



*SPECIALIST BIODIVERSITY REPORT*

**Terrestrial Biodiversity and Wetland Delineation Report:  
Proposed Extensions 5, 6, 7 and 8 of  
Siyathuthuka Township, Belfast**

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## Executive Summary

The relevant land is located adjacent to the existing Siyathuthuka Township to the west of Belfast town, Mpumalanga Province. This site is earmarked for township development by the Municipality. As part of the requirement for the EIA process, specific biodiversity surveys were recommended by the environmental consultant. The terms of reference for this investigation are as follows: Biodiversity Assessment with the following objectives:

- Important communities and habitats;
- Important- and indicator species and their relevance;
- Red Data potential and actual species found;
- Identification and delineation of wetlands;
- Ecological mapping and sensitivity zoning of relevant areas;
- Invasive/Exotic species and weeds;
- Impact assessment, recommendations and mitigation measures;

The study sites consist of four new proposed extensions of Siyathuthuka Township:

- 1) Extension 5 is located on Portion 3 of the farm Klipfontein 385JS and is approximately 12ha in extent. This land is located immediately to the southwest of the existing township. A wetland and informal farming area is located in between the existing township and the proposed Extension 5. A cemetery and coal storage area is located on the southern section of this property.
- 2) Extensions 6 & 8 are located on Portion 79 of the farm Tweefontein 357JT and are approximately 29ha in extent. This land is located immediately to the east of the existing township.
- 3) Extension 7 is located on Portion 5 of the farm Weltevreden 386JS and is approximately 2.4ha in extent. This land is located immediately to the northeast of the existing township.

The general study area consists of Siyathuthuka Township and the economic activities of the surrounding area which includes a large opencast coal mine to the south. Forestry plantations are located to the north and east and informal farming activities surround the township. The heaps of domestic waste surrounding the township indicate that services provision in the Township are inadequate. The following habitats and land uses were classified:

### i) Natural grassland

This vegetation community is found only on the northern section (to the north of the wetland) of the site earmarked for Extension 5 and consists of climax grassland.

This habitat is dominated by the grasses *Eragrostis racemosa*, *Panicum natalense*, *Aristida junciformis*, *Tristachya leucothrix* and *Eragrostis micrantha*. *Loudetia simplex* is found on poor soils where sandstone formations predominate. Common grassland forbs and wild flowers are present, these include *Berkheya radula*, *Berkheya maritima*, *Hypericum aethiopicum*, *Hypoxis argentea*, *Hermannia transvaalensis*, *Helichrysum rugulosum* and *Gladiolus crassifolius*. *Lopholaena coriifolia* and *Diospyros lycioides* are found on the sandstone outcrops present in the northern area of the grassland. Other shrubs and small trees and shrubs are *Rhus dentata* and *Rhus pyroides*. No RDL flora species were recorded and the incidence of weeds and invaders are also low.

Under ideal conditions this community would provide habitat to a diverse range of fauna, especially birds and small mammals will utilize the grassland, including several very sensitive Red Data Listed species and reptiles will utilize the niche provided by the rocky outcrops as well as the grassland. However, there are several negative impacts originating on the surrounding land (e.g. pollution and littering from the formal and informal settlements) as well as impacts on site (e.g. human traffic and the evident hunting of wild animals, as well as medicinal plant harvesting and too frequent unplanned burning of the veld). These will have a significant impact on the biodiversity maintenance function

(especially on fauna) of this grassland. As result of all the abovementioned reasons it has a **Medium** sensitivity rating which can only be improved by formally and physically protecting the site.

ii) **Seepage wetland**

A prominent seepage wetland area was identified on the southern area of the site for the proposed Extension 5. The vegetation indicators of the permanently wet areas are consist of *Schoenoplectus brachyceras*, *Juncus effusus* *Persicaria sp* and the hydrophitic grasses *Setaria pallide-fusca*, *Echinochloa colona* and *Paspalum dilatatum*. Indicator grass species of the seasonal zone are *Panicum shinzii*, *Setaria nigrirostris* and *Eragrostis plana*.

The difference in soil indicators between the terrestrial and wetland zones are well defined and rather abrupt. The wetland soil samples are black and very clayey and varying in moistness. Indicators of wetness are Fe and Mn nodules in the deeper sample sections due to reduction processes associated with wetland conditions.

Negative impacts on the ecological integrity of this wetland include the township and informal farming practises that have encroached onto the northern and eastern wetland area. However, the wetland retains its functions in maintaining biodiversity and the release of clean water into the environment and therefore it has a **High** sensitivity rating.

iii) **Degraded and transformed land**

For the purpose of this report, transformed land refers to areas that have been changed or disturbed to such an extent that all natural habitats, biota and ecosystem functions have been fragmented or lost and rehabilitation or conservation is not regarded as an option. Vegetation consists of fragments of grassland, pioneer grasses (e.g. *Hyparrhenia tamba*, *Hyparrhenia hirta* and *Melinis repens*), weeds and invasive vegetation such as *Eucalyptus sp* and *Acacia mearnsii* and others.

On site, these areas include the informal settlements, cemeteries and the area affected by forestry plantations and invasive vegetation. These areas are of **Low** sensitivity and biodiversity value. The proposed Extensions 6, 7 and 8 is included within this rating.

No Red Data Listed or important fauna and flora were identified during the filed searches, although there is potential for such species to be present. The results of the biodiversity investigation indicate that although much of the sites are actually transformed, with no natural habitat remaining, there are also highly significant natural areas remaining. The sensitivity zoning (based upon natural integrity, fauna potential and ecological functions) for the different ecological communities are summarized as follows:

<b>Vegetation Community</b>	<b>Sensitivity Rating</b>
Natural grassland	Medium
Seepage wetlands	High
Degraded and transformed land	Low

The ecological integrity and functions of the natural grassland can only be improved by formally and physically protecting the site from the relevant impacts. This will be highly unlikely and it can be assumed that the informal settlements will eventually invade the total extent of site. As this development is a logical extension of the township and the fact that lesser sensitive alternative sites for this development are not available, it can be recommended that the natural grassland is also considered for the development (given special precautionary mitigation measures). Development of the township will ensure that adequate services provision is available and that the township is developed in a formal manner, minimizing the negative social and environmental impacts associated with informal settlements.

The major anticipated impact on biodiversity is the loss and fragmentation of habitat which means the loss of living space (habitat) for animals and natural vegetation alike. If adequate mitigation and conservation of natural habitats are prerequisites for the development, fauna and flora will be able to continue to use the natural habitats on site. However, if this is not the case biodiversity will be lost – a scenario which cannot be reversed. Potential development impacts on the natural and ecological aspects of the environment and their magnitude and significance, as well as mitigation measures are given in the Impact Assessment Table provided on the following page.

### **Recommendations**

The total site areas can be considered for development, given that the following recommendations and mitigation measures are followed:

#### **Wetland**

- It is not anticipated that the wetlands will be physically affected by the development.
- The wetland is of *High* biodiversity significance and must be conserved.
- A buffer zone of 50m to both sides of the wetland is recommended to mitigate impacts on the wetland area. The buffer zone has to be added to the delineated area.

#### **Natural grassland**

- This area is of *Medium* biodiversity significance (northern area earmarked for Extension 5) and special mitigation measures must be followed before development can commence:
  - The affected area must be searched before and during construction by specialists in order to identify and remove important and rare fauna & flora.

#### **General recommendations**

Additionally, the following measures must be included with the management plan:

- Use only indigenous flora for landscaping;
- Implement an alien invader vegetation control program;

Nature of impact	Duration	Intensity	Probability	Significance before mitigation	Mitigation measures	Significance after mitigation
Loss of plants and habitats	Long term	Medium	Definite	High	<ul style="list-style-type: none"> <li>Conserve the remaining natural habitats in the surrounding area.</li> <li>Educate the community on the importance of biodiversity and the conservation thereof.</li> </ul>	Medium
Loss of important flora species	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>As above.</li> <li>Identify and relocate important species and individuals before and during construction.</li> </ul>	Low
Increased levels of alien invasive plants due to disturbance	Long term	High	Definite	Medium	<ul style="list-style-type: none"> <li>Implement weed control program in natural and developed areas.</li> <li>Use only indigenous flora for landscaping.</li> </ul>	Low
Changes to and fragmentation of habitats	Long term	Medium	Definite	High	<ul style="list-style-type: none"> <li>Follow all above measures.</li> <li>Construction methods must be respectful of the environment.</li> </ul>	Medium
Loss of general terrestrial fauna	Long term	Medium	Definite	Medium	<ul style="list-style-type: none"> <li>Conserve the remaining natural habitats off site.</li> </ul>	Low
Loss of important and rare terrestrial fauna	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>Conserve remaining natural habitats off site.</li> <li>Identify and relocate important species and individuals before and during construction.</li> </ul>	Low
Impacts on important and rare avifauna	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>Conserve remaining natural habitats off site.</li> <li>Use only indigenous flora for landscaping.</li> </ul>	Low
Negative impacts on wetlands	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>It is not anticipated that the wetlands will be physically affected by the development</li> <li>Conserve the relevant wetland areas as recommended in this report (Fig. 2).</li> </ul>	Low

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## 1. Introduction and objectives

The relevant land is located adjacent to the existing Siyathuthuka Township to the west of Belfast town, Mpumalanga Province. This site is earmarked for township development by the Municipality. As partial requirement for the EIA process, specific biodiversity surveys were recommended by the environmental consultant. The terms of reference for this investigation are as follows: Biodiversity Assessment with the following objectives:

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For the purposes of this report, the site was surveyed on 2012-02-21/22.

## 2. Survey Methods and Reporting

### 2.1 General

The author relied on aerial images and ortho photos to assemble background information regarding the different features and vegetation communities present within the affected areas. The information thus gathered was used for selecting survey sites and to identify possible sensitive areas to be investigated. Problematic, as well as potential sensitive areas were visited and investigated as explained in the following two sections. All literature and other references used to support findings and to assist in making conclusions are listed.

### 2.2 Vegetation

Floral diversity was determined by completing survey transects and sample sites along all the different habitats within the physiographic zones represented in the affected areas (Deal *et al.* 1989a). In order to attain scientifically reliable results, obviously distinct vegetation communities were surveyed by selecting representative sites in each homogenous unit (Mathews *et al.* 1992). The vegetation units of Mucina & Rutherford (2006) are used as reference but where necessary communities are named according to the recommendations for a standardized South African syntaxonomic nomenclature system as explained by Deal *et al.* (1989b). By combining the available literature with the survey results, stratification of vegetation communities was possible.

The survey transects and sites in the affected areas were also intensively searched for important species and the potential for Red Data Listed (RDL) and other important species were established and cross referenced with PRECIS Data for the relevant quarter degree grid/s (SANBI, 2008). The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The veld types are described on a local level in section 4, and with the aid of illustrations in Appendix 2 of this report.

### 2.3 Terrestrial Fauna

The fauna investigation is based on an intensive desktop study verified by cross reference with available habitats of the study area, so as to establish the faunal potential of a particular site. All fauna that were observed during field trips and floral surveys were also recorded. However, selected survey sites were well searched for fauna and habitats were identified during the vegetation surveys so as to establish the faunal potential of a particular area. By method of elimination (based on available habitats and the taxon's biology and known distribution), lists of faunal representation for the study area was assembled. The investigation included:

- Butterflies;
- Frogs;
- Birds;
- Reptiles – in order not to destroy or damage natural rocky areas and termite mounds the reptile search were limited to visual encounters as well as investigating smaller cover objects which could be replaced in its natural position;
- Mammals – this investigation was based on visual encounters and physical signs (e.g. tracks and droppings);

So as to attain universal terms and references for this report, all reports refer to the floral habitats that were identified. However, other important habitats that were identified and that do not have a floristic relevance are also discussed where applicable

### 2.4 Wetland delineation

Wetlands and riparian areas are protected by the National Water Act (Act 36 of 1998). Wetlands are defined by this act as:

*“Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”*

Wetlands must have one or more of the following attributes or indicators (Fig.1):

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation;



- The presence, at least occasionally, of water loving plants (hydrophytes);
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.

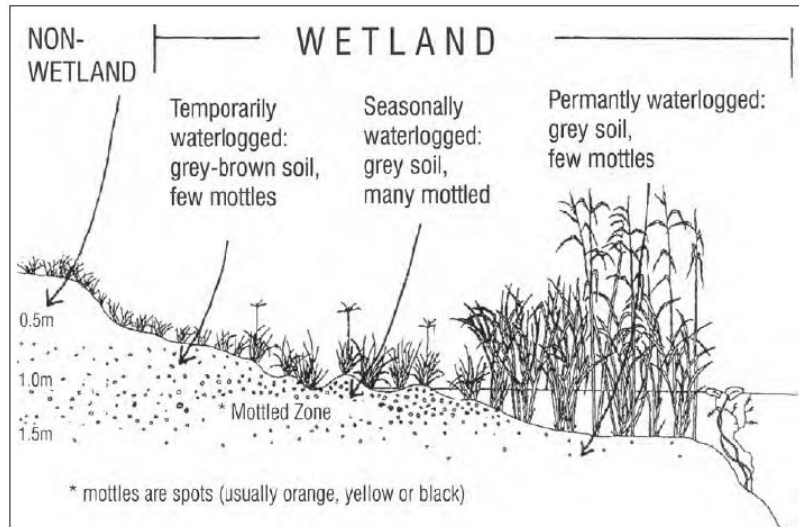


Fig. 1 The physical indicators of a typical wetland (DWAf guidelines, 2005)

The following biophysical indicators are used for wetland identification and delineation:

- Terrain Unit Indicator; Soil Form Indicator; Soil Wetness Indicator; Vegetation Indicator.

The actual wetland boundaries are delineated by using the following indirect indicators of prolonged saturation:

- Wetland plants (hydrophytes); Wetland soils (hydromorphic soils).

In order for an area to be classified as a wetland by the DWAf guidelines, hydromorphic soils must display signs of wetness (mottling and gleying) within 50cm of the soil surface. The geotechnical report for this project was used to aid for soil structure evaluation and classification. The DWAf Guidelines (2005) were used for classifying and delineating riparian zones on the property.

### 2.5 Ecological importance and sensitivity rating of habitats

By considering the results of all the above investigations, the authors allocate a qualitative sensitivity rating to the habitats that were identified, based upon its ecological importance and biodiversity value. A qualitative method was chosen at the first stage of

assessment instead of a quantitative method in order to simplify the procedure of assessment. This method of assessment is based on the criteria used by DWAF for *river ecoclassification* (Kleynhans *et al.*, 2009) and a *technique for assessing wetland health* (Macfarlane *et al.*, 2005). In order to simplify the decision making process, a scale of *Low*, *Medium* and *High* is used, based upon biodiversity value and ecological functions (Table 1). This method is used as a first level of expressing the sensitivity of a specific component and is not used in comparative assessments of alternatives where a quantitative approach will be more appropriate. Wetland sensitivity is measured only on its maintenance of biodiversity function at this basic level of assessment.

Table 1 Criteria used for sensitivity rating of habitats

Ecological Importance/Biodiversity Value	Sensitivity Rating
<b>Terrestrial and Riparian Communities</b>	
Natural communities which are regarded as ecologically important and sensitive and important for the maintenance of biodiversity. It may be linked to other important communities and provide an important refuge/corridor for biodiversity (fauna and flora). This rating can also be allocated due to the presence of one or more unique qualities (e.g. occurrence of RDL, Endemic and/or Protected species). The presence of unnatural impacts is low and can be managed. Any external impacts will have a significant negative effect on its status.	<i>High</i>
Natural communities which have a limited ecological function and a limited function for maintaining biodiversity. This may be due to homogenous habitat conditions and/or the negative effects of external impacts. External impacts can be managed and mitigated to reduce the significance of their magnitude.	<i>Medium</i>
Communities which have been significantly modified or transformed with the result that little or no natural flora and habitats remain intact. Ecological importance as well as biodiversity value is low. External impacts will not have a significant impact on its status.	<i>Low</i>

### 3. Background Information

#### 3.1 Biophysical description of the study area

The general study area consists of Highveld grassland of eastern Mpumalanga (quarter degree grid 2529DB). Due to the mountainous topography, rainfall varies considerably according to altitude and compass direction. Temperature extremes are also typical. The summer rainfall ranges from 750 to 1500mm per year and temperatures vary from –8°C to 39°C, the average being 15°C.

The geology consists predominantly of shale and mudstone (Timeball Hill formations). The soils consist of shallow soils and weathered shales and small outcrops are present. The nominated veld type is *Lydenburg Montane Grassland*. The exposed locality and poor soils makes for hardy plants being able to survive, while fires and frost will also play a dominant role in maintaining the vegetation composition.

### 3.2 Veld types & Vegetation units

Nationally, the vegetation type can be described as the Northeastern Mountain Grassland biome (Low & Rebelo, 1996) or according to Acocks (1987), Northeastern Mountain Sourveld (A8). This veld type consists of typical grassland of the Escarpment Mountains and Plateau. On a regional scale the veld unit is classified as Lydenburg Montane Grassland (Gm18) according to Mucina & Rutherford (2006).

Nationally, 45% of the Northeastern Mountain Grassland veld type has been transformed and only 7.4% is conserved (Low & Rebelo, 1996). Lydenburg Montane Grassland is not well protected and 23% has been transformed. For this reason this grassland ecosystem is rated as *Vulnerable* (Mucina & Rutherford, 2006). According to the Mpumalanga Biodiversity Conservation Plan (MBCP), the sites are located in areas ranging from *No natural habitat remaining* and *Least concern* to *Important and necessary* (Appendix 1); (Lötter, 2006).

### 3.3 Site description

The study sites consists of four new proposed extension of Siyatuthuka Township:

- 4) Extension 5 is located on Portion 3 of the farm Klipfontein 385JS and is approximately 12ha in extent. This land is located immediately to the southwest of the existing township. A wetland and informal farming area is located inbetween the existing township and the proposed Extension 5. A cemetery and coal storage area is located on the southern section of this property.
- 5) Extensions 6 & 8 are located on Portion 79 of the farm Tweefontein 357JT and are approximately 29ha in extent. This land is located immediately to the east of the existing township.
- 6) Extensions 7 is located on Portion 5 of the farm Weltevreden 386JS and is approximately 2.4ha in extent. This land is located immediately to the northeast of the existing township.

The general study area consists of Siyathuthuka Township and the economic activities of the surrounding area which includes a large opencast coal mine to the south. Forestry plantations are located to the north and east and informal farming activities surrounds the township. The heaps of domestic waste surrounding the township indicate that services provision in the Township are inadequate.

## 4. Vegetation report and general biophysical descriptions

Although the vegetation classification of Mucina & Rutherford (2006) is used as reference, these units are broadly classed and may include several distinct vegetation communities within a particular vegetation unit. The vegetation communities that were identified during this investigation are described in the following sections.

### 4.1 Vegetation and land uses

The biophysical features and habitat assemblage of the study area are projected on an aerial image (Fig. 1). It should be noted that only natural vegetation that is likely to be affected, is indicated. Illustrations of the veld conditions of the proposed alternatives are given in Appendix 2.

#### 4.1.1 Natural habitats

##### i) Natural grassland

This vegetation community is found only on the northern section (to the north of the wetland) of the site earmarked for Extension 5 and consists of climax grassland.

This habitat is dominated by the grasses *Eragrostis racemosa*, *Panicum natalense*, *Aristida junciformis*, *Tristachya leucothrix* and *Eragrostis micrantha*. *Loudetia simplex* is found on poor soils where sandstone formations predominate. Common grassland forbs and wild flowers are present, these include *Berkheya radula*, *Berkheya maritima*, *Hypericum aethiopicum*, *Hypoxis argentea*, *Hermannia transvaalensis*, *Helichrysum rugulosum* and *Gladiolus crassifolius*. *Lopholaena coriifolia* and *Diospyros lycioides* are found on the sandstone outcrops present in the northern area of the grassland. Other shrubs and small trees and shrubs are *Rhus dentata* and *Rhus pyroides*.

No RDL flora species were recorded and the incidence of weeds and invaders are also low.

Under ideal conditions this community would provide habitat to a diverse range of fauna, especially birds and small mammals will utilize the grassland, including several very sensitive Red Data Listed species and reptiles will utilize the niche provided by the rocky outcrops as well as the grassland (section 5). However, there are several negative impacts originating on the surrounding land (e.g. pollution and littering from the formal and informal settlements) as well impacts on site (e.g. human traffic and the evident hunting of wild animals, as well as medicinal plant harvesting and too frequent unplanned burning of the veld). These will have a significant impact on the biodiversity maintenance function (especially on fauna) of this grassland. As result of all the abovementioned reasons it has a **Medium** sensitivity rating which can only be improved by formally and physically protecting the site.

## ii) Seepage wetland

A prominent seepage wetland area was identified on the southern area of the site for the proposed Extension 5. The vegetation indicators of the permanently wet areas consist of *Schoenoplectus brachyceras*, *Juncus effusus*, *Panicum sp* and the hydrophytic grasses *Setaria pallide-fusca*, *Echinochloa colona* and *Paspalum dilatatum*. Indicator grass species of the seasonal zone are *Panicum shinzii*, *Setaria nigrirostris* and *Eragrostis plana*.

The difference in soil indicators between the terrestrial and wetland zones are well defined and rather abrupt. The wetland soil samples are black and very clayey and varying in moistness. Indicators of wetness are Fe and Mn nodules in the deeper sample sections due to reduction processes associated with wetland conditions.

Negative impacts on the ecological integrity of this wetland include the township and informal farming practices that have encroached onto the northern and eastern wetland area. However, the wetland retains its functions in maintaining biodiversity and the release of clean water into the environment and therefore it has a **High** sensitivity rating.

## iii) Degraded and transformed land

For the purpose of this report, transformed land refers to areas that have been changed or disturbed to such an extent that all natural habitats, biota and ecosystem functions have been fragmented or lost and rehabilitation or conservation is not regarded as an option. Vegetation consists of fragments of grassland, pioneer grasses (e.g. *Hyparrhenia tamba*, *Hyparrhenia hirta* and *Melinis repens*), weeds and invasive vegetation such as *Eucalyptus sp* and *Acacia mearnsii* and others as listed in section 4.2.

On site, these areas include the informal settlements, cemeteries and the area affected by forestry plantations and invasive vegetation. These areas are of **Low** sensitivity and biodiversity value. The proposed Extensions 6, 7 and 8 is included within this rating.

## 4.2 Occurrence of important flora species

Conservation-important, naturally occurring species can be categorized according to specific features that are important, usually due to rarity, habitat specificity, medicinal value, ecological value, endemism, over-exploitation, economic value or a combination of these. Species of conservation importance are either categorized as Red Data Listed species (RDL species), according to specific scientifically researched criteria and administered by the South African National Biodiversity Institute (SANBI), or as Protected Trees and Plants by the National and Provincial nature conservation

legislation. The National List for Red Data flora (2009) is the most updated and applicable reference for vegetation conservation in South Africa. Applicable legislation that protect flora in South Africa are the National Environmental Management Biodiversity Act of 2004 (NEMBA) and the National Forests Act of 1998 (NFA). The flora checklist obtained from SANBI (POSA data download) list the Red Data species for the relevant grid area.

Table 1.1 Global and National Red Data Listed plants of the study area. Species with a high potential of being present are indicated with cells shaded in grey. Species that were actually recorded are shaded in red.

Family	Scientific Name	National RDL Status
AMARYLLIDACEAE	<i>Crinum bulbispermum</i> (Burm.f.) Milne-Redh. & Schweick.	Declining
APIACEAE	<i>Alepidea peduncularis</i> A.Rich.	DDT
APOCYNACEAE	<i>Riocreuxia aberrans</i> R.A.Dyer	NT
AQUIFOLIACEAE	<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining
ARACEAE	<i>Zantedeschia pentlandii</i> (R.Whyte ex W.Watson) Wittm.	VU
ASPHODELACEAE	<i>Aloe reitzii</i> Reynolds var. <i>reitzii</i>	NT
ASTERACEAE	<i>Callilepis leptophylla</i> Harv.	Declining
ASTERACEAE	<i>Callilepis salicifolia</i> Oliv.	LC
ASTERACEAE	<i>Conyza bonariensis</i> (L.) Cronquist	NE
ASTERACEAE	<i>Conyza pinnata</i> (L.f.) Kuntze	LC
ASTERACEAE	<i>Cymbopappus piliferus</i> (Thell.) B.Nord.	Threatened
ASTERACEAE	<i>Helichrysum homilochrysum</i> S.Moore	Rare
FABACEAE	<i>Pearsonia hirsuta</i> Germish.	VU
GESNERIACEAE	<i>Streptocarpus latens</i> Hilliard & B.L.Burt	Rare
GUNNERACEAE	<i>Gunnera perpensa</i> L.	Declining
HYACINTHACEAE	<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Baker) Reyneke	Declining
HYACINTHACEAE	<i>Eucomis montana</i> Compton	Declining
HYACINTHACEAE	<i>Merwillia plumbea</i> (Lindl.) Speta	NT
IRIDACEAE	<i>Gladiolus malvinus</i> Goldblatt & J.C.Manning	VU
MESEMBRYANTHEMACEAE	<i>Khadia alticola</i> Chess. & H.E.K.Hartmann	Rare
PROTEACEAE	<i>Protea parvula</i> Beard	NT
ROSACEAE	<i>Prunus africana</i> (Hook.f.) Kalkman	VU
SANTALACEAE	<i>Thesium subsimile</i> N.E.Br.	DDD

No RDL species were recorded during the field searches. No legally protected plant species were found during the field surveys. Permits will have to be obtained from the

Department of Water Affairs and/or the Provincial nature conservation agency, if legally protected trees or plant species are identified and affected.

Also of conservation importance is the occurrence of alien invasive species and weeds. Such species are listed in the Conservation of Agricultural Resources Act of 1983 (CARA) and the Mpumalanga Conservation Act (1998). The control by landowners of the presence and spreading of such species are regulated by these Acts. Several important exotic species are present and most of the natural habitats contain alien invader species (Table 2.2).

Table 2.2 Aliens, weeds and exotics, CARA categories are indicated where applicable

Scientific Name	Status	Recorded
<i>Argemone ochroleuca</i>	Category 1 weed	Transformed land
<i>Cirsium vulgare</i>	Category 1 weed	Transformed land
<i>Datura stramonium</i>	Category 1 weed	Transformed land
<i>Pyracantha angustifolia</i>	Category 3 invader	Natural grassland
<i>Ricinus communis</i>	Category 2 invader	Transformed land
<i>Eucalyptus sp</i>	Category 2 invader	Transformed land
<i>Acacia mearnsii</i>	Category 2 invader	Transformed land
<i>Pennisetum clandestinum</i>	Naturalized/weed	Transformed land
<i>Amaranthus viridis</i>	Naturalized/weed	Transformed land
<i>Conyza albida</i>	Naturalized/weed	Transformed land
<i>Tagetes minuta</i>	Naturalized/weed	Transformed land
<i>Bidens pilosa</i>	Naturalized/weed	Agriculture lands

## 5. Terrestrial Fauna Report

### 5.1 Amphibians

Frogs will utilize the aquatic and terrestrial habitats on the property for several reasons, including breeding purposes. Essential habitats for the survival of frogs on the property include the river, streams, and woodland. Frogs are rather sensitive to pollution and ecological imbalances, thus the presence of frogs indicate that the habitats where they were recorded are healthy and of good ecological integrity. Important frog species expected in the study area is presented in Table 3.

Table 3 Important frogs of the study area

Taxon Common name	Habitat Preference	P	Status
<i>Semnodactylus wealii</i> Rattling frog	Grassland biome. Under loose stones or tufts of grass.	166	Least Concern Endemic Sthrn A
<i>Breviceps mossambicus</i> Mozambique Rain frog	Savanna, grassland, Rainfall >700mm.	184	Least Concern Endemic Sthrn A
<i>Breviceps verrucosus</i> Plaintive Rain frog	Escarpment mountains, moist upland grassland. Afromontane forests.	194	Least Concern Endemic Sthrn A
<i>Cacosternum nanum nanum</i> Bronze Caco	Wide variety of habitats. Savanna, fynbos, grasslands.	232	Least Concern Endemic Sthrn A
<i>Cacosternum nanum parvum</i> Mountain Caco	Restricted to high altitude grasslands above 1200m	233	Least Concern Endemic Sthrn A
<i>Strongylopus grayii</i> Clicking stream frog	Widespread and variety of habitats. Tolerant.	311	Least Concern Endemic Sthrn A

One of these has Red Data status and several endemic/near endemic species are included (Table 3). The anticipated impacts on these taxa and their habitats are assessed in section 6.

### 5.2 Reptiles

The list of important reptiles of the study area is subjective, based only on presently known distribution records (as also stated by Ferrar *et al* 1988). Presently, this is the only data available and is sporadic and may not reflect the actual distribution range of specific taxons. However, the the study area, possess several important endemic species that also have the potential of being present in the study area (Table 4).



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Table 4 Important reptiles of the study area. Shaded cells indicate species most likely to be negatively affected by the intended activities.

Name	Habitat description	Status
<i>Acontias breviceps</i> p132 Shortheaded limbless skink	Montane grasslands.	Endemic
<i>Agama atra atra</i> Southern rock agama	Rock outcrops and mountain plateaus including escarpment mountains.	Endemic
<i>Afroedura multiporis multiporis</i> p235 Woodbush flat gecko	Rocky outcrops in open woodland to montane forest. Restricted to Woodbush Forest (Known distribution).	Endemic
<i>Amblyodipsas concolor</i> p65 Natal purple-glossed snake	Burrows in humic soils in forests. Moist forested areas.	Endemic Protected
<i>Amphlorhinus multimaculatus</i> p82 Cape reed snake	Large mountain ranges of region. Mountain streams and vleis: Reed beds and waterside vegetation.	N-Endemic Protected
<i>Bradypodion transvaalense</i> p224 Transvaal dwarf chameleon	Wet escarpment forests in kloofs. Barberton to Soutpansberg.	Endemic
<i>Bitis atropos</i> p115 Berg adder	Montane grassland.	N-Endemic Protected
<i>Chamaesaura aenea</i> p185 Transvaal grass lizard / snake lizard	Grass-covered mountain slopes and plateaus: Long grass.	Endemic
<i>Chamaesaura anguina</i> p185 Cape grass lizard / snake lizard	Fynbos and grass-covered mountain slopes and plateaus: Long grass.	Endemic
<i>Cordylus vittiver vittiver</i> p195 Transvaal girdled lizard	Grassland: In cracks in small rock outcrops. Rocky outcrops in Bushveld, Open woodland, Grassland Crevices, Under rocks.	Endemic
<i>Cordylus warreni</i> p195 Warrens girdled lizard	Montane- well wooded rocky outcrops. Three subspecies. Distribution records erratic.	Endemic
<i>Elapsoidea sundevallii media</i> p106 Highveld garter snake	Varied: coastal forest, highveld grassland, arid and mesic savanna. Old termitaria and under stones.	Endemic Protected
<i>Homoroselaps lacteus</i> p102 Spotted harlequin snake	Varied habitats, semi-arid to grassland, coastal bush. Under rocks, old termite mounds.	Endemic Protected
<i>Hemachatus hemachatus</i> p109 Rinkhals	Grassland. Highveld.	N-Endemic Protected
<i>Lamprophis aurora</i> p75 Aurora house snake	Uncommon. Savanna and grassland. Moister regions of SA.	Endemic Protected
<i>Lamprophis guttatus</i> p74 Spotted house snake	Rocky areas, preferring dry habitats.	Endemic Protected
<i>Lamprophis inornatus</i> p74 Olive house snake	Moist coastal bushveld and fynbos, extending into grassland of escarpment.	Endemic Protected
<i>Lamprophis swazicus</i> p75 Swazi rock snake	Savanna, extending into grassland. Rocky areas.	Rare Endemic Protected
<i>Leptotyphlops conjunctus incognitus</i> p56 Cape thread snake / Lesser worm snake	Varied, burrow underground. Lives underground and only wriggle to surface after being flooded by heavy rains from their underground retreats. In or under rotting logs, among the roots of grass and small bushes. Particularly in or near termitaria where there is an abundance of termites.	N- Endemic Protected
<i>Leptotyphlops distanti</i> p57 Distant's thread snake	Varied, coastal bush, grassland and savanna. Burrow underground. Usually taken under stones.	Endemic Protected
<i>Leptotyphlops nigricans</i> p56 Black thread snake	Fossorial: under stones, among roots of grass tussocks; moribund termitaria.	Endemic Protected
<i>Lycophidion variegatum</i> p76 Variegated wolf snake	Savanna inhabitant. Under stones, dead aloes and rotting logs.	Peripheral N- Endemic Protected
<i>Lygodactylus methuni</i> p247	Montane forests. Restricted to Woodbush Forest (Known distribution).	Vulnerable

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Woodbush dwarf gecko		Endemic
<i>Lygodactylus ocellatus</i> p248 Ocellated dwarf gecko	Rocky areas on exposed slopes and mountains.	Endemic
<i>Pachydactylus vansoni</i> p262 Van Son's thicktoed gecko	Land type: Varied – karroid veld, grassland and mesic savanna. Terrestrial; inhabits rocky outcrops and more frequently found under rocks or logs on soil; disused termitaria.	N-Endemic
<i>Philothamnus natalensis occidentalis</i> p95 Natal water snake / Eastern Natal green snake	Wet montane and dry forest: Reedbeds, vleis and streams. Vicinity of water bodies. Arboreal.	Endemic Protected
<i>Platysaurus intermedius intermedius</i> p201 Flat Lizard	Rocky outcrops of granite, sandstone, gneiss.	Endemic
<i>Platysaurus orientalis orientalis</i> Sekukhune flat lizard	Widely distributed through Mpumalanga Drakensberg.	Endemic
<i>Prosymna sundevalli lineate</i> p84 Sundevall's shovel-snout / Sundevall's streaky shovel-snout	Open woodland. Dry areas, including savanna woodlands: burrow in loose soil. Nocturnal, partially fossorial. Under rocks, logs or even piles of bricks.	N-Endemic
<i>Psammophis crucifer</i> p92 Mountain grass snake	Large mountain ranges of region. Mountain streams and vleis: Reed beds and damp grassland.	N-Endemic Protected
<i>Psammophylax rhombaeus</i> p88 Spotted skaapsteker / Rhombic skaapsteker	Highveld grassland.	Endemic
<i>Pseudocordylus melanotus</i> p206 Drakensberg crag lizard	Rock outcrops on mountain plateaus and in rolling grassland: rock crevices.	Endemic
<i>Python sebae natalensis</i> p59 Common African python / African rock python	Moist, rocky, well-wooded valleys, reed-beds or even bush country, seldom venture far from permanent water. Eggs are laid in hollow tree trunks, antbear holes or old termite hills.	Vulnerable Protected CITES Appendix II
<i>Rhinotyphlops lalandei</i> p53 Delalande's blind snake	Found in variety of veld types. Varied, semi-desert, savanna: Under stones and in termitaria. Is most commonly found in or near the nest of termites boulders.	N-Endemic Protected
<i>Scelotes mirus</i> p145 Montane (dwarf) burrowing skink	Rocky montane grassland: live in grass among rocks on upper mountain slopes and summits.	Endemic
<i>Typhlops bibroni</i> p55 Bibron's blind snake	Highveld grassland: Underneath rocks and in termitaria.	N-Endemic Protected

Endemic: South Africa; Near Endemic: South Africa, Swaziland, Zimbabwe

Several species are endemic to the Drakensberg mountain range whilst others are found more wide-spread. Species with a very restricted distribution are also included (Table 4). A total of 23 Endemic; 9 Near Endemic; 4 Red Data species are included. Grassland species that may be directly affected includes a total of 26 species. None of the important species were recorded on site during the present survey and most of these species have a low potential of being present due to the impacts on or near the site. The anticipated impacts on these taxa and their habitats are assessed in section 6.

### 5.3 Bird distribution in the study area

The larger study area can be seen as rich in, and essential for, avifauna. Several species are endemic to the grasslands of South Africa and several are forest species, others are found more widespread. A total of 17 Endemic (including 5 Red Data species); 11 Near Endemic (including 2 Red Data species); 42 Red Data – species are included. The potential important species of the study area is listed in Table 5.

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Table 5 Red Data and Endemic birds that may be present in the study area. National Red Data listed birds according to Barnes (2000).

Scientific name Common name (p Roberts)	Habitat requirements	National Red Data and Endemic Status
<i>Aegypius occipitalis</i> Whiteheaded vulture (p492)	Dry woodland, arid savannah, often associated with Baobab trees.	VU
<i>Aegypius tracheliotos</i> Lappetfaced vulture (p491)	Open woodland in arid and semi-arid regions. <i>Acacia</i> , <i>Boscia</i> , <i>Terminalia</i> .	VU
<i>Alcedo semitorquata</i> Half collared kingfisher (p173)	Fast flowing streams; clear water and well-wooded banks; rapids. Broken escarpment terrain. Riverbanks to excavate nest tunnels.	NT (Sthrn A)
<i>Anastomus lamelligerus</i> Openbilled stork (p618)	Wetlands – floodplains, pans, marshes, ponds, steams, rivers, dams, lakes.	VU
<i>Anthropoides paradisea</i> Blue Crane (p309)	Karoo and grassland biome. Croplands.	VU
<i>Aquila ayresii</i> Ayre's eagle (p534)	Dense woodland and forest edges, often in hilly areas.	NT
<i>Aquila rapax</i> Tawny eagle (p529)	Woodlands, lightly wooded areas: needs trees.	VU
<i>Botaurus stellaris</i> Bittern (p602)	Tall, dense emergent vegetation within seasonal and permanent wetlands.	CR
<i>Bradypterus barratti</i> Barratt's warbler (p794)	Dense scrub, bracken ( <i>Pteridium</i> ), brambles and <i>Erica</i> heath.	(SA)
<i>Bucorvus leadbeateri</i> Southern ground hornbill (p158)	Grassland, savanna, woodland. From higher than 2000m in grassland with patches of forests and gorges to lowland <i>Mopane</i> woodland.	VU
<i>Buphagus erythrorhynchus</i> Redbilled oxpecker (p973)	Open savanna. Wide tolerance.	NT
<i>Buteo rufofuscus</i> Jackal Buzzard (p526)	Mountainous and hilly areas: grass and other short vegetation. Nests on cliffs and in trees.	(Sthrn A)
<i>Buteo trizonatus</i> Forest Buzzard (p523)	Afromontane forests and plantations. Occurrence potential may be encouraged by establishment of plantations.	(SA)
<i>Ciconia nigra</i> Black stork (p626)	Shallow water: streams, rivers, marshes, floodplains, coastal estuaries, large and small dams; dry land. Cliffs for breeding.	NT
<i>Cinnyris chalybeus</i> Double-collared sunbird (p988)	Fynbos to Afromontane forest and forest edge.	(SA)
<i>Circus macrourus</i> Pallid harrier (p502)	Grasslands associated with open pans and floodplains.	NT
<i>Circus ranivorus</i> African marsh harrier (p505)	Nests in extensive reedbeds; forage over reeds, lake margins, floodplains and woodland.	VU
<i>Columba delegorguei</i> Bronze-naped pigeon (p279)	Lowland, riverine forests. Restricted to mistbelt forest. No recent records for this region.	VU
<i>Cossypha dichroa</i> Chorister robin (p034)	Evergreen forest. Widespread.	(SA)
<i>Crithagra citrinipectus</i> Lemon-breasted canary (p1123)	Forest patches and adjoining <i>Protea</i> and <i>Passerina</i> woodland.	(SA)
<i>Dendropicor</i>	Evergreen forests and surrounding areas. Fairly common.	

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<i>grisocephalus</i> <i>grisocephalus</i> Olive woodpecker (p137)		(SA)
<i>Dricurus ludwigii</i> <i>ludwigii</i> Square tailed drongo (p683)	Evergreen forest, low to medium altitude. Fairly common.	(Sthrn A)
<i>Ephippiorhynchus senegalensis</i> Saddlebilled stork (p625)	Large rivers in open savanna, marshes, lake shores and flood plains.	EN
<i>Eupodotis barrowii</i> Whitebellied korhaan (p304)	Tall, fairly dense grassland: Open and lightly wooded areas.	VU (Sthrn A)
<i>Eupodotis melanogaster</i> Blackbellied Korhaan (p302)	Tall, fairly dense grassland in grassy savanna – hilly and flat areas with rainfall>600mm.	NT (SA)
<i>Falco biarmicus</i> Lanner Falcon (p556)	Open grassland and cleared woodland habitats. Cliff-nester, also in old nests in trees.	NT
<i>Falco naumanni</i> Lesser Kestrel (p545)	Semi-arid grassland. Avoid wooded areas; forage in agricultural fields. Grassy Karoo, Sweet and Mixed grassland, Central Kalahari vegetation types.	VU
<i>Falco peregrinus</i> Peregrine Falcon (p557)	Restricted to mountainous, riparian or coastal areas where high cliffs are available for nesting and roosting.	NT
<i>Geocolaptes olivaceus</i> Ground Woodpecker (p134)	Steep boulder strewn slopes, or cave sandstone regions – Alpine grasslands. Avoid dense vegetation.	(SA)
<i>Geronticus calvus</i> Southern Bald Ibis (p610)	High rainfall, sour and alpine grasslands – absence of trees, short dense grass sward. Montane grassland of Eastern Transvaal escarpment. Cliffs for breeding.	VU (SA)
<i>Gorsachius leuconotus</i> White-backed night heron (p598)	Clear and slow flowing rivers and streams with overhanging vegetation. Forested and woodland regions.	VU
<i>Gyps africanus</i> Whitebacked vulture (p488)	Drier woodlands, mopane, arid Kalahari; tall trees for roosting and nesting.	VU
<i>Gyps coprotheres</i> Cape Vulture (p489)	Both open country (grasslands) and woodland. Reliant on tall cliffs for breeding and roosting. Wanders widely.	VU
<i>Hirundo atrocaerulea</i> Blue Swallow (p752)	High rainfall montane grassland with streams forming shallow valleys, potholes and dongas, edges of marshes. Potholes, dongas, mine shafts and old excavations for nest sites.	CR
<i>Laniarius ferrugineus</i> Southern Boubou (p697)	Dense tangled undergrowth, thickets along watercourses in wide range of woodland types; all woodlands and forest types. Forests and exotic plantations. Grasslands – thickets along watercourses.	(Sthrn A)
<i>Leptoptilos crumeniferus</i> Marabou stork (p626)	Terrestrial and aquatic habitats, excluding desert and forests.	NT
<i>Lioptilus nigricapillus</i> Bush blackcap (p814)	Afromontane and mistbelt forests. Especially where fringed by <i>Leucosidea</i> and <i>Buddleja</i> .	(SA)
<i>Macronyx capensis</i> Orange-throated Longclaw (p1098)	Variety of grassland types at fairly high elevations. Not in bushveld; may occur in grassland adjacent to woodland. In association with wetlands. Moist grassland: near vleis and dams. Open countryside with thick grass.	(Sthrn A)
<i>Monticola explorator</i> Sentinel Rock-Thrush (p898)	Rocky uplands in grassland biome.	(SA)
<i>Mycteria ibis</i> Yellowbilled stork	Dams, large marshes, swamps, estuaries, margins of lakes and rivers, seasonal wetlands.	NT

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(p617)		
<i>Necrosyrtes monachus</i> Hooded vulture (p486)	Mesic savanna. Well developed woodlands with tall trees, e.g. Mopane, Jackal berry and Nyala tree.	VU
<i>Neotis denhami</i> Stanley's Bustard (p291)	Breeding: High rainfall sour grassveld, fairly high altitudes. Also cultivated pastures. Non-breeding: Lower-lying regions, grassland and woodland.	VU (SA)
<i>Nettapus auritus</i> Pygmy Goose (p99)	Inland wetlands, mainly in savanna, clear water and drifting vegetation especially water lillies.	NT
<i>Oenanthe bifasciata</i> Buff-streaked Chat (p947)	Sour grassland – rocky habitat on mountains, hills, ridges and escarpments (1500-1700). Avoids woodlands, including aliens.	(SA)
<i>Oenanthe monticola</i> Mountain chat (p948)	Rocky habitats in mountains, hills, koppies, scarps and boulder strewn level ground. Scrub or grass.	(SA)
<i>Phylloscopus ruficapilla</i> Yellow-throated warbler (p806)	Evergreen forest.	(SA)
<i>Ploceus capensis</i> Cape weaver (p1012)	Nests in reeds and bulrushes along rivers and dams.	(SA)
<i>Pnoenopterus minor</i> Lesser flamingo (p602)	Shallow eutrophic wetlands, saltpans and sheltered coastal lagoons.	NT
<i>Pnoenopterus ruber</i> Greater flamingo (p605)	Shallow eutrophic wetlands; breeds on pans and mudflats.	NT
<i>Pododica senegalensis</i> African finfoot (p314)	Forest and woodland areas: Streams and rivers lined with reeds, overhanging trees and shrubs. Avoids stagnant and fast flowing water. Perennial watercourses, clear water.	VU
<i>Poicephalus robustus</i> Cape parrot (p221)	Afromontane forests. Nests in Yellowwood ( <i>Podocarpus</i> ) trees. Feeds on fruiting trees and in orchards. Known records from Wolkberg to north.	EN (SA)
<i>Polemaetus bellicosus</i> Martial Eagle (p538)	Open grassland and scrub. Large trees for nests. Wide range of vegetation types: deserts, densely wooded and forested areas.	VU
<i>Prinia hypoxantha</i> Drakensberg Prinia (p846)	Rank grass and shrubs in valley bottoms, forest margins, and hillsides, along steam banks and rivers.	(SA)
<i>Promerops gurneyi</i> Gurney's sugarbird (p1001)	Montane shrub with <i>Protea</i> , <i>Aloe</i> and <i>Strelitzia</i> .	(SA)
<i>Rostratula benghalensis</i> Painted snipe (p380)	Exposed mud adjacent to cover. Marshes, muddy edges of swamps, lake edges, and riverbanks with thick vegetation cover.	NT
<i>Sagittarius serpentarius</i> Secretary bird (p542)	Open country: Savanna, open woodland, grassland and dwarf shrubland.	NT
<i>Sarothrura affinis</i> Striped flufftail (p319)	Dry upland grassland with trees e.g. <i>Protea</i> , <i>Leucosidea</i> , <i>Buddleja</i> .	VU
<i>Schoenicola brevirostris</i> Broadtailed warbler (p790)	Rank grassland in poorly drained areas. Grassy hillsides and tall coarse grasses along drainage lines.	NT
<i>Sigelus silens</i> Fiscal Flycatcher (p917)	Fairly open vegetation with trees or intermittent scrub.	(Sthrn A)
<i>Sphenoaecus afer</i> Cape Grassbird (p781)	Rank vegetation with long grasses, restios or ferns, in tangled scrub, low sparse shrubland and in hilly grasslands with scattered bushes. Avoids areas in which the woody component become too high or dense.	(Sthrn A)
<i>Spreo bicolor</i> Pied Starling (p968)	Open Karoo and grassland habitats. Open fields. Not found in wooded areas. Areas of broken ground.	(Sthrn A)
<i>Stephanoaetus coronatus</i> Crowned eagle (p541)	Forests and plantations, dense woodland. Forested gorges in grassland.	NT
<i>Tchagra tchagra</i> Southern tchagra (p694)	<i>Lantana</i> , <i>Pteridium</i> , <i>Acacia</i> stands.	(SA)
<i>Telophorus zeylonus</i> Bokmakierie (p700)	Karoo, Fynbos and grassland biomes: Scrubby habitat, low bushes in association with rocky outcrops. Avoid woodland types except Valley Bushveld. Edges of range: light mixed woodland and thorn savanna on stony	(Sthrn A)

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	ground.	
<i>Trochocerus cyanomelas</i> Crested fly catcher (685)	Afromontane, lowland, riverine forest.	(SA)
<i>Tyto capensis</i> African Grass owl	Rank grass and marshes are the preferred habitat. Usually in open habitat at fairly high altitudes.	VU
<i>Vanellus melanopterus</i> Black-winged plover (p415)	Short and burnt grassland; higher altitudes.	NT (SA)
<i>Zoothera gurneyi</i> Orange thrush (p901)	Moist afromontane forest. Favours small forests linear to deep drainage lines.	NT
<i>Zosterops pallidus</i> Cape White-eye (p822)	Catholic choice of habitat: Evergreen and coastal forests, fynbos, riverine bush, thickets. Drainage lines. Wooded areas in grassland and alien plantations.	(Sthrn A)

Abbreviations as follows: CR=critically endangered; EN=endangered; VU=vulnerable; T=threatened; NT=near threatened; LC=least concern; DD=data deficient. Endemic status (SA = South Africa; Sthrn A = Southern Africa):

None of the important species were recorded on site during the present survey and most of the sensitive species have a low potential of being present due to the impacts on or near the site. The anticipated impacts on these taxa and their habitats are assessed in section 6.

### 5.4 Mammals

Several species of small to large sized mammals will utilize the natural habitats on the property. Twenty three mammals categorized as Red Data may be found in the study area. A further 16 species are listed as “Data Deficient” (DD). It should be noted that “Data Deficient” is not a category of threat. A taxon is listed in this category when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status (Friedman & Daly 2004). Important mammals are given in Table 6.

Table 6 Red Data listed mammals of the study area and their occurrence potential (Friedman & Daly, 2004)

Classification	Habitat	Status
<b>Order: Insectivora</b>		
<b>Family: Soricidae</b>		
Dark-footed forest shrew ( <i>Myosorex cafer</i> )	Montane grasslands; wet sponges in mistbelt. Dense scrub and grass in damp areas fringing mountain streams.	Data Deficient
Forest shrew ( <i>Myosorex varius</i> )	In moist, densely vegetated areas; burrows under rocks and uses rodent burrows Dense grass along streams.	Data Deficient Endemic
Swamp musk shrew ( <i>Crocidura mariquensis</i> )	Moist habitats, thick grass along riverbanks, in reedbeds and in swamp.	Data Deficient
Reddish-grey musk shrew ( <i>Crocidura cyanea</i> )	Dry terrain: Among rocks, in dense scrub and grass. Grassland and thick shrub bordering streams. Wet vleis with good grass cover.	Data Deficient
Peter's musk shrew ( <i>Crocidura gracilipes</i> )	Coastal forest, savanna woodland, montane evergreen forest, montane communities, grassland: under trees, in old timber, under rocks and stones.	Data Deficient
Greater red musk shrew ( <i>Crocidura flavescens</i> )	Broken country with a dense cover of vegetation, areas of decaying leaf litter in damp places, thick undergrowth in vleis or along the banks of streams.	Data Deficient

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Tiny musk shrew ( <i>Crocidura fuscomurina</i> )	All latitudes, wide tolerance. Terrestrial. Cover such as debris, fallen trees, wood piles or dense grass clumps.	Data Deficient
Lesser red musk shrew ( <i>Crocidura hirta</i> )	In damp situations along rivers and streams. Low bushes, dense undergrowth, piles of debris and fallen logs.	Data Deficient
Lesser grey-brown musk shrew ( <i>Crocidura silacea</i> )	Catholic in habitat requirements; damp places	Data Deficient
Least dwarf shrew ( <i>Suncus infinitesimus</i> )	Commonly associated with termitaria. Terrestrial.	Data Deficient
Lesser dwarf shrew ( <i>Suncus varilla</i> )	Broad tolerance. Reliant on termite mounds.	Data Deficient
Greater dwarf shrew ( <i>Suncus lixus</i> )	Broad tolerance.	Data Deficient
<b>Family: Chrysochloridae</b>		
Rough-haired golden mole ( <i>Chrysofalax villosus</i> )	Grassland, dry ground on the fringes of marshes or damp vleis. Excavate burrows; loose piles of soil.	Critically Endangered Endemic
Hottentot golden mole ( <i>Amblysomus hottentotus meesterii</i> )	Grassland, soft ground. Sandy soils or sandy loam, live in burrows.	Data Deficient Endemic
<b>Order: Chiroptera</b>		
<b>Family: Hipposideridae</b>		
Short-eared trident bat	Caves, savanna, mixed woodland	Critically Endangered
Sundevall's leaf-nosed bat ( <i>Hipposideros caffer</i> )	Caves, savanna	Data Deficient
<b>Family: Vespertilionidae</b>		
Schreibers' long-fingered bat ( <i>Miniopterus schreibersii</i> )	Cave dweller : Caves and subterranean habitats. Wide range of vegetational association.	Near threatened
Lesser long-fingered bat ( <i>Miniopterus fraterculus</i> )	Forest, savanna, wide variety habitats. Cave dweller.	Near threatened
Temminck's hairy bat ( <i>Myotis tricolor</i> )	Savannah woodland: Cave dweller- availability govern distribution.	Near threatened
Welwitsh's hairy bat ( <i>Myotis welwitshii</i> )	Savannah, dry tropical. Roosts in shrubs and trees.	Near threatened
Rusty bat ( <i>Pipistrellus rusticus</i> )	Savanna woodland: riverine associations.	Near threatened
Lesser woolly bat ( <i>Kerivoula lanosa</i> )	Savanna, riparian woodland, roosts in unused bird nests	Near threatened
<b>Family: Rhinolophidae</b>		
Geoffroy's horseshoe bat ( <i>Rhinolophus clivosus</i> )	Savannah woodland: Forest fringes. Caves, rock crevices.	Near threatened
Darling's horseshoe bat ( <i>Rhinolophus darlingi</i> )	Savannah woodland. Caves, rock crevices. Caves.	Near threatened
Lander's horseshoe bat ( <i>Rhinolophus landeri</i> )	Savannah woodland, tropical moist areas. Forest fringes. Caves, rock crevices.	Near threatened
Ruppel's horseshoe bat ( <i>Rhinolophus fumigatus</i> )	Savannah woodland. Caves, rock crevices. Caves.	Near threatened
Hildebrandt's horseshoe bat ( <i>Rhinolophus hildebrandtii</i> )	Savannah woodland. Caves, rock crevices. Caves.	Near threatened
<b>Order: Carnivora</b>		
<b>Family: Protelesidae</b>		
Aardwolf ( <i>Proteles cristatus</i> )	Savannah woodland and grassland. Nocturnal, solitary. Termites.	Protected
<b>Family: Hyaenidae</b>		
Brown hyaena ( <i>Hyaena brunnea</i> )	Semi-desert, rocky grassland: open scrub and open woodland savanna. Nocturnal.	Near threatened
<b>Family: Felidae</b>		
Serval ( <i>Felis serval</i> )	Proximity to water; tall grass	Near

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		threatened
<b>Family: Canidae</b>		
Side-striped jackal ( <i>Canis adustus</i> )	Savanna and well-watered conditions; tall grass.	Near threatened
<b>Family: Mustelidae</b>		
Spotted-necked otter ( <i>Lutra maculicollis</i> )	Aquatic: Rivers, lakes, swamps and dams, extensive areas of open water.	Near threatened
Cape clawless otter ( <i>Aonyx capensis</i> )	Aquatic: Rivers, lakes, swamps and dams. Widespread.	Protected
African weasel / Striped weasel ( <i>Poecilogale albinucha</i> )	Savannah: Moist grassland. Litters born in burrows.	Data Deficient
Honey badger ( <i>Mellivora capensis</i> )	Widespread. Not in desert. Most habitats.	Near threatened
<b>Family: Viveridae</b>		
Meller's mongoose ( <i>Rhynchogale melleri</i> )	Montane and tall grassland areas.	Data Deficient
<b>Order: Tubulidentata</b>		
<b>Family: Orycteropodidae</b>		
Aardvark / Antbear ( <i>Orycteropus afer</i> )	Widespread. Wide habitat tolerance. Open woodland, scrub and grassland.	Least Concern Protected
<b>Order: Pholidota</b>		
<b>Family: Manidae</b>		
Pangolin ( <i>Manis temminckii</i> )	Grassland, shrubland, savannah. Reliant on termites.	Vulnerable Protected
<b>Order: Artiodactyla</b>		
<b>Family: Bovidae</b>		
Blesbok ( <i>Damaliscus dorcas phillipsi</i> )	Grasslands: Highveld grasslands where water is available.	Endemic
Grey rhebok ( <i>Pelea capreolus</i> )	Rocky hills & mountain slopes and plateaus with good grass cover.	Endemic Protected
Oribi ( <i>Ourebia ourebi</i> )	Open habitat. Open grassland, flood plain; sparse scattering of trees.	Endangered Protected
Klipspringer ( <i>Oreotragus oreotragus</i> )	Rocky outcrops through all biomes	Protected
<b>Family: Bathyergidae</b>		
Cape Molerat ( <i>Georychus capensis</i> )	Sandy coastal dunes as well as unconsolidated soils along rivers.	Endemic
<b>Family: Muridae</b>		
Water rat ( <i>Dasymys incomtus</i> )	Swamps, wet vleis and reed beds along rivers.	Near threatened
Single striped mouse ( <i>Lemniscomys rosalia</i> )	Grassland, fallow fields.	Data Deficient
<b>Family: Gliridae</b>		
Rock Dormouse ( <i>Graphiurus platyops</i> )	Near or on rocky outcrops. Association with dassies.	Data Deficient
<b>Order: Lagomorpha</b>		
<b>Family: Leporidae</b>		
Natal red rock rabbit ( <i>Pronolagus crassicaudatus</i> )	Grassland. Rocky habitat: Rocky terrain or boulder-strewn areas.	Least concern Endemic
Hewitt's red rock rabbit ( <i>Pronolagus saundersiae</i> )	Grassland. Top of rocky outcrops	Least concern Endemic

A total of 19 Data Deficient (including 2 Endemic species); 23 Red Data; 8 Endemic and 11 Protected species are included with Table 6. Of these 18 species are categorized as Data Deficient (1 Endemic); 7 Endemic; 17 Red Data; 9 Protected; may be affected by



the proposed activities. However, none of the important species were recorded on site during the present survey and most of these species have a low potential of being present due to the impacts on and near the site.

### 5.5 Limitations to Fauna Report

The faunal survey was not a comprehensive specialist survey but rather an overview of the available habitats and their potential to be utilized by fauna. However, representative samples of the habitats were well searched for fauna actually present as well as field signs of fauna present. No nocturnal surveys were done.

## 6. Discussion and Impact Assessment

### 6.1 Sensitivity rating

The results of the biodiversity investigation indicate that although much of the sites are actually transformed, with no natural habitat remaining, there are also highly significant natural areas remaining. The sensitivity zoning (based upon natural integrity, fauna potential and ecological functions) for the different ecological communities are delineated in Fig. 1 and summarized as follows:

<b>Vegetation Community</b>	<b>Sensitivity Rating</b>
Natural grassland	Medium
Seepage wetlands	High
Degraded and transformed land	Low

The ecological integrity and functions of the natural grassland can only be improved by formally and physically protecting the site from the relevant impacts. This will be highly unlikely and it can be assumed that the informal settlements will eventually invade the total extent of site. As this development is a logical extension of the township and the fact that lesser sensitive alternative sites for this development are not available, it can be recommended that the natural grassland is also considered for the development (given special precautionary mitigation measures). Development of the township will ensure that adequate services provision is available and that the township is developed in a formal manner, minimizing the negative social and environmental impacts associated with informal settlements.

### 6.2 Impact Assessment

Due to both (negative) ecological as well as (positive) socio-economic impacts that the development will create, it is important that the potential impacts are objectively evaluated according to the findings of the sensitivity analyses. It can be assumed that

the following impacts already have significant negative affects on the natural environment of the development site:

- Pollution originating from the existing township.
- Encroaching informal settlements on the western section without services provision. The following impacts will result from this activity:
  - Pollution and littering due to a lack of refuse removal;
  - Pollution due to untreated sewage;
  - Spreading of weeds;
- A formal cemetery is also present in the study area which may result in groundwater pollution of the western wetland;
- Relatively large herds of (communal) cattle use the sites for grazing.
- It is evident that people are constantly hunting with dogs in the natural grassland which will have a significant impact on the presence of fauna on site.

Due to the abovementioned present impacts it can be assumed that the floral and faunal assemblages on site have already been negatively affected. As result it is likely that species that are vulnerable to these impacts have already disappeared from the remaining natural habitats on site. The remaining assemblages can thus be regarded as being in an impoverished state of biodiversity.

The major anticipated impact on biodiversity is the loss and fragmentation of habitat which means the loss of living space (habitat) for animals and natural vegetation alike. If adequate mitigation and conservation of natural habitats are prerequisites for the development, fauna and flora will be able to continue to use the natural habitats on site. However, if this is not the case biodiversity will be lost – a scenario which cannot be reversed. Potential development impacts on the natural and ecological aspects of the environment and their magnitude and significance, as well as mitigation measures are given in Table 7.

Table 7 Impact assessment and mitigation measures

Nature of impact	Duration	Intensity	Probability	Significance before mitigation	Mitigation measures	Significance after mitigation
Loss of plants and habitats	Long term	Medium	Definite	High	<ul style="list-style-type: none"> <li>Conserve the remaining natural habitats in the surrounding area.</li> <li>Educate the community on the importance of biodiversity and the conservation thereof.</li> </ul>	Medium
Loss of important flora species	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>As above.</li> <li>Identify and relocate important species and individuals before and during construction.</li> </ul>	Low
Increased levels of alien invasive plants due to disturbance	Long term	High	Definite	Medium	<ul style="list-style-type: none"> <li>Implement weed control program in natural and developed areas.</li> <li>Use only indigenous flora for landscaping.</li> </ul>	Low
Changes to and fragmentation of habitats	Long term	Medium	Definite	High	<ul style="list-style-type: none"> <li>Follow all above measures.</li> <li>Construction methods must be respectful of the environment.</li> </ul>	Medium
Loss of general terrestrial fauna	Long term	Medium	Definite	Medium	<ul style="list-style-type: none"> <li>Conserve the remaining natural habitats off site.</li> </ul>	Low
Loss of important and rare terrestrial fauna	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>Conserve remaining natural habitats off site.</li> <li>Identify and relocate important species and individuals before and during construction.</li> </ul>	Low
Impacts on important and rare avifauna	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>Conserve remaining natural habitats off site.</li> <li>Use only indigenous flora for landscaping.</li> </ul>	Low
Negative impacts on wetlands	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>It is not anticipated that the wetlands will be physically affected by the development</li> <li>Conserve the relevant wetland areas as recommended in this report (Fig. 2).</li> </ul>	Low

## 7. Recommendations

The total site areas can be considered for development, given that the following recommendations and mitigation measures are followed:

### **Wetland**

- It is not anticipated that the wetlands will be physically affected by the development.
- The wetland is of *High* biodiversity significance and must be conserved.
- A buffer zone of 50m to both sides of the wetland is recommended to mitigate impacts on the wetland area. The buffer zone has to be added to the delineated area in Fig.1.

### **Natural grassland**

- This area is of *Medium* biodiversity significance (northern area earmarked for Extension 5) and special mitigation measures must be followed before development can commence:
  - The affected area must be searched before and during construction by specialists in order to identify and remove important and rare fauna & flora.

### **General recommendations**

Additionally, the following measures must be included with the management plan:

- Use only indigenous flora for landscaping;
- Implement an alien invader vegetation control program;

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# **APPENDIX 1: MAPS**



## **APPENDIX 2: ILLUSTRATIONS**