		0	
	<i>Thallomys nigricaudatus</i>	Black-tailed Tree Rat		0	
	<i>Grammomys dolichurus</i>	Woodland Thicket Rat		0	
	<i>Pelomys fallax</i>	Creek Groove-toothed Rat		0	
	<i>Mastomys natalensis</i>	Natal Multimammate Mouse		3	
	<i>Mastomys coucha</i>	Southern Multimammate Mouse		0	
	<i>Mastomys shortridgei</i>	Shortridge's Mouse		0	DD
	<i>Myomyscus verrauxii</i>	Verraux's Mouse		0	
	<i>Rattus rattus*</i>	House Rat		3	
	<i>Rattus norvegicus*</i>	Brown Rat		0	
	<i>Parotomys brantsii</i>	Brants's Whistling Rat		0	
	<i>Parotomys littledalei</i>	Littledale's Whistling Rat		0	
	<i>Otomys laminatus</i>	Laminate Vlei Rat		0	
	<i>Otomys angoniensis</i>	Angoni Vlei Rat		3	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Otomys saundersiae</i>	Saunders's Vlei Rat		0	
	<i>Otomys irroratus</i>	Vlei Rat		3	
	<i>Otomys sloggetti</i>	Sloggett's Rat		0	
	<i>Otomys unisulcatus</i>	Bush Karoo Rat		0	
	<i>Petromyscus collinus</i>	Pygmy Rock Mouse		0	
	<i>Petromyscus barbouri</i>	Barbour's Pygmy Rock Mouse		0	
	<i>Petromyscus monticularis</i>	Brukkaros Pygmy Rock Mouse		0	
	<i>Petromyscus shortridgei</i>	Shortridge's Pygmy Rock Mouse		0	
CANIDAE (Foxes, Jackals, Wild Dog)	<i>Vulpes chama</i>	Cape Fox		2	
	<i>Otocyon megalotis</i>	Bat-eared Fox		0	
	<i>Canis mesomelas</i>	Black-backed Jackal		3	
	<i>Canis adustus</i>	Side-striped Jackal		0	
	<i>Lycaon pictus</i>	Wild Dog	LE	0	EN
MUSTELIDAE (Otters, Badger, Weasel & Polecat)	<i>Aonyx capensis</i>	Cape Clawless Otter		3	
	<i>Lutra maculicollis</i>	Spotted-necked Otter		3	
	<i>Mellivora capensis</i>	Honey Badger (Ratel)		0	
	<i>Poecilogale albinucha</i>	African Striped Weasel		3	
	<i>Ictonyx striatus</i>	Striped Polecat		3	
HERPESTIDAE (Mongooses)	<i>Mungos mungo</i>	Banded Mongoose		0	
	<i>Rhynchogale melleri</i>	Meller's Mongoose		0	
	<i>Bdeogale crassicauda</i>	Bushy-tailed Mongoose		0	
	<i>Paracynictis selousi</i>	Selous's Mongoose		0	
	<i>Galerella pulverulenta</i>	Small Grey Mongoose		0	
	<i>Herpestes ichneumon</i>	Large Grey Mongoose		0	
	<i>Gallerella sanguinea</i>	Slender Mongoose		0	
	<i>Attilax paludinosus</i>	Water (Marsh) Mongoose		3	
	<i>Helogale parvula</i>	Dwarf Mongoose		0	
	<i>Ichneumia albicauda</i>	White-tailed Mongoose		3	
	<i>Cynictis penicillata</i>	Yellow Mongoose		3	
	<i>Suricata suricatta</i>	Suricate (Meerkat)		2	



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
VIVERRIDAE (Genets & Civets)	<i>Genetta genetta</i>	Small-spotted Genet		2	
	<i>Genetta maculata</i>	Common Large-spotted Genet		0	
	<i>Genetta tigrina</i>	South African Large-spotted Genet		0	
	<i>Civettictis civetta</i>	African Civet		0	
NANDINIIDAE (Palm Civet)	<i>Nandinia binotata</i>	African Palm Civet		0	
HYAENIDAE (Hyaenas)	<i>Crocuta crocuta</i>	Spotted Hyaena	LE	0	
	<i>Parahyaena brunnea</i>	Brown Hyaena	LE	0	NT
PROTELIDAE (Aardwolf)	<i>Proteles cristatus</i>	Aardwolf		2	
FELIDAE (Cats)	<i>Felis silvestris lybica</i>	African Wild Cat		2	
	<i>Felis nigripes</i>	Small Spotted Cat		1	VU
	<i>Leptailurus serval</i>	Serval		0	
	<i>Caracal caracal</i>	Caracal		0	
	<i>Acinonyx jubatus</i>	Cheetah	LE	0	VU
	<i>Panthera leo</i>	Lion	LE	0	VU
	<i>Panthera pardus</i>	Leopard	LE	0	NT
ORYCTEROPODIDAE (Aardvark)	<i>Orycteropus afer</i>	Aardvark		3	
ELEPHANTIDAE (Elephant)	<i>Loxodonta africana</i>	African Elephant	LE	0	NT
PROCAVIIDAE (Dassies / Hyrax)	<i>Procavia capensis</i>	Rock Dassie (Hyrax)		1	
	<i>Procavia capensis welwitschii</i>	Kaokoveld Rock Dassie (Hyrax)		0	
	<i>Heterohyrax brucei</i>	Yellow-spotted Rock Dassie (Hyrax)		0	
	<i>Dendrohyrax arboreus</i>	Tree Dassie (Hyrax)		0	
EQUIDAE (Zebras)	<i>Equus zebra zebra</i>	Cape Mountain Zebra		0	VU
	<i>Equus zebra hartmannae</i>	Hartman's Mountain Zebra		0	
	<i>Equus quagga</i>	Plains Zebra	LE	0	
RHINOCEROTIDAE (Rhinoceroses)	<i>Diceros bicornis</i>	Hook-lipped Rhinoceros	LE	0	CE
	<i>Ceratotherium simum</i>	Square-lipped Rhinoceros	LE	0	NT



TERRESTRIAL ECOLOGY ASSESSMENT

FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
SUIDAE (Pigs & Hogs)	<i>Phacochoerus africanus</i>	Common Warthog		0	
	<i>Potamochoerus larvatus</i>	Bushpig		0	
HIPPOPOTAMIDAE (Hippopotamuses)	<i>Hippopotamus amphibius</i>	Hippopotamus	LE	0	VU
GIRAFFIDAE (Giraffe)	<i>Giraffa camelopardalis</i>	Giraffe		0	
BOVIDAE (Buffalo & Antelopes)	<i>Syncerus caffer</i>	African Buffalo	LE	0	
	<i>Tragelaphus oryx</i>	Common Eland	LE	0	
	<i>Tragelaphus strepsiceros</i>	Greater Kudu		0	
	<i>Tragelaphus angasii</i>	Nyala		0	
	<i>Tragelaphus spekei</i>	Sitatunga		0	
	<i>Tragelaphus scriptus</i>	Bushbuck		0	
	<i>Hippotragus equinus</i>	Roan Antelope		0	
	<i>Hippotragus niger</i>	Sable Antelope		0	
	<i>Oryx gazella</i>	Gemsbok (Oryx)		0	
	<i>Kobus ellipsiprymnus</i>	Waterbuck		0	
	<i>Kobus leche</i>	Lechwe		0	
	<i>Kobus vardonii</i>	Puku		0	
	<i>Redunca fulvorufula</i>	Mountain Reedbuck		0	
	<i>Redunca arundinum</i>	Common (Southern) Reedbuck	LE	0	
	<i>Pelea capreolus</i>	Grey Rhebok		0	
	<i>Connochaetes gnou</i>	Black Wildebeest	LE	0	
	<i>Connochaetes taurinus</i>	Blue Wildebeest	LE	0	
	<i>Alcelaphus buselaphus</i>	Red Hartbeest	LE	0	
	<i>Alcelaphus lichtensteinii</i>	Lichtenstein's Hartebeest		0	
	<i>Damaliscus pygargus dorcas</i>	Bontebok		0	
	<i>Damaliscus pygargus phillipsi</i>	Blesbok		0	
	<i>Damaliscus lunatus</i>	Tsessebe		0	
	<i>Aepyceros melampus</i>	Impala		0	
<i>Antidorcas marsupialis</i>	Springbok	LE	0		
<i>Madoqua demarensis</i>	Damara Dik-dik		0		



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FAMILY	BIOLOGICAL NAME	COMMON NAME	LOCALLY EXTINCT	PROBABILITY	RED DATA
	<i>Neotragus moschatus</i>	Suni		0	
	<i>Oreotragus oreotragus</i>	Klipspringer		0	
	<i>Raphicerus campestris</i>	Steenbok		2	
	<i>Ourebia ourebi</i>	Oribi		0	
	<i>Raphicerus melanotis</i>	Cape Grysbok		0	
	<i>Raphicerus sharpei</i>	Sharpe's Grysbok		0	
	<i>Cephalophus natalensis</i>	Red Duiker		0	
	<i>Cephalophus monticola</i>	Blue Duiker		0	
	<i>Sylvicapra grimmia</i>	Common Duiker		2	
CERVIDAE (Deer)	<i>Cervus dama</i>	European Fallow Deer (Introduced)		0	

The relevant IUCN status categories are:

Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Data Deficient (DD)

Least Concern (LC)

All species without a category are shown as Not Listed (NL)

Shaded species indicate species known to occur within the study area

Probability of occurrence categories are as follows:

0 = Highly improbable

1 = Low probability

2 = Moderate probability

3 = High probability

4 = Recorded

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