



*SPECIALIST BIODIVERSITY REPORT*

**DRAFT**

**Biodiversity & Habitat Report**  
(Including Terrestrial & Wetland Habitats)

**Ptn 13 Zoekop 426JS; Ptn 13 Leeuwbank 427JS; Remainder of  
Paardeplaats 425JS, Belfast, Mpumalanga Province**

Prepared for

**AURECON**  
**Project No: 112407**

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March 2016

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## **Specialist declaration**

I, Danie van der Walt, declare that -

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

L.D. VAN DER WALT

Date: 2016-03-28

## Executive Summary

The proposed development site is located to the north of the N4 Highway between Belfast and Wonderfontein. The development project entails the resettlement of a small community to provide housing for people whom will be relocated by a mining company. The total site is approximately 56Ha in extent of which 9Ha is proposed for the development. Small sections of the land are classified by the Mpumalanga Biodiversity Sector Plan and subject to the LN3 EIA listings as sensitive, necessitating a Biodiversity Assessment in support of the EIA process.

### Background

Classified on a regional scale the site is classified as *Eastern Highveld Grassland* (Gm12). Only small fragments of *Eastern Highveld Grassland* are officially conserved and 44% has been transformed. For this reason this grassland type is rated as *Endangered*. The Mpumalanga Biodiversity Sector Plan (MTPA, 2014) and LN3 ratings for the site are summarized as follows:

- Terrestrial biodiversity maintenance:  
*Critical Biodiversity Area*  
*Heavily or Moderately Modified Areas*
- Aquatic biodiversity:  
*Highly Significant*
- LN3:  
*Critical Biodiversity Area*  
*Aquatic Ecological Support Area*

The extreme northern section of the property is indicated as *other natural areas* according to the Mpumalanga Biodiversity Sector Plan (MTPA, 2014). The sector plan and LN3 ratings for the site are summarized as follows:

- Terrestrial biodiversity maintenance: *Other natural areas*  
*Heavily or Moderately Modified Areas*
- Aquatic biodiversity: *Irreplaceable*
- LN3: *Aquatic ecological support area*  
*Ecological support area*

### Site description

The property is located immediately to the north of the railway line and is bordered by cultivated lands to the east and west. The vegetation consists of plantations of exotic trees and natural vegetation that is invaded by exotic trees as well as old plantations and fragments of natural grassland. Small wetland areas are present. The topography is relatively flat with a slight decline to the west and north. No outcrops are present. Two RDL flora species were recorded. The results of the biodiversity investigation indicate that the natural habitats on site have been fragmented as result of human induced impacts. Large sections have been transformed to Eucalyptus plantations and/or are in a state of recovery to pioneer grassland. The sensitivity ratings (based upon floral integrity, fauna potential and ecological functions) for the different habitats are summarized as follows:

<b>Vegetation Community</b>	<b>Sensitivity Rating</b>
Eucalyptus plantations and transformed land	Low
Disturbed land & pioneer grassland	Low - Medium
Fragmented grassland	High
Wetland zones	Medium - High

### Recommendations

The single most important impact on biodiversity is the loss and fragmentation of natural habitats which has already occurred as result of the historic transformation and degrading of the land. The biodiversity

and impact assessment concludes that the footprint area for the proposed development site is of *Low – Medium* biodiversity and sensitivity value and can be recommended for development on condition that the mitigation measures and recommendations will be enforced. Wetland areas are located nearby the site and the operational phase of the proposed development may indirectly affect these habitats negatively if strict buffer zones and mitigation are not enforced. The final layout and activities must be planned to accommodate these objectives:

- It is recommended that the remaining natural habitat and wetlands are not considered for development;
- Development areas must be planned to make use of already disturbed areas;
- Search for- and rescue important taxa before commencing with site preparation.
- The wetland zones must be considered for development and must be protected by at least a 15m buffer.

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

- Use only indigenous flora for landscaping;
- Implement an alien invader plant control program;
- Topsoil must be protected and stabilized.
- The wetland and aquatic ecosystems must be protected and monitored for any signs of degradation/pollution or negative impacts arising from the construction and operational phases.

## CONTENTS

1. Introduction .....	7
1.1 Objectives .....	7
1.2 Specialist report requirements.....	7
2. Methods and Reporting .....	7
2.1 Assumptions, uncertainties and limitations.....	7
2.2 General .....	8
2.3 Vegetation & habitats .....	8
2.4 Terrestrial Fauna .....	8
2.5 Ecological importance and sensitivity rating of habitats .....	9
3. Background Information .....	10
3.1 Biophysical description of the study area .....	10
3.2 Ecology & biodiversity .....	10
3.3 Conservation & Importance .....	10
4. Vegetation report and general biophysical descriptions .....	11
4.1 Site description.....	11
4.2 Occurrence of important flora species.....	13
5. Terrestrial Fauna Report .....	15
5.1 Amphibians.....	15
5.2 Reptiles .....	16
5.3 Bird distribution in the study area .....	17
5.4 Mammals.....	20
5.5 Invertebrates .....	23
6. Discussion and Impact Assessment.....	24
6.1 Sensitivity rating .....	24
6.2 Impact Assessment .....	25
7. Recommendations .....	18

## **LIST OF TABLES**

Table 1: Criteria used for sensitivity rating of habitats .....	9
Table 2: National Red Data Listed plants of the study area (recorded taxa are indicated with red font). .....	14
Table 3: Alien vegetation, weeds and exotics, CARA categories are indicated where applicable .....	14
Table 4: Important frogs of the study area.....	15
Table 5: Important reptiles of the study area.....	16
Table 6: Red Data Listed birds that may be present in the study area. National Red Data Listed birds according to Barnes (2000). .....	17
Table 7: Red Data listed mammals of the study area (Friedman & Daly, 2004).....	21
Table 8: Impact assessment and mitigation measures.....	17

## **APPENDIXES**

- Appendix 1: Specialist Details
- Appendix 2: Maps
- Appendix 3: Illustrations

# **1. INTRODUCTION**

## **1.1 Objectives**

The proposed development site is located to the north of the N4 Highway between Belfast and Wonderfontein. The development project entails the establishment of a small township to provide housing for people whom will be relocated by a mining company. The total site is approximately 56Ha in extent of which 9Ha is proposed for the development. Small sections of the land are classified by the Mpumalanga Biodiversity Conservation Sector Plan and subject to the LN3 EIA listings as sensitive, necessitating a Biodiversity Assessment in support of the EIA process. The terms of reference for this biodiversity investigation were to identify and assess the following aspects:

- 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;

For the purposes of this report, the site was investigated on 2016-03-12/15.

## **1.2 Specialist report requirements**

With reference to Appendix 6 of the EIA regulations (2014) the specialist declaration is included on page 2 of this report and details and the specialist's curriculum vitae are included with Appendix 1.

# **2. METHODS AND REPORTING**

## **2.1 Assumptions, uncertainties and limitations**

The results and recommendations of the report are based on the actual site status. Assumptions that are made and uncertainties that are encountered are indicated in the report (where applicable). As indicated under the relevant sections in the report consultation of authorities' data bases forms part of this report. However, the scope of work for this specialist report does not include public participation.

## **2.2 General**

The author relied on aerial images and ortho photos to remotely assess the site preliminary to the actual on site investigation in order to get familiarized with the different features and vegetation communities (habitats) present within the affected areas. The information thus gathered was used for selecting survey sites and to identify possible sensitive areas. Problematic, as well as potential sensitive areas were identified during the site assessment and these were thoroughly 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. Illustrations of the environment and typical habitats are included in Appendix 3 as attached.

## **2.3 Vegetation & habitats**

Floral diversity was determined by completing survey transects and sample sites along all the different habitats within the physiographic zones represented in the study area (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 a unit's diagnostic floral feature and/or topographical setting or other biophysical features (or a combination of several descriptive features). A wetland study of the property was conducted by GroundTruth (2016) and was used as reference for the wetland habitats of this report. For the purposes of this report, wetland habitats were classified and delineated by using vegetation indicators and its morphological features only (soil sampling and classification were not performed).

By combining the available literature with the results of the vegetation investigation, stratification of vegetation communities were 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 (POSA) as obtained from the SANBI data base. The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The vegetation and habitats are described on a local level in section 4 of this report.

## **2.4 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 searched for fauna and habitats were identified during the vegetation surveys so as to establish the faunal potential of a particular area. The fauna potential is discussed in section 5 of this report.



## 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, High* and *Very 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**

<b>Ecological Importance/Biodiversity Value</b>	<b>Sensitivity Rating</b>
<b>Terrestrial and Riparian Communities</b>	
Natural communities (habitats and ecosystems) that are regarded as pristine or largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged and the community is regarded as very important for the maintenance of biodiversity and rare and important taxa are present (e.g. occurrence of RDL, Endemic and/or Protected species). The local area is an important ecological support area and any external impacts will have a significant negative effect on its status.	<i>Very High</i>
Natural communities (habitats and ecosystems) 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.	<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 study area is located in the grassland biome on the south eastern Mpumalanga Highveld (quarter degree grid 2530CA). The landscape consists of undulating plains, including low hills, pan depressions and numerous small streams. The vegetation is short dense grassland dominated by typical Highveld grasses, scattered rocky outcrops vegetated with trees are also present. Sandy soils are predominant. Rainfall occurs mainly in the summer and winters are very dry. Mean annual precipitation varies between 650-900mm.

#### 3.2 Ecology & biodiversity

On a national level, the study area is situated within the Grassland Biome, and is classified by Acocks (1953) as Northeastern Mountain Sourveld (A8) and as Moist Sandy Highveld Grassland (LR38) by Low & Rebelo (1998). Classified on a regional scale and according to a more detailed system the site is classified as *Eastern Highveld Grassland* (Gm12), 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). Only small fragments of *Eastern Highveld Grassland* are officially conserved and 44% has been transformed. For this reason this grassland type is rated as *Endangered* (Mucina & Rutherford, 2006).

#### 3.3 Conservation & Importance

The Mpumalanga Biodiversity Sector Plan (MTPA, 2014) and LN3 ratings for the site are projected in Appendix 2 and summarized as follows:

- Terrestrial biodiversity maintenance: *Critical Biodiversity Area  
Heavily or Moderately Modified Areas*
- Aquatic biodiversity: *Highly Significant*
- LN3: *Critical Biodiversity Area  
Aquatic Ecological Support Area*

These ratings are verified in this report and has been discussed in section 6.

## 4. VEGETATION REPORT AND GENERAL BIOPHYSICAL DESCRIPTIONS

### 4.1 Site description

The property is located immediately to the north of the railway line and is bordered by cultivated lands to the east and west. The vegetation consists of plantations of exotic trees and natural vegetation that is invaded by exotic trees as well as old plantations and fragments of natural grassland. Small wetland areas are present. The topography is relatively flat with a slight decline to the west and north. No outcrops are present. Illustrations of the site are included with Appendix 3.

The biophysical features and habitat assemblage of the study area are projected on an aerial image (Figure. 1) and are described in the following sections.

#### ***i) Eucalyptus plantations and transformed land***

It is evident that a large extent of the site has been planted with *Eucalyptus* in the historic past. Large sections of these plantations have been removed over time and presently small to large fragments of plantations remain. *Eucalyptus spp* are known to make the soils in their immediate vicinity sterile for the growth of most indigenous flora and furthermore is not used by fauna as a source of food or biological functions. These plantations are not important for the maintenance of biodiversity and have a *Low* ecological importance.

Other disturbed areas include the historic dwelling/settlement area as well as earthen dams that have been constructed in the southern section. Exotic vegetation present at the dwelling area includes fruit trees (*Prunus spp*), the invasive grass (*Pennisetum clandestinum*) as well as sisal (*Agave sp*). The affected wetland zones are discussed under heading (iii) of this section.

#### ***ii) Disturbed land and pioneer grassland***

This component represents most of the eastern half of the property where evidently *Eucalyptus* plantations were historically present. Indicators of the old plantations are the remaining stumps of cut trees. Vegetation indicators of the disturbed nature of the land are the presence of pioneer (and increaser) grasses, invasive vegetation and the absence of climax grasses and geophytic vegetation. Pioneer and increaser grasses present are *Aristida junciformis*, *Aristida canescens*, *Paspalum dilatatum*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Cynodon dactylon* and *Pennisetum clandestinum*. The incidence of forbs and wild flowers is low and is indicative of the disturbed nature of this zone. The invasive forbs *Stoebe vulgaris*, *Hypochaeris radicata* and *Richardia brasiliensis* are present in large numbers. No RDL flora species were recorded. This habitat provides limited ecological functions and is in a positive state of recovery and is of *Low - Medium* ecological importance.

**iii) Fragmented grassland**

A relatively small fragment of natural grassland is present on the north western section. This grassland fragment is rather isolated as the agriculture activities to the north, plantation and railway to the south and east. These impacts compromise ecological connectivity with similar grassland communities further afield. The assemblage of grasses differs significantly from those present in the last mentioned area. It is dominated by the sub climax grasses *Hyparrhenia hirta*, *Heteropogon contortus* and *Panicum ecklonii*. Common grassland forbs and wild flowers are present; these include *Dicoma anomala*, *Ledebouria ovatifolia*, *Helichrysum allioides*, *Berkheya setifera*, *Oxalis obliquifolia*, *Hermannia transvaalensis*, *Acalypha angustata* and the succulent mesemb, *Delosperma lydenburgense* (Endemic). Geophytes present are *Hypoxis rigidula*, *Gladiolus crassifolius* and a single example of *Boophane disticha* (Red Data Listed) was recorded.

Under natural circumstances this community will provide habitat to a diverse range of fauna and flora and several RDL species can be expected (section 4.2 and section 5). However, the relatively small size (fragmented habitat), the nearby presence of humans (and surrounding activities) will have a negative effect on the diversity of biota present on the site and it has a *High* sensitivity rating.

**iv) Wetland and poorly drained zones**

Four zones were identified that are typified by hygrophilous vegetation, all of which cannot be classified as wetlands, as permanent wet zones are not present. The largest zone is present on the central southern section and has been severely modified as result of dam construction and excavations. No permanent source of water is present and it is not classified as wetland but rather as a poorly drained area. This zone is typified by the hygrophilous grasses *Andropogon eucomus* and *Eragrostis lehmanniana* (indicators of poorly drained soils). *Cynodon dactylon* and *Eragrostis aspera* are dominant on the severely disturbed areas. *Acacia mearnsii* has formed a thicket on the walls of the large dam that is present in this zone. This zone has a *Low - Medium* ecological/biodiversity importance.

Wetland zone 1 is situated on the western perimeter of the study site is divided by the adjoining property. It has been completely modified to agriculture lands on the adjoining property. It has been modified by the excavation of channels that drain it towards the west and evidently the historic plantations also encroached into it in the past. No flow or surface water was present at the time of the investigation. Wetland indicator vegetation in the temporary zone includes the grasses *Andropogon eucomus* (dominant), *Paspalum scrobiculatum* and *Eragrostis capensis*. Vegetation indicators in the seasonal seepage zone include the grasses *Setaria sphacelata*, *Ischaem fasciculatum* *Paspalum urvillei* and the sedges *Schoenoplectus corymbosus*, *Juncus effusus* *Eleocharis limosa* and *Kyllinga alata*.

Wetland zone 2 is located to the east and comprises a small seasonal seepage zone that drains into a northerly direction. This zone has been modified by excavation and damming in order to provide water for livestock. Vegetation indicators are similar to the zone 1 and no flow or surface water was present at the time of the investigation. Invasive vegetation present in this zone is *Eucalyptus sp*, *Populus alba*, *Pennisetum clandestinum*, *Cynodon dactylon*, *Hypochaeris radicata* and *Verbena bonariensis*.

Under natural circumstances the above-mentioned wetland zones would have been highly sensitive and important to the general ecology of the local area. However, due to the present and historic impacts, these habitats lost most of its function in maintaining biodiversity and ecological functions has therefore been compromised. It is therefore given a *Medium* sensitivity rating. However, these wetland zones remain important hydrological functions.

Wetland zone 3 is situated on the eastern section within the fragment of natural grassland. It is located in a depression and it is the smallest wetland zone but also the least disturbed although a well has been excavated in order to provide water. Typical wetland vegetation is not as pronounced as in the other larger zones and include similar grasses but also include the forbs *Eucomis autumnalis* (RDL), *Lobelia erinus* and *Monopsis decipens*. The presence of these species are possibly indicative of a more natural environment. Larger sedges are absent due to the temporary nature of this zone. It is evident that this zone still maintains biodiversity and it provides an ecological function in its local natural grassland setting. For these reasons it has a *High* ecological sensitivity 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, PRECIS data download) list the Red Data species for the relevant grid area (Table 2). Two RDL species were recorded.

**Table 2: National Red Data Listed plants of the study area (recorded taxa are indicated with red font).**

Family	Scientific Name	National RDL Status
AMARYLLIDACEAE	<i>Boophane disticha</i> (L.f.) Herb.	Declining
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>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)	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
MESEMBRYANTHEMACEAE	<i>Khadia carolinensis</i>	VU
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

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 and spreading of such species are regulated by these Acts. Several important exotic/invasive species are present (Table 3).

**Table 3: Alien vegetation, weeds and exotics, CARA categories are indicated where applicable**

Scientific Name	Status	Recorded
<i>Cirsium vulgare</i>	Category 1 weed	Disturbed land/Wetlands
<i>Datura stramonium</i>	Category 1 weed	Disturbed land
<i>Pyracantha angustifolia</i>	Category 3 invader	Disturbed land/Wetland
<i>Ricinus communis</i>	Category 2 invader	Disturbed land/Wetland
<i>Eucalyptus</i> sp	Category 2 invader	Disturbed land/Wetland
<i>Pinus</i> sp	Category 2 invader	Disturbed land Fragmented grassland
<i>Acacia mearnsii</i>	Category 2 invader	Disturbed land/Wetland
<i>Pennisetum clandestinum</i>	Naturalized/weed	Disturbed land/Wetland
<i>Amaranthus viridis</i>	Naturalized/weed	Disturbed land/Wetland

<i>Conyza albida</i>	Naturalized/weed	Disturbed land/Wetland/ Fragmented grassland
<i>Tagetes minuta</i>	Naturalized/weed	Disturbed land/Wetland
<i>Bidens pilosa</i>	Naturalized/weed	Disturbed land/Wetland
<i>Plantago minora</i>	Category 1 weed	Disturbed land Fragmented grassland

## 5. TERRESTRIAL FAUNA REPORT

The fauna investigation 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 investigated for the presence of fauna. No nocturnal surveys were conducted.

### 5.1 Amphibians

The potential important frog assemblage for the study area is diverse but none of these has Red Data status and six are endemic/near endemic species (Table 3).

**Table 4: 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>Bufo rangeri</i> Raucous frog	Savanna, grassland, thickets,	78	Least Concern Endemic
<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>Afrana angolensis</i> Cape river frog	Grassland, fynbos. Permanent ponds, springs, dams.	273	Least Concern Endemic
<i>Strongylopus grayii</i> Clicking stream frog	Widespread and variety of habitats. Tolerant.	311	Least Concern Endemic Sthrn A

None of these taxa were recorded on site during the present survey but several of these species may utilize the natural habitats on the site and has the potential of being present. Fragmentation and degradation will negatively impact these species the most. This development will have a small ecological footprint and with correct site selection it is not anticipated that it will have a significant impact on this taxon if the natural habitat and adequate buffer zones are conserved.

## 5.2 Reptiles

The literature review indicates that a diverse group of reptiles may utilize the larger study area. The study area, possess 18 endemic and near endemic species all of which have the potential of being present in the study area (Table 5).

**Table 5: Important reptiles of the study area.**

Name	Habitat description	Status
<i>Acontias breviceps</i> p132 Shortheaded limbless skink	Montane grasslands.	Endemic
<i>Agama atra atra</i> p214 Southern rock agama	Rock outcrops and mountain plateaus including escarpment mountains.	Endemic
<i>Chamaesaura aenea</i> p185 Transvaal grass lizard / snake lizard	Grass-covered mountain slopes and plateaus: Long grass.	Endemic
<i>Cordylus vittiger vittiger</i> p195 Transvaal girdled lizard	Grassland: In cracks in small rock outcrops. Rocky outcrops in bushveld, open woodland, grassland crevices, under rocks.	Endemic
<i>Elapsoidea sundevallii media</i> p106 Highveld garter snake	Varied: coastal forest, Highveld grassland, arid and mesic savannah. 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
Olive house snake ( <i>Lamprophis inornatus</i> )	Moist coastal bushveld and fynbos, extending into grassland of escarpment.	
Common slug eater ( <i>Duberria lutrix lutrix</i> )	Grassland and savannah.	Endemic Protected
Thintailed legless skink ( <i>Acontias gracilicauda</i> )	Mesic thicket and grassland. Compact moist soils.	Endemic
<i>Pachydactylus vansonii</i> p262 Van Son's thicktoed gecko	Land type: Varied – karroid veld, grassland and mesic savannah. Terrestrial; inhabits rocky outcrops and more frequently found under rocks or logs on soil; disused termitaria.	N-Endemic
Ocellated dwarf gecko ( <i>Lygodactylus ocellatus</i> )	Rocky areas on exposed slopes and mountains.	Endemic
<i>Psammophylax rhombaeus</i> p88 Spotted skaapstekker	Highveld grassland.	Endemic
Mountain grass snake ( <i>Psammophis crucifer</i> )	Large mountain ranges of region. Mountain streams and vleis: Reed beds and damp grassland.	Endemic
<i>Pseudocordylus melanotus</i> p206 Drakensberg crag lizard	Rock outcrops on mountain plateaus and in rolling grassland: rock crevices.	Endemic
<i>Typhlops bibroni</i> p55 Bibron's blind snake	Highveld grassland: Underneath rocks and in termitaria.	N-Endemic Protected
Cape thread snake / Lesser worm snake ( <i>Leptotyphlops conjunctus conjunctus</i> )	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. In particularly in or near termitaria.	N-Endemic Protected

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

Several of these species are endemic to this region 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; and 4 Red Data species are included. Grassland species that may be directly affected includes a total of 26 species. None of these taxa were recorded on site during the present survey but several of these species may utilize the natural habitats on the site and has the potential of being present. The main negative



impact on this taxon will be fragmentation and degradation of habitat. This development will have a small ecological footprint and with correct site selection it is not anticipated that it will have a significant impact on this taxon if the natural habitat and adequate buffer zones are conserved.

### 5.3 Bird distribution in the study area

The literature review indicates that a diverse group of birds may utilize the larger study area. More than 300 species' range of distribution falls within the study area which includes twelve Red Data Listed species. No Red Data or Endemic species were observed during the survey. The larger study area is rich in, and essential for, avifauna. Nineteen species are endemic or near endemic to South Africa and 22 are Red Data Listed (Table 6).

**Table 6: Red Data Listed 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 RDL Status	Potential presence on site
<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)	Unlikely. Habitat inadequate.
<i>Anthropoides paradisea</i> Blue Crane (p309)	Karoo and grassland biome. Croplands.	VU	Possible foraging visitor. Habitat adequate but human impacts will discourage permanent residence.
<i>Baelearica regulorum</i> Crowned crane (p307)	Breeds in marshes, pans and dams with fairly tall vegetation. Forages in short to medium grassland, cultivated fields and pastures.	VU	Possible foraging visitor. Habitat inadequate for breeding.
<i>Bugeranus carrunculatus</i> Wattled Crane (p311))	Breeding in small permanent wetlands with short vegetation. Forages on floodplains, wetlands and grassland.	CR	Possible visitor. Habitat adequate but human impacts will discourage permanent residence.
<i>Bradypterus barratti</i> Barratt's warbler (p794)	Dense scrub, bracken ( <i>Pteridium</i> ), brambles and <i>Erica</i> heath.	(SA)	Possible resident in stream valley.
<i>Buteo rufofuscus</i> Jackal Buzzard (p526)	Mountainous and hilly areas: grass and other short vegetation. Nests on cliffs and in trees.	(Sthrn A)	Likely summer visitor.
<i>Ciconia nigra</i> Black stork (p620)	Shallow water: streams, rivers, marshes, floodplains, coastal estuaries, large and small dams; dry land. Cliffs for breeding.	NT	Possible foraging visitor. Habitat inadequate for breeding.
<i>Circus macrourus</i> Pallid harrier (p503)	Grasslands associated with open pans and floodplains.	NT	Possible summer resident. Grassland and floodplain ideal habitat.
<i>Circus ranivorus</i> African marsh harrier (p501)	Nests in extensive reedbeds; forage over reeds, lake margins, floodplains and woodland.	VU	Unlikely. Wetland is too small and disturbed.
<i>Eupodotis barrowii</i> Whitebellied korhaan (p304)	Tall, fairly dense grassland: Open and lightly wooded areas.	VU (Sthrn A)	Possible resident. Ideal grassland habitat.
<i>Eupodotis melanogaster</i> Blackbellied Korhaan (p306)	Tall, fairly dense grassland in grassy savannah – hilly and flat areas with rainfall>600mm.	NT (SA)	Possible resident. Ideal grassland habitat.
<i>Eupodotis caerulescens</i> Blue Korhaan (p302)	Flat and undulating grassland and karoo.	NT (SA)	Unlikely. Terrain is sloped.
<i>Falco biarmicus</i>	Open grassland and cleared woodland habitats. Cliff-	NT	Possible resident or visitor.

*Biodiversity & Habitat Report*

Lanner Falcon (p556)	nester, also in old nests in trees.		Grassland and floodplain ideal habitat.
<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	Possible summer visitor. Grassland and floodplain ideal habitat.
<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)	Likely foraging visitor.
<i>Mycteria ibis</i> Yellowbilled stork (p617)	Dams, large marshes, swamps, estuaries, margins of lakes and rivers, seasonal wetlands.	NT	Likely foraging visitor. Habitat inadequate for breeding.
<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)	Unlikely. Too much human activity.
<i>Pnoenopterus minor</i> Lesser flamingo (p602)	Shallow eutrophic wetlands, salt pans and sheltered coastal lagoons.	NT	Unlikely. Wetland is too small and disturbed.
<i>Pnoenopterus ruber</i> Greater flamingo (p605)	Shallow eutrophic wetlands; breeds on pans and mudflats.	NT	Unlikely. Wetland is too small and disturbed.
<i>Polemaetus bellicosus</i> Martial Eagle (p538)	Open grassland savannah and scrub. Large trees for nests. Wide range of vegetation types: deserts, densely wooded and forested areas.	VU	Possible visitor.
<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	Unlikely. Habitat inadequate.
<i>Sagittarius serpentarius</i> Secretary bird (p542)	Open country: Savanna, open woodland, grassland and dwarf shrubland.	NT	Likely foraging visitor.
<i>Tyto capensis</i> African Grass owl (p252)	Rank grass and marshes are the preferred habitat. Usually in open habitat at fairly high altitudes.	VU	Unlikely. Too much human activity.
<i>Vanellus melanopterus</i> Black-winged plover (p415)	Short and burnt grassland; higher altitudes.	NT (SA)	Unlikely. Expected at higher altitudes.

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; Sthn A = Southern Africa):

As is evident from Table 6 the natural areas on site will provide habitat for a diverse range of birds including RDL and endemic species. None of the RDL species were observed during the assessment. In the following subsections the potential presence of several of the most important RDL species are discussed as example.

### Yellow breasted pipit

Habitat requirements are montane grassland, higher altitudes in summer, moving down to lower altitudes during winter (Newman 1993). Is mostly an uncommon resident throughout its range of distribution but is reported to be present in grid cell 2530AC (Harrison *et al.* 1997). It favours lush, long grass on grassy slopes of mountainous country and avoids recently burnt or grazed areas. Its specific requirements are rather specialized and may be limited by seasonal burning practices and intensive grazing. According to Barnes (2000), the main factor discouraging its presence within its distribution range may be the impact of heavy grazing and burning of grassland. Other impacts affecting its habitat include agricultural intensification and afforestation. The available habitat on the study site is not ideal for this species and it is unlikely that this species will visit the site or will be permanently present.

### Blackrumped buttonquail

Uncommon resident found in moist grassland and irrigated farmlands (Newman, 1993). This is a secretive bird and not much is known about its biology and specific habitat requirements. Although it has not been reported from the relevant grid cell, it has been reported to be present in IBA SA016 (Harrison *et al.* 1997).

In South Africa, breeding occurs in sparse, dry *Sporobolus* grassland. Preferred habitats vary and include areas with long grass but also shrubland with thin grass cover as well as shrubs and grass cover on old farmlands. Threats to its existence include destruction of grassland through overgrazing, trampling, burning, afforestation, crop farming and human settlement. This species is very sensitive to the impacts of stock-farming and the likeliness of its presence should thus be regarded as low.

### Rudd's lark

Uncommon, localized resident endemic to high altitude grasslands of eastern South Africa (Newman 1993; Barnes 2000). The centre of its range is found in south-eastern Mpumalanga (Wakkerstroom) but small isolated populations are also found in the Dullstroom - Machadodorp area. Rudd's lark is highly selective of its favoured habitat which is level, open, grazed grassland without forb invasion. It prefers hilltops or plateaus restricted to Highland Sourveld and Northeastern Sandy Highveld. They are often found in heavily grazed and trampled sites. All the above mentioned information suggests that Rudd's lark may occur very localized and also temporally at localities conforming to all these criteria. The main threats is afforestation, mining, dense human settlement and inappropriate grazing and burning practices. The available habitat on the study site is not ideal for this species and it is unlikely that this species will visit the site or will be permanently present.

### Striped flufftail

Over most of its range it is found in dense upland Sourveld grassland, but also inhabits open woodland areas and is sometimes associated with seepage zones and drainage lines. This bird avoids rocky areas and steep slopes and is adapted to fire-climax grassland and its habitat is improved by biennial burning or controlled grazing. The major threats to this species are the loss of highland grassland due to annual burning, intensive grazing, crop farming and afforestation. Although the available habitat on the site conforms to the requirements of this species, the disturbed and fragmented state of thereof is not ideal.

### Cranes

Three species of cranes may use the available habitats of the study area. These birds are extremely sensitive and are easily disturbed by human traffic and activities – to such an extent that they will abandon an area of prime habitat for this reason only. The above information serve as an example of how sensitive and selective many of the fauna is regarding their habitats and that disturbance or transformation thereof may threaten the continued presence of many of these species. Although the available habitat on the site

conforms to the requirements of this species, the disturbed and fragmented state thereof is not ideal for permanent residence but Cranes may well visit the site in order to forage.

#### Grass Owl

The grass owl, *Tyto capensis*, range of distribution includes the study area and an exclusive investigation for its likelihood of presence as well as likelihood to use the site as a range was investigated. It can be concluded that the wetlands and grassland on site is too fragmented and is small in size which make the possibility of this species being present to be low.

#### Lanner Falcon

Most frequent in open grassland, open woodland as well agriculture lands. Main prey is pigeons, doves and game birds. Nests on cliffs, on tall structures and in tall trees. Main threat is poisoning by agrochemicals used for crop protection. This species may use the available habitat on site but was not recorded.

#### Korhaans and Bustards

These closely related taxa have quite similar habitat requirements and habits. They inhabit short to fairly tall dense grassland, especially sour and mixed grassland in open or lightly wooded, undulating to hilly landscapes. Nests on ground surface between tufts of grass. Feed on invertebrates, small vertebrates and vegetable matter. The main threat is habitat loss as result of human settlement, cultivation of crops and afforestation. Although the available habitat on the site conforms to the requirements of this group, the disturbed and fragmented state thereof is not ideal for permanent residence but they may well visit the site in order to forage.

None of the abovementioned taxa were recorded on site during the survey. This development will have a very small ecological footprint and it is not anticipated that it will have a significant impact on these taxa or the habitat that is essential to maintain them.

## **5.4 Mammals**

Table 7 summarizes the important mammals that may be found in the study area as well as their habitat requirements. Sixteen RDL species and 10 endemic species are can be found in the study area. A further 12 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).

Table 7: Red Data listed mammals of the study area (Friedman & Daly, 2004)

Classification	Habitat	Status
<b>Order: Insectivora</b>		
<b>Family: Soricidae</b>		
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
Dark-footed forest shrew ( <i>Myosorex cafer</i> )	Montane grasslands; wet sponges in mist belt. Dense scrub and grass in damp areas fringing mountain streams.	Data Deficient Endemic
Swamp musk shrew ( <i>Crocidura mariquensis</i> )	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. Wetlands.	Data Deficient
Peter's musk shrew ( <i>Crocidura gracilipes</i> )	Coastal forest, savannah 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
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
<b>Family: Chrysochloridae</b>		
Rough-haired golden mole ( <i>Chrysospalax villosus</i> )	Grassland, dry ground on the fringes of marshes or damp vleis. Excavate burrows; loose piles of soil.	Critically Endangered Endemic
Highveld golden mole ( <i>Amblysomus septentrionalis</i> )	Moist sandy Highveld grassland. Wetlands.	Near Threatened Endemic
Hottentot golden mole ( <i>Amblysomus hottentotus meesterii</i> )	Grassland, soft ground. Sandy soils or sandy loam, live in burrows.	Data Deficient Endemic
<b>Family: Erinaceidae</b>		
Hedgehog ( <i>Atelerix frontalis</i> )	Temperate climate. Grassland and savannah.	Near threatened
<b>Order: Chiroptera</b>		
<b>Family: Vespertilionidae</b>		
Schreiber's' long-fingered bat ( <i>Miniopterus schreibersii</i> )	Cave dweller : Caves and subterranean habitats. Wide range of vegetation association.	Near threatened
Temminck's hairy bat ( <i>Myotis tricolor</i> )	Savannah woodland: Cave dweller- availability governs distribution.	Near threatened
Welwitsh's hairy bat ( <i>Myotis welwitschii</i> )	Savannah, dry tropical. Roosting shrubs and trees.	Near threatened
<b>Family: Rhinolophidae</b>		
Geoffrey's horseshoe bat ( <i>Rhinolophus clevises</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
<b>Order: Carnivora</b>		
<b>Family: Protelidae</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 savannah. Nocturnal.	Near threatened Protected
<b>Family: Felidae</b>		
Serval ( <i>Felis serval</i> )	Proximity to water; tall grass	Near

## Biodiversity & Habitat Report

		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 Protected
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>Order: Tubulidentata</b>		
<b>Family: Orycteropodidae</b>		
Aardvark / Ant bear ( <i>Orycteropus afer</i> )	Widespread. Wide habitat tolerance. Open woodland, scrub and grassland.	Least Concern 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
<b>Family: Gliridae</b>		
Rock Dormouse ( <i>Graphiurus platyops</i> )	Near or on rocky outcrops. Association with dassies.	Data Deficient

As is evident, the natural areas of the study area will provide habitat for a diverse range of important mammals. No RDL species could be confirmed during the assessment. In the following subsections the potential presence of several of the most important of these species are discussed as an example of the deduction method used.

### Bats

Bats are not expected to be permanently present and will be overflying, feeding visitors. The bats that may visit the property should not be directly affected by the impacts of development on the property as it is unlikely that they are permanent residents, however, the land use change will not affect the presence of bats.

### South African Hedgehog

Little information regarding this species is available but its range of distribution includes the study area. This species have been collected from several types of habitats including temperate savannah and grassland (Friedman & Daly 2004; Smithers 1983). Threats to this species may be summarized as the same for most grassland species: transformation and fragmentation of habitat. As is noted above, little information is known about the preferred habitats of this species but it should be considered that the study site possess suitable habitat to support this species.

### Golden Moles

The wetlands and adjacent terrestrial habitat can be utilized by this taxon and individuals may be present permanently on the fringes of the wetlands and in the grassland. However, an intensive search for signs indicating the presence of Golden Moles did not yield any results that indicate the presence of Golden Moles.

### Serval Cat

The grassland habitat and wetlands present on the study site are ideally suited for this species and it is highly probable that individuals are present in the area.

### Oribi

The Oribi is exclusively a grassland species and requires a mosaic of tall and short grasses to meet its resting and feeding habits (Friedman & Daly 2004; Smithers 1983). Furthermore, it is a selective feeder and its favorite grasses (Smithers 1983) are included in the list of grasses that were identified on the property. However, they are sensitive to human activities and are easily hunted. Oribi is not expected on site due to the magnitude of human activities in the larger study area. Threats include afforestation, conversion to pastures, poor veld management, poaching and hunting by dogs.

### African Weasel

Little is known about the habits and biology of this species. It is found in moist grassland and moist savannah in the eastern part of the subcontinent. It is specialized to hunt rodents and moles and may form small family groups. Main threat is the trade of body parts for traditional medicine.

None of these taxa were recorded on site during the present survey. This development will have a small ecological footprint and with correct site selection it is not anticipated that it will have a significant impact on this taxon if the natural habitat and adequate buffer zones are conserved.

## **5.5 Invertebrates**

Potentially, the natural habitats on site will offer refuge to all invertebrate groups with the available habitats on site. This consists of a large number of species for which field searches are too extensive to be accommodated for the present scope of this study. Picker *et. Al.* (2002) can be referred to so as to get an idea of the large invertebrate diversity that can be expected in the study area. No Red Data invertebrates are expected in the study area.

## 6. DISCUSSION AND IMPACT ASSESSMENT

### 6.1 Sensitivity rating

The results of the biodiversity investigation indicate that the natural habitats on site have been fragmented as result of human induced impacts. Large sections have been transformed to Eucalyptus plantations and/or are in a state of recovery to pioneer grassland. The sensitivity ratings (based upon floral integrity, fauna potential and ecological functions) for the different habitats are delineated in Figure. 1 and are summarized as follows:

<b>Vegetation Community</b>	<b>Sensitivity Rating</b>
Eucalyptus plantations and transformed land	Low
Disturbed land & pioneer grassland	Low - Medium
Fragmented grassland	High
Wetland zones	Medium - High

The fragmented grassland and wetland zones are not recommended for development and these habitats must be well managed and protected during the operational phase. The conservation and responsible management of these areas will ensure that the presence of sensitive fauna and flora is maintained. The MBS-Plan and LN3 ratings relevant to the project are discussed in the sections below:

#### Aquatic biodiversity maintenance

##### Site rating:

##### *Highly Significant*

It is important that the development does not impede on the availability of water in this sub catchment as it plays an important role in maintaining aquatic biodiversity. Furthermore, it is recommended that the wetlands are conserved and managed in a responsible manner.

#### Terrestrial biodiversity maintenance

##### Site ratings:

##### *Critical Biodiversity Areas*

Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes. Must be kept in a natural state, with no further loss of habitat. Only low-impact, biodiversity-sensitive land uses are appropriate.

##### *Heavily or Moderately Modified Areas*

Such areas offer the most flexibility regarding potential land-uses, but these should be managed in a biodiversity-sensitive manner, aiming to maximise ecological functionality and authorisation is still required for high-impact land-uses. Moderately modified areas (old lands) should be stabilised and restored where possible, especially for soil carbon and water-related functionality.



Ecological support areas:

Site rating:

*Ecological Support Area (Aquatic)*

Ecological Support Areas are supporting zones required to prevent the degradation of Critical Biodiversity Areas (CBAs) and Protected Areas. These may include areas that are degraded or even transformed if these areas still play an important role in supporting CBAs. The purpose of this aquatic ecological support area is important and must be managed to ensure that the wetland and aquatic ecosystems of the local and downstream areas are not affected negatively. It will thus be important to reach the following objectives in the local area:

- Protect the wetland areas with an adequate buffer zone;
- Maintain the volume and unimpeded flow of water in the catchment;
- Prevent negative impacts on water quality by providing adequate waste and sewage disposal services;
- The Local Municipality must provide and effectively manage water, sewage- and waste disposal for the proposed development.

It is important that these support areas are managed and development activities therein be regulated and limited to ensure that the present biodiversity and ecological integrity of these areas are not significantly disturbed or lost.

In respect of the abovementioned review it is recommended that the remaining natural habitat and wetland areas are not considered for development and be conserved. The final layout must be planned to accommodate these objectives.

## **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. Potential impacts on the natural environment and their magnitude and significance, as well as mitigation measures are given in Table 8. The single most important impact on biodiversity is the loss and fragmentation of natural habitats (and its consequences) which has already occurred on most of the site as result of the historic transformation and degrading of the land. 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 8 (on the following page).

**Table 8: 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	Possible	High	<ul style="list-style-type: none"> <li>Use only the disturbed and pioneer grassland for the development.</li> <li>Conserve the wetland zones.</li> </ul>	Medium
Loss of important flora species	Long term	High	Possible	High	<ul style="list-style-type: none"> <li>Use only the disturbed and pioneer grassland for the development.</li> <li>Search for- and rescue important taxa on the development site.</li> </ul>	Low
Increased levels of alien invasive plants	Long term	High	Definite	Medium	<ul style="list-style-type: none"> <li>Implement weed control program on the entire site and control encroachment and spreading of exotic trees.</li> <li>Use only indigenous flora for landscaping.</li> </ul>	Low
Changes to and fragmentation of habitats	Long term	High	Possible	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	Possible	Low	<ul style="list-style-type: none"> <li>Use only the disturbed and pioneer grassland for the development.</li> <li>Secure and relocate any fauna that may be discovered on the development site during construction.</li> </ul>	Low
Loss of important and rare terrestrial fauna	Long term	High	Possible	Low	<ul style="list-style-type: none"> <li>Use only the disturbed and pioneer grassland for the development.</li> <li>Conserve and manage the wetlands and natural grassland.</li> </ul>	Low
Impacts on wetland areas	Long term	High	Possible	Low	<ul style="list-style-type: none"> <li>Conserve the wetland zones with a 15m or larger buffer.</li> <li>Untreated sewage or waste water may not be discharged into the riparian areas or watercourses.</li> <li>Storm water may not be discharged directly into the wetlands.</li> </ul>	Low
Negative impacts on biodiversity priority areas and ecological support areas	Long term	Medium	Unlikely	Medium	<ul style="list-style-type: none"> <li>It is recommended that the remaining natural grassland and wetland areas are not considered for development and be conserved with a buffer zone.</li> <li>Maintain the volume and unimpeded flow of water in the sub catchment and in the wetland zones;</li> <li>Prevent negative impacts on water quality by providing adequate waste and sewage disposal services;</li> <li>Prevent any additional degrading of the wetlands and monitor and address erosion and encroaching alien vegetation.</li> </ul>	Low

## 7. RECOMMENDATIONS

The single most important impact on biodiversity is the loss and fragmentation of natural habitats which has already occurred as result of the historic transformation and degrading of the land. The biodiversity and impact assessment concludes that the footprint area for the proposed development site is of *Low – Medium* biodiversity and sensitivity value and can be recommended for development on condition that the mitigation measures and recommendations will be enforced. Wetland areas are located nearby the site and the operational phase of the proposed development may indirectly affect these habitats negatively if strict buffer zones and mitigation measures are not enforced. The final layout and activities must be planned to accommodate these objectives:

- It is recommended that the remaining natural habitat and wetlands are not considered for development;
- Development areas must be planned to make use of already disturbed areas;
- Search for- and rescue important taxa before commencing with site preparation.
- The wetland zones must be considered for development and must be protected by at least a 15m buffer.

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

- Use only indigenous flora for landscaping;
- Implement an alien invader plant control program;
- Topsoil must be protected and stabilized.
- The wetland and aquatic ecosystems must be protected and monitored for any signs of degradation/pollution or negative impacts arising from the construction and operational phases.

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## **APPENDIX 1: SPECIALIST DETAILS**

## **APPENDIX 2: MAPS**



## **APPENDIX 3: ILLUSTRATIONS**