



*SPECIALIST REPORT*

**ECOLOGICAL ASSESSMENT FOR CLEARING OF INDIGENOUS  
VEGETATION FOR THE CULTIVATION OF NUT-TREES ON  
VARIOUS PORTIONS OF THE FARMS VERGELEGEN 709JT,  
CAMBALALA 765JT, WINKELHAAK 723JT, BATAVIA 151JT,  
NKOMAZI 772JT AND STERKSPRUIT 728JT  
BADPLAAS, ALBERT LUTHULI LOCAL MUNICIPALITY**

***Draft Report***

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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: 2020-11-25

## EXECUTIVE SUMMARY

The applicant plans to establish cultivated lands on the property, specifically for the production of Macadamia and Pecan nuts. The total project area is approximately 3600Ha in extent. As the clearing of indigenous vegetation is a regulated activity, environmental authorization is required before commencement of the activity. As part of the EIA process an ecological and biodiversity assessment was recommended by the environmental consultant and Afrika Enviro & biology was appointed to do this assessment.

The study area falls within the Barberton Makhonjwa Mountains World Heritage Site and partially within the Nkomazi Private Game Reserve. According to the Mpumalanga Biodiversity Conservation Plan (MBCP) Nkomazi falls in an area of conservation importance. Nkomazi forms a corridor between the Barberton Mountain lands in the east and the Badplaas Mountain lands in the west. It is also the only natural lowland corridor linking Songimvelo Nature Reserve (MTPA) and the Badplaas/Kangwane Mountains. It includes CBA and ESA zones.

The study area is located on the plains to the south of the foothills of the Makhonya Mountains in the north and the Skurweberg (Escarpment), approximately 10km to the east of Badplaas / eManzana. Access is gained from the R541 on the southern boundary. The Nkomazi Game Reserve is located directly to the east and several of the properties forming part of this project is fenced in with this Reserve. The main administrative buildings and staff quarters are located centrally.

The Komati River flows from west to east through the central section and the Zeekoespruit tribute to the Komati River on the property. These watercourses have well-defined channels with smaller tributaries present from north to south. Other hydrological features include wetlands and severely eroded drainage channels. Several prominent rocky outcrops are present and these are largely in a natural state.

The elevation ranges between 945m a.s.l. in the valley bottom to 1100m a.s.l. on the northern watershed. The local land use varies from natural areas to cultivated fruit and nut orchards as well as forestry in the higher lying areas. The study area is approximately 3600Ha in size and is being administered as part of the Game Reserve. In the historic past most arable land on the study area was cultivated, mainly with tobacco and fodder meadows but presently, no agricultural activities are present and all agriculture lands have been fallow for >10 years. The sensitivity zoning (based upon natural integrity, fauna potential and ecological functions) for the different ecological units is delineated and summarized as follows:

Habitat	Sensitivity Rating	Surface area
Transformed land: Infrastructure	Very low	16Ha
Pioneer grassland: Old lands	Low-medium	1908Ha
Disturbed grassland: Old meadows	Medium	44Ha
Climax grassland	High	180Ha
Rocky outcrop habitat	High	130Ha
Riparian zones & aquatic ecosystems	High	170Ha
Wetlands	High	539Ha
Buffer zones	(Also include other habitat)	613Ha
<b>Total:</b>		<b>3614Ha</b>
<b>Total land cover</b> that qualify per definition as indigenous vegetation		1952Ha

The investigation indicates that several habitat types are sensitive habitats where large scale development is not recommended. By implication, only relatively level areas (without sensitive bio-ecological features) and previously disturbed areas can be considered for development. These areas include the pioneer grassland (old lands) and disturbed grassland. In order to provide adequate protection of the sensitive habitats and to provide refuge for biota, buffer areas and corridors must be provided.

The MTPA minimum requirement is a 30m buffer zone around rock outcrops which is implemented with this report. A 100m buffer is required around NFEPA wetlands and rivers. This requirement may be applicable in cases to protect pristine ecosystems but in this instance it will sterilize a large surface area of land available for cultivation in an already disturbed ecosystem. A more objective approach was to use the DWS buffer guideline / tool for determining appropriate buffer zones and to combine this with site conditions in order to provide a suitable buffer zone. Determination of this buffer zone has been calculated in the Freshwater Ecosystems Report and the results are integrated into this report as well. One exception where the buffer size can be relaxed is where roads and infrastructure are present where a large buffer is illogical and will not serve a purpose but will sterilize unnecessary large surface areas for cultivation.

Considering the fact that these properties formed part of a Protected Area and the fact that the MTPA provides for ecological corridors in the site area, special consideration must be given to provide land to for corridors and to conserve important biodiversity and ecosystems. The proposed corridors and conservation areas has been designed with the objective to create functional ecological corridors to connect habitats and to conserve habitats with a high ecological importance.

The biodiversity assessment concludes that significant areas on the site are of **high** biological and ecological importance and sensitivity. These areas must be conserved and buffer zones must be provided to ensure that any potential impacts are mitigated to an efficient extent. However, specific areas may be considered for development where potential impacts on the natural environment can be managed to an acceptable level. These areas include the pioneer grassland (old lands) and disturbed grassland as indicated on the delineation figures.

## Executive Summary

### 1. Introduction

- 1.1 Background and objectives
- 1.2 Specialist report requirements

### 2. Methods and Reporting

- 2.1 Assumptions, uncertainties and limitations
- 2.2 General
- 2.3 Vegetation & habitats
- 2.4 Terrestrial Fauna
- 2.5 Watercourse classification & delineation
- 2.6 Ecological importance and sensitivity rating of habitats

### 3. Background Information

- 3.1 Biophysical description of the study area
- 3.2 Ecology & biodiversity
- 3.3 Conservation & Importance
- 3.4 Protected Areas & Heritage Sites

### 4. Vegetation & habitat report and general biophysical descriptions

- 4.1 General site description and land uses
- 4.2 Habitats & vegetation
- 4.3 Occurrence of important flora species

### 5. Terrestrial Fauna Report

- 5.1 Amphibians
- 5.2 Reptiles
- 5.3 Birds
- 5.4 Mammals
- 5.5 Invertebrate Report
- 5.6 Pollinators

### 6. Sensitivity and Impact Assessment

- 6.1 Sensitivity rating and buffer zones
- 6.2 Discussion and Impact assessment

### 7. Conclusion & Recommendations

### 8. References

## APPENDIXES

- APPENDIX 1: Specialist details
- APPENDIX 2: MBCP Maps

## 1. Introduction

### 1.1 Background and objectives

The applicant plans to establish cultivated lands on the property, specifically for the production of Macadamia and Pecan nuts. The total project area is approximately 3600Ha in extent. As the clearing of indigenous vegetation is a regulated activity, environmental authorization is required before commencement of the activity. As part of the EIA process an ecological and biodiversity assessment was recommended by the environmental consultant and Afrika Enviro & biology was appointed to do this assessment. The terms are as follows:

- Terrestrial vegetation and ecological assessment;
- Biodiversity investigation must cover flora as well as the following classes of fauna: Invertebrates (including butterflies), amphibians, reptiles, birds and mammals.
- Search for important biota (e.g. Red Data Listed and threatened species as well as invasive species) with specific reference to *Aloe simii* and predict the potential of threatened species being present.
- Define, differentiate and delineate habitats present on the property;
- Provide sensitivity analysis of the sensitivity of habitats and highlight sensitive areas / locations.
- Discuss the need of buffer zones and make recommendations to this regard;
- Compile a geo-referenced map and shape files that project the findings of the investigation.
- Conduct an impact assessment and give recommendations and mitigation measures;

The site was investigated on 2020-10-21; 2020-11-04; 2021-01-14 and 2021-01-15.

### 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. The author is confident that the results obtained by the present study are of sufficient significance to make conclusions and recommendations regarding the subjects that were investigated. 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. No nocturnal surveys were conducted.

## 2.2 General

The author relied on aerial images and ortho photos to remotely assess the site before the actual on site investigation in order to get familiarized with the different features and vegetation communities (habitats) present within the affected areas. The verification of old agriculture lands is very important and historic aerial photos dated 1975 and 1985 were used in addition to more recent photographs for this purpose. The SANBI *Land cover* data base was also employed.

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.

## 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 described according to a unit's diagnostic floral features and/or topographical setting or other biophysical features (or a combination of several descriptive features). 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 as obtained from the SANBI data base (POSA). The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The vegetation communities/habitats are described in section 4 of this report.

## 2.4 Terrestrial Fauna

The fauna investigation is based on a desktop study verified by cross reference with available habitats of the study area, so as to establish the faunal potential of a particular site. 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.

## 2.5 Freshwater ecosystem assessment

Freshwater ecosystems (rivers, streams and wetlands) are assessed in a separate investigation and report. The results of the freshwater ecosystem report are used in the terrestrial biodiversity report in order to produce integrated maps and buffer zones.

## 2.6 Ecological importance and sensitivity rating of terrestrial habitats

By considering the results of all the above investigations, the author 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 simplify the procedure of assessment. In order to simplify the decision making process, a scale of *Very Low*, *Medium*, *High* and *Very High* is used, based upon biodiversity value and ecological functions (Table 1.1).

Table 1.1 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>
Modifications to the natural environment have been severe and the ecosystem/s has been completely modified with an almost complete loss of natural habitat and biota.	<i>Very Low</i>

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. Furthermore, it should be noted that the above method is not used for the sensitivity rating of wetlands. The results of the freshwater ecosystem integrity assessment are used to indicate the sensitivity and extent of freshwater ecosystems.

## 3. Background Information

### 3.1 Biophysical description of the study area

The general study area consists of mountainous bushveld typical of the eastern Lowveld Escarpment foothills at altitude 400-1100m. The most serious transformation of the natural environment consists of cultivation of crops, forestry and formal and informal settlements which have transformed significant areas of



natural land in the past few years. Very hilly with moderate to steep slopes. Grey soils, derived from Randian granites and Swazian granites and gneiss. Soils are dark, very clayey: Sterkspruit, Valsrivier and Swartland soil forms. Summer rainfall with dry winters. MAP: 700-1350mm. Frost infrequent to occasional at higher altitudes. Approximately 21% transformed to cultivation and forestry.

### 3.2 Ecology & biodiversity

Nationally, the site is situated within the Lowveld Sour Bushveld (A9) veld type according to Acocks (1988), or North-eastern Mountain Grassland (LR43) according to Low & Rebelo (1996) and Schmidt *et al* (2002). However, these classifications are very broad and may include several sub veld types of importance. The more detailed vegetation classification system of Mucina & Rutherford (2006) is used to classify the veld unit on a regional scale:

#### Unit 1) Swaziland Sour Bushveld (SVI14) 2530DC

Mainly found in Mpumalanga, Swaziland from Badplaas eastwards to Pigs Peak and Manzini. Altitude 400-1100m. Open to closed tree layer with well developed (closed) grass layer. Conservation: Vulnerable.

### 3.3 Conservation & Importance

The Mpumalanga Biodiversity Sector Plan (MBSP); (MTPA, 2014) and the **National Freshwater Ecosystem Priority Areas** (NFEPA); (WRC, 2011) ratings for the terrestrial and freshwater ecology of the project area are projected in Appendix 2.

Table 1.2 MBCP and NFEPA categories relevant to the site

Freshwater ecosystems / NFEPA inventory		
Category	Subcategory	Content
Critical Biodiversity Area	Wetlands	NFEPA Wetlands
Ecological Support Area	Important sub catchments	Fish support areas
Ecological Support Area	Wetland clusters	Wetland clusters
Heavily or moderately modified	Heavily modified	Heavily modified
Terrestrial Ecology		
Category	Subcategory	Content
Protected Areas	National Parks & Nature Reserves	Nature Reserve
Critical Biodiversity Area	Irreplaceable	
Ecological Support Area	Local corridor	
Ecological Support Area	Protected Area buffer	
Heavily or moderately modified	Heavily modified	Heavily modified
Heavily or moderately modified	Moderately modified	Old lands

### 3.4 Protected Areas & Heritage Sites

The study area falls within the Barberton Makhonjwa Mountains World Heritage Site and partially within the Nkomazi Private Game Reserve. Nkomazi Private Game Reserve was declared a Private Nature Reserve in 2001 via Section 85 (a) of The Mpumalanga Nature Conservation Act, Act 10 of 199. Furthermore, according to the Mpumalanga Biodiversity Conservation Plan (MBCP) Nkomazi falls in an area of conservation importance. Nkomazi forms a corridor between the Barberton Mountain

lands in the east and the Badplaas Mountain lands in the west. It is also the only natural lowland corridor linking Songimvelo Nature Reserve (MTPA) and the Badplaas/Kangwane Mountains.

#### 4. Vegetation & habitat report and general biophysical descriptions

##### 4.1 General site description and land uses

The study area is located on the plains to the south of the foothills of the Makhonya Mountains in the north and the Skurweberg (Escarpment), approximately 10km to the east of Badplaas / eManzana. Access is gained from the R541 on the southern boundary. The Nkomazi Game Reserve is located directly to the east and several of the properties forming part of this project is fenced in with this Reserve. The main administrative buildings and staff quarters are located centrally.

The Komati River flows from west to east through the central section and the Zeekoeispruit tribute to the Komati River on the property. These watercourses have well-defined channels with smaller tributaries present from north to south. Other hydrological features include wetlands and severely eroded drainage channels. Several prominent rocky outcrops are present and these are largely in a natural state.

The elevation ranges between 945m a.s.l. in the valley bottom to 1100m a.s.l. on the northern watershed. The local land use varies from natural areas to cultivated fruit and nut orchards as well as forestry in the higher lying areas. The study area is approximately 3600Ha in size and is being administered as part of the Game Reserve. In the historic past most arable land on the study area was cultivated, mainly with tobacco and fodder meadows but presently, no agricultural activities are present and all agriculture lands have been fallow for >10 years.

The biophysical features and habitat delineation of the study sites are projected on an aerial image (Figure. 1). Illustrations of the environment and vegetation are included with the following sections.



The study area is located on the plains to the south of the foothills of the Makhonya Mountains (visible in the background)

#### 4.2 Habitats & vegetation

The vegetation communities present on the property are classified according to simplified biophysical descriptions and discussed in the following sections:

##### i) Transformed land: Infrastructure

Areas that have been totally transformed for the construction of dwellings, sheds and infrastructure presents little or no habitat and has very low ecological significance. Indigenous as well as exotic vegetation is present.



Dwelling houses, lodges and stores comprises a very low percentage of the total surface area

##### i) Pioneer grassland: Old lands

Since the historic past most arable land on the valley plains and gentle slopes has been cultivated for the production of crops, mainly for the production of maize and tobacco. Cultivation of these lands has ceased more than 10 years ago and in some case more than 40 years in the past. The preparation of these lands and the cultivation thereof has destroyed the natural vegetation structure and has impoverished the vegetation and fauna species assemblage. This is affirmed by the absence of geophytes and climax grassland wild flower species on these lands. The vegetation on these old lands is dominated by the tall grass, *Hyperthelia dissoluta*, *Eragrostis curvula* (to a lesser extent, localized) and *Sporobolus pyramidalis*. The dominance by the tall grass component is negative for the re-introduction of wild flowers (short growth form) as the last mentioned receives very little or no sunlight, essential for growth. In other places the grass is cut short throughout the growth season and the short grass *Cynodon dactylon* is present but wild flowers and herbaceous species are absent. The alien invasive species and weeds, *Verbena bonariensis*, *Verbena brasiliensis*, *Conyza albida*, *Solanum panduriforme*, *Richardia brasiliensis* and *Campuloclinium macrocephalum*. This vegetation community is the

most suitable for the proposed activity as it has the least biodiversity and will need considerable time before it can be considered to be of low-medium ecological importance. The areas that can be considered for development has been delineated in Figures 1.1; 1.2 and 1.3 and excludes footprints in sensitive areas (and buffer zones) that was historically under cultivation.



The old lands comprise large tracts of land and maintain a low level of biodiversity



The alien invasive species, *Campuloclinium macrocephalum*, has invaded large areas of this community

## ii) Climax grassland

The remaining natural grassland component has not been cultivated in the past for the reason that it is stony (eroded sandstone and quartz) and has shallow soils. The general topography may also play a role as this feature is mostly located on the areas that lead to the ravines and may have steep slopes (however, this is not always the case). This grassland type is open and includes a good diversity of grasses, forbs and wild flowers. Shrubs and trees are limited to small rock outcrops found intermittently on the slopes (described under separate heading).

The species assemblage is dominated by climax grasses: *Themeda triandra*, *Tristachya leucotrix*, *Panicum natalense* and dominated by *Hyperthelia dissoluta* where deeper soil is present. Other grasses present are *Aristida junciformis*, *Eragrostis micrantha* and *Loudetia simplex*. Forbs and wild flowers are well represented and typical grassland species are present: *Vernonia natalensis*, *Barleria quenzii*, *Graderia scraba*, *Crossandra zuluensis*, *Acalypha angustata*, *Raphionacme hirsuta*, *Becium obovata*, *Vernonia natalensis*, *Gnidia capitata*, *Hypoxis rigidula*, *H. iridifolia*, *Crinum macowanii* *Asclepias gibba*, *Dicoma anomala*, *Ledebouria ovatifolia*, *Helichrysum allioides*, *Berkheya setifera*, *Oxalis obliquifolia*, *Pachycarpus transvaalensis*, *Asclepias gibba*, *Hermannia transvaalensis* and the succulent *Aloe greatheadii*. No RDL species were recorded. Due to its importance as refuge for biota and maintenance of biodiversity this community has a **High** ecological sensitivity and is also integrated with the ecological corridor that must be provided.



The general topography may also play a role as this feature is mostly located on the areas that lead to the ravines and may have steep slopes (however, this is not always the case).



This grassland type is open and includes a good diversity of grasses, forbs and wild

flowers. Shrubs and trees are limited to small rock outcrops.

### iii) Disturbed grassland: Old meadows

On aerial photography specific areas appears to be old cultivated lands as lines associated with ploughing are evident on the photographs. However, on closer inspection these areas are stony and not arable and ground was never broken. The lines are in fact rows of packed stones and rocks. It would appear that the land users removed the larger loose stones and rocks and dumped these on piles outside of harm's way. The cleared areas were then used as meadows for livestock and were probably regularly burned and the grass thereon may have been cut and bailed. As result the much of the expected diversity of wild flowers on these areas disappeared. Geophytes has survived this impact and individuals of *Crinum macowanii*, *Ledebouria ovatifolia* and several species of the genus *Hypoxis* are present (*H. iridifolia*, *H. argentea* and *H. rigidula*). Other forbs present are *Vernonia natalensis*, *Argyrolobium stipulaceum*, *Scabiosa columbaria*, *Hermannia transvaalensis*, *Sonchus nanus*, *Gnidia capitata*, which forms large stands in areas that may be an indicator of frequent burning.



Some of these areas were not cultivated because of the rocky surface; instead the rocks were collected and removed to create meadows for grazing

These areas have low biodiversity and is fragmented and isolated by the road and game fences and its ecological importance is rated **Medium**. These areas are relatively small and concentrated within areas that have been previously cultivated. For these reasons it can be considered for the proposed activity.

### iv) Rocky outcrop habitat

Several prominent rock outcrops and rocky hillsides are present in the southern and central section of the study area and along the ravines of the Komati River and the Seekoeispruit. The foothills of the Makhonya Mountains are located on the extreme northern section, but these will not be directly affected by the current planning. These outcrops are mostly derived of sandstone.

The geology of the outcrops is based on sandstone formations in various stages of erosion and the outcrops varies in size from relatively small and low ridges to

relatively large, prominent hillsides. These rocky areas have not been changed significantly by human hand although the historic remains of human habitation are present.

The dominant grass on the slopes of the outcrops is *Cymbopogon plurinodis*, other commonly found grasses are *Panicum natalense*, *Eragrostis superba* and *Loudetia simplex*. The succulents *Aloe marlothii* and *Aloe greatheadii* are commonly found. Shrubs and medium sized trees forms a closed woodland structure and are represented by *Ficus ingens*, *Pterocarpus rotundifolius*, *Faurea saligna*, *Mundulea sericea*, *Combretum molle*, *Searsia dentata*, *Gymnosporia glaucophylla*, *Englerophytum magalismontanum* and *Commiphora*. Species of ferns found in this habitat are *Cheilanthes viridus* and *Pellaea calomelanos*. *Scadoxus puniceus* is present in shady areas.

The rocky outcrops (and buffer zones) form part of the ecological corridor that must be provided and provide potential habitat for fauna. For the purpose of this report all the rocky habitats has a **High** ecological importance.



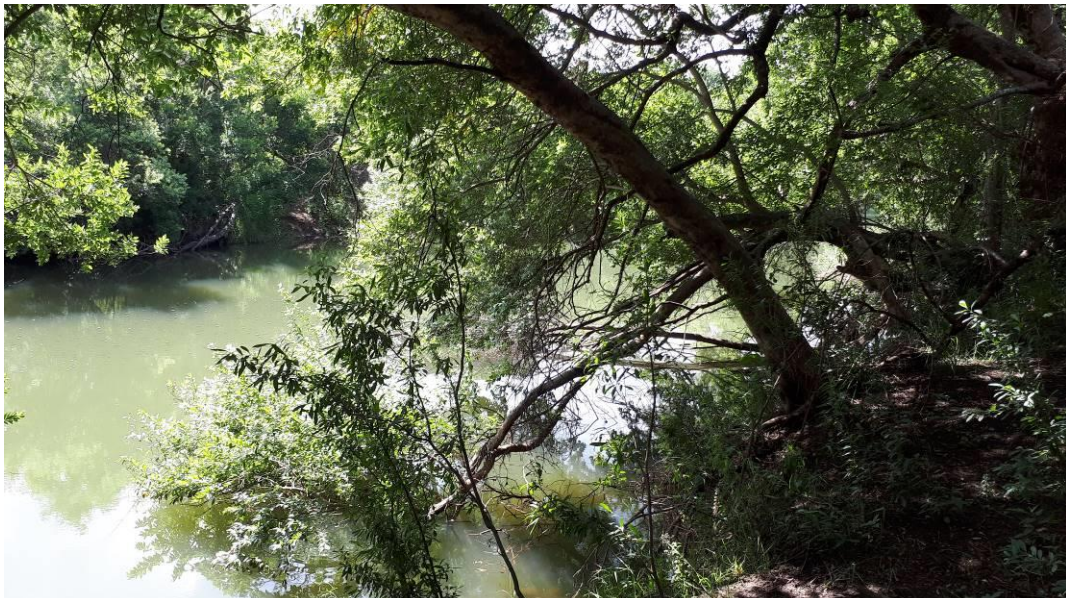
Some of the outcrops are well vegetated with trees and provide habitat for fauna as well



The outcrops and their vegetation are in natural state and important for the maintenance of biodiversity. The outcrops are connected to the larger corridors that have been designed for ecological connectivity.

**v) Riparian habitat** (Refer to the Freshwater Ecosystems Report)

The riparian habitat is found in the valley bottoms alongside the Komati River (third order), Seekoeispruit and Lekkerloopspruit. These are perennial watercourses and as such the availability of water and fertile alluvial soils presents excellent conditions to maintain riparian vegetation. Large obligate riparian trees are present and dominated by *Combretum erythrophyllum*. Other indigenous species are *Vachellia natalita*, *Diospyros lycioides* and *Salix mucronata*. Other indigenous species are *Vachellia natalita*, *Diospyros lycioides* and *Salix mucronata*. Several alien invasive species are present: *Melia azedarach*, *Populus alba*, *Pinus sp*, *Eucalyptus sp* and *Morus alba*. No RDL species were recorded.



The riparian zone lining the Komati River is well developed and the trees stabilize the river banks and provides habitat for fauna





Elephant uses the cover provided by the trees to move undetected along the river (corridor). The elephant path is clearly discernible (mud covers the trees along which they scratch)

The riparian zones and watercourses (including buffer zones) form part of the ecological corridor that must be provided and provide potential habitat for fauna. All the riparian zones have a **High** ecological importance.

vi) **Wetland habitat** (Refer to the Freshwater Ecosystems Report)

Several prominent valley bottom wetlands are present as well as associated seepage zones and artificial wetlands. The desktop study indicates that several of these wetlands are listed as NFEPA wetlands (Figure 1.1 and Figure 1.2). The wetlands were delineated by a combination of site assessments where the edges were plotted by GPS and refining by remote sensing on the aerial images. In order to simplify the map work, the wetland delineations projected in Figure 1.1, Figure 1.2 and Figure 1.3 projects the buffer zones around the wetlands. The wetland types are listed in Table 1.3 and the main wetland units are discussed in the following text.

Table 1.3 Wetland types and attributes

Reference	Classification and attributes					
	Level 1 (Ecoregion)	Level 2 (Wetland vegetation group)	Level 3 (Landscape unit)	Level 4 (Hydrogeomorphic unit)	Level 5 (Hydrological regime)	Level 6 (Characteristics)
Type 1	Lowveld	Lowveld Group 9	Valley floor	Channelled valley bottom	Non-perennial	Natural
Type 2	Lowveld	Lowveld Group 9	Bench	Flat	Non-perennial	Natural
Type 3	Lowveld	Lowveld Group 9	Slope	Valley head seep	Non-perennial	Natural
Type 4	Lowveld	Lowveld Group 9	Bench	Flat	Non-perennial	Artificial

It should be understood that the larger wetland units comprises one or more different wetland type as listed (Table 1.3). The wetlands (and buffer zones) form part of the

ecological corridor that must be provided and provide potential habitat for fauna. For the purpose of this report all the wetland units has a **High** ecological importance.



Several wetland types and units are present on the study area and has been delineated

#### 4.3 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 forests and the provincial nature conservation legislation. The National List for Red Data flora is the most updated and applicable reference for vegetation conservation in Mpumalanga. Applicable legislation that protect flora in South Africa and specifically in Mpumalanga Province are the National Environmental Management Biodiversity Act of 2004 (NEMBA), the Mpumalanga Nature Conservation Act of 1998 (MNCA) and the National Forests Act of 1998 (NFA). Red Data Listed (RDL) species that has the potential to be present in the local area and associated with the habitats on site are listed in Table 2.1.

Table 2.1 National RDL species potential for the relevant quarter degree grid (2531AA)

Species	National Status	Habitat preference
<i>Aloe thorncroftii</i>	Near Threatened	High altitude rocky outcrops.
<i>Dioscorea sylvatica</i>	Vulnerable	Rock outcrops.

No RDL species was recorded. The legally protected species that were recorded are listed in Table 2.2. Permits will have to be obtained from the Department of Forestry, and/or the Mpumalanga Tourism and Parks Agency, if legally protected trees or plant species are to be removed or destroyed.

Table 2.2 Protected and RDL species recorded on the property

Scientific Name	RDL Status	Protected Status	Vegetation community/ Habitat
<i>Faurea saligna</i>		MNCA	Outcrops
<i>Faurea</i>		MNCA	Outcrops
<i>Aloe marlothii</i>		MNCA	Grassland / Outcrops
<i>Aloe greatheadii</i>		MNCA	Grassland / Outcrops

## 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 listed in the checklists prepared by a desktop study. However, the proposed activity sites were investigated for fauna actually present.

### 5.1 Amphibians

A variety of frogs will utilize the aquatic and terrestrial habitats on the property for several reasons, including breeding purposes. Thirty frog species' range of distribution includes the study area, none of these have Red Data status. Only one species, the yellow-striped reed frog (*Hyperolius semidiscus*), is regarded as endemic. Given that mitigation is in place and site selection is educated, it is not expected that the ecology or biology of frogs will be significantly affected by the proposed activity.

### 5.2 Reptiles

According to the South African Reptile Conservation Assessment (SARCA); (Bates et al. 2014) approximately 70 species of reptiles can potentially occur in the larger study area. The terrestrial and arboreal habitats present in the larger study area will provide habitat for a diverse group of reptiles. No ultra-endemic species (very restricted range) are expected on site. One Red Data Listed species is included with the list (Table 3.1).

Table 3.1 Important reptiles of the study area.

Scientific Name Common Name	Habitat and Ecology	Distribution / Endemic / Range Description	Global RDL Status
<i>Crocodylus niloticus</i> Nile Crocodile	Inhabits large rivers, swamps, lakes and river mouths.	Widespread throughout Africa. <b>Present in Nkomazi GR.</b>	Vulnerable A2ac
<i>Chamaesaura macrolepis</i> Large-scaled Grass Lizard	Little known species. Grassland and open woodland	Near endemic to SA <b>Possibly present</b> , habitat adequate.	Near Threatened
<i>Homoroselaps dorsalis</i> Striped Harlequin Snake	Partially fossorial and known to inhabit old termitaria in grassland habitat. Most of its range is at moderately high altitudes, reaching 1,800m.	Near endemic to SA <b>Unlikely present</b> , prefer high altitude grassland.	Near Threatened

As noted in Table 3.1 one species (Nile Crocodile) is present but is limited to the official (fenced) section of the Game Reserve. The Large-scaled Grass Lizard may be present, especially in the natural, unmodified grassland habitat. A large loss of indigenous vegetation and habitat will have a negative impact on the maintenance of reptiles, locally. For this reason it is important that adequate refuge and ecological corridors are provided to ensure that the present reptile assemblage is maintained in the local area.

### 5.3 Birds

The literature review indicates that a diverse group of birds may utilize the area. Almost 200 species' range of distribution falls within the study area and are supported by the available habitats in the larger local area. Due to the topography and habitat types present in the study area, the expected birds will be diverse and largely limited to bushveld savannah species. A total of 15 Red Data Listed species are expected in the larger study area (Table 3.2).

Table 3.2 Red Data and Endemic birds that may be present in the study area (Taylor M.R. et al, 2015)

Scientific name Common name (p Roberts)	Habitat requirements	National Red data Status	Occurrence Potential
<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	Likely (Komati River)
<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	Visitor
<i>Circus ranivorus</i> African Marsh Harrier	Undisturbed wetland and grassland.	EN	Visitor to Mpumalanga
<i>Coracias garrulous</i> European Roller	Open woodland	NT	Edge of range. Fragmented habitat
<i>Eupodotis senegalensis</i> White-bellied Korhaan	Open woodland and grassland	VU	Unlikely, habitat inadequate
<i>Falco biarmicus</i> Lanner Falcon (p556)	Open grassland and cleared woodland habitats. Cliff-nester, also in old nests in trees.	NT	Likely
<i>Geronticus calvus</i> Southern Bald Ibis	Montane grassland, ploughed lands	VU	Seasonal visitor
<i>Gyps coprotheres</i> Cape Vulture (p489)	Both open country (grasslands) and woodland. Reliant on tall cliffs for breeding and roosting. Wanders widely.	VU	Frequent visitor
<i>Hirundo atrocaerulea</i> Blue Swallow	Mist belt grassland	CR	Unlikely, habitat inadequate
<i>Mycteria ibis</i> Yellowbilled stork (p617)	Dams, large marshes, swamps, estuaries, margins of lakes and rivers, seasonal wetlands.	NT	Seasonal visitor
<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	Likely (Komati River)
<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	Frequent visitor
<i>Sagittarius serpentarius</i> Secretary bird (p542)	Open country: Savanna, open woodland, grassland and dwarf shrubland.	NT	Frequent visitor
<i>Turnix nanus</i> Black-rumped Buttonquail	Secretive, nomadic. Wide range of habitats.	EN	Unknown
<i>Tyto capensis</i> African Grass Owl	Extensive tracts of open grassland and wetland	VU	Possible, wetlands and nearby grassland

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):

The half collared Kingfisher was recorded during the survey in the riparian habitat of the Komati River and the African finfoot was confirmed to be present in the same habitat by conservation personnel of the Game Reserve. The Lanner falcon may be seasonally or permanently present. Of special concern is the grass owl and marsh harrier that may be permanently or seasonally present within and wetland habitats and nearby grassland.

The bird assemblage in the local area can be assumed to be diverse and representative of the atlas area (with exception of sensitive and specialized birds that may have been affected by negative changes to the larger local environment). There are few large trees and with exception of the riparian habitat and rocky outcrops there are no natural woodland present on the study area that may be used for nesting by large birds. Large raptors, vultures and storks will certainly visit the site regularly in search of food as their natural habitat has already been significantly been reduced regionally, over the past decades.

A large loss of indigenous vegetation and habitat will have a negative impact on the maintenance of reptiles, locally. For this reason it is important that adequate refuge and ecological corridors are provided to ensure that the present bird assemblage is maintained in the local area.

#### 5.4 Mammals

Several species of small to medium sized mammals will utilize the natural habitats on the property. Table 3.3 projects the assemblage of Red Data Listed and Endemic mammals that falls within the distribution range of the study area (Child et al, 2016).

Table 3.3 Red Data listed mammals of the study area (Child et al, 2016)

<i>Scientific Name</i> <i>Common Name</i>	Habitat and Ecology	Endemism / Local status	Regional Status 2016	IUCN Status
ORDER: Artiodactyla - Family: Bovidae				
<i>Cephalophus natalensis</i> Natal Red Duiker	Inhabits evergreen forest, tropical/subtropical forest patches, coastal scrub, and riverine thickets.	Unlikely to be present, habitat inadequate	Near Threatened B2ab(ii,V)	Least Concern 2016
<i>Hippotragus niger niger</i> Sable Antelope	The Sable Antelope is an "edge" species that frequents the woodland/grassland ecotone.	Locally extinct	Vulnerable A1ab+C2a(i)+D1*†	Least Concern 2008
<i>Ourebia ourebi</i> Oribi	Oribi inhabit savannah woodlands, floodplains and other open grasslands, from around sea level to about 2,200 m.	Possible, habitat adequate	Endangered C2a(ii)	Least Concern 2016
<i>Pelea capreolus</i> Grey Rhebok	Grey Rhebok is associated with rocky hills, grassy mountain slopes, and plateau grasslands in the eastern extent of their distribution.	Endemic <b>Present, recorded on site.</b>	Near Threatened A2bd*†	Least Concern 2004
<i>Redunca fulvorufula</i> Mountain Reedbuck	Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands, from 1,500-5,000 m.	Near Endemic. Possible on higher altitude hillsides.	Endangered A2b*†	Least Concern 2008

ORDER: Artiodactyla - Family: Hippopotamida				
<i>Hippopotamus amphibius</i> Hippopotamus	The Hippo is an amphibious creature, spending the majority of its day in water, and emerging at night.	Possible, habitat adequate Present in official Nkomazi GR	Least Concern*†	Vulnerable A4cd 2008
ORDER: Perissodactyla - Family: Rhinocerotidae				
<i>Ceratotherium simum</i> Southern White Rhinoceros	The species is found in grassland in bushveld savanna habitats.	Near Endemic. Possible, habitat adequate	Near Threatened A4ad*†	Near Threatened C1+A3ad 2011
ORDER: Artiodactyla Family: Giraffidae				
<i>Giraffa camelopardalis</i> Giraffe	Acacia savannah/woodland and open woodland landscapes are the preferred habitats for this subspecies.	Present in official Nkomazi GR (Escapees may visit)	Least Concern	Vulnerable A2acd 2016
ORDER: Proboscidea Family: Elephantidae				
<i>Loxodonta africana</i> African Elephant	Within South Africa, elephants occur in most habitat types.	Present in official Nkomazi GR (Escapees may visit)	Least Concern*†	Vulnerable A2a 2008
ORDER: CARNIVORA Family: Mustelidae				
<i>Aonyx capensis</i> Cape Clawless Otter	African Clawless Otters are predominantly aquatic and seldom found far from water.	Possible, habitat adequate <b>Present, recorded on site.</b>	Near Threatened C2a(i)*	Near Threatened A2cde+3cde 2015
<i>Lutra maculicollis</i> Spotted-necked Otter	The Spotted-necked Otter inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes.	Possible, habitat adequate	Vulnerable C2a(i)	Near Threatened A3cde 2015
<i>Poecilogale albinucha</i> African Weasel	It is mainly found in savanna associations, although this species probably has a wide habitat tolerance.	Unknown	Near Threatened C1	Least Concern 2015
ORDER: CARNIVORA Family: Herpestidae				
<i>Lycaon pictus</i> African Wild Dog	African Wild Dogs were primarily an open plains species, more recent data indicate that they reach their highest densities in thicker bush.	Unlikely visitor	Endangered D	Endangered C2a(i)
ORDER: CARNIVORA Family: Felidae				
<i>Leptailurus serval</i> Serval	The Serval has quite specific habitat requirements, so it may be locally restricted to smaller areas within its broad distribution range.	Likely to be present, habitat adequate	Near Threatened A2c + C2a(i)*†	Least Concern 2015
<i>Panthera pardus</i> Leopard	Leopards occur in the widest range of habitats among any of the Old World Cats.	Visitor	Vulnerable C1*††	Vulnerable A2cd
<i>Panthera leo</i> Lion	Wide tolerance of habitat. Social prides of several individuals.	Present in official Nkomazi GR (Escapees may visit)	Least Concern	Vulnerable A2abcd
ORDER: CARNIVORA Family: Hyaenidae				

<i>Hyaena brunnea</i> Brown Hyaena	The Brown Hyaena is found in dry areas, rocky, mountainous areas with bush cover in the bushveld areas.	Possible, habitat adequate	Near Threatened C2a(i)+D1*	Near Threatened C1 2015
<i>Crocuta crocuta</i> Spotted Hyaena	Widespread in African savannah.	Locally extinct	Near Threatened C2a(ii)*+‡	Least Concern
ORDER: Chiroptera Family: Vespertilionidae				
<i>Miniopterus schreibersii</i> Schreibers' Long-fingered Bat	Fragmented, Primary cause of change: Human interference.	Occasional visitor	Near Threatened	
ORDER: Chiroptera Family: Rhinolophidae				
<i>Rhinolophus cohenae</i> Cohen's horseshoe bat	This species mainly occurs in the Mesic Highveld Grassland Bioregion but also occurs in the Lowveld Bioregion and the Central Bushveld Bioregion. Key roosting sites include subterranean habitats like caves and old mine adits.	Likely visitor	Vulnerable C2a(ii)+D1	Not evaluated
ORDER: Insectivora Family: Chrysochloridae				
<i>Amblysomus hottentotus</i> Hottentot's Golden Mole	This species occurs predominantly within the mesic eastern regions of South Africa. Prefer moist soils near water sources, however they are able to survive far from water providing that soils remain soft enough for burrowing	Endemic. Possible, habitat adequate	Least Concern	Least Concern 2015
<i>Amblysomus septentrionalis</i> Highveld Golden Mole	Ranging across the Mpumalanga Highveld from Wakkerstroom northwards to Ermelo and Barberton, and westwards to Gauteng, OFS. Typically occurs within meadows and edges of marshes in high-altitude grasslands	Endemic. Possible, habitat adequate	Near Threatened B2ab(ii,iii)*	Near Threatened B2ab(ii,iii)* 2015
ORDER: Insectivora Family: Soricidae				
<i>Crocidura mariquensis</i> Swamp Musk Shrew	This species has highly specific habitat requirements. It occurs in wetlands and waterlogged grasslands predominantly, reed beds. Important prey species of African Grass-owls.	Possible, habitat adequate	Near Threatened B2ab(ii,iii,iv)	Least Concern 2016
<i>Myosorex cafer</i> Dark-footed Forest Shrew	Dark-footed Forest Shrews are restricted to moist, densely vegetated forests and grasslands. <b>Endemic.</b>	Unlikely to be present, habitat inadequate	Vulnerable B2ab(i,ii,iii,iv)*+†	Least Concern 2016
ORDER: Primates Family: Cercopithecoidea				
<i>Cercopithecus albogularis</i> Samango Monkey	Samango Monkeys are primarily arboreal, utilising the canopy of evergreen forests.	Unlikely, habitat inadequate	Near Threatened B2ab(ii,iii,v)	Least Concern 2008
ORDER: Rodentia Family: Muridae				
<i>Dasymys robertsii</i> African Marsh Rat	These species have been recorded from a wide variety of habitats, but they rely on intact wetlands in these	Possible, habitat adequate	Near Threatened B2ab(ii,iii,iv)	Least Concern 2016

	areas.			
ORDER: Pholidota    Family: Manidae				
<i>Smutsia temminckii</i> Ground Pangolin	It is a predominantly solitary, terrestrial species that is present in various woodland and savannah habitats.	Unlikely to be present, habitat inadequate	Vulnerable A4d	Vulnerable A4cd*†‡

The following larger mammals are confirmed to be present on the larger Game Reserve: Blesbok; Bushbuck; Cheetah; Common Duiker; Eland; African Elephant; Gemsbok; Giraffe; Hippopotamus; Brown Hyena; Impala; Klipspringer; Kudu; Lion; Nyala; Oribi; Red Hartebeest; Reedbuck; Mountain Reedbuck; White Rhinoceros; Springbuck; Steenbok; Warthog; Waterbuck; Blue Wildebeest; Burchells Zebra. Several of these have been re-introduced to the Game Reserve and require special fencing as these are classified as being dangerous (Elephant, White Rhinoceros and Lion) and cannot be allowed to roam free on the total area of the Game Reserve.

For interest sake, historically expected species are included (Table 3.3) and it can be concluded that nine species are locally extinct since historic times. With exception of the re-introduced species, most threatened species that may be present represents smaller animals that can hide from humans and predators and / or have a secretive nature (Oribi, Serval, Cape clawless otter, Spotted-necked otter). The Cape clawless otter and Grey Rhebuck was confirmed to be present during this assessment. It can be assumed that the natural habitats on site provide ideal conditions for a wide range of mammals. It is therefore important that the natural, unmodified habitat is managed with a conservation approach as a large loss of indigenous vegetation and habitat will have a negative impact on the maintenance of birds, locally.

### 5.5 Invertebrate Report

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 study. Picker *et al.* (2002) can be referred to so as to get an idea of the large amount of invertebrate diversity that can be expected in the study area. The habitats present have the potential to support approximately 200 species of butterflies. Cross-referenced larval host plants and prey items, a total of approximately 175 species may be present at one time or another. Due to the dynamic mobility of butterflies, any of these species has the potential to be present at a given time, although variable conditions will be a limiting factor.

One Red Data Listed species are expected in the study area, Balinsky's Sprite, *Pseudagrion inopinatum*. This species habitat preference includes meandering open rivers and streams, with abundant marginal vegetation. This species has a high potential to be present in the Komati River as old records list Badplaas and it was recently confirmed to be present in the River in the reach below the Vygeboom Dam and at other localities. The global population however is still thought to be declining, and has a known extent of occurrence of less than 15000 km<sup>2</sup>. The species has



therefore been down listed from Endangered to Near Threatened on the basis of this new information. This information was sourced from the SANBI Red List of South African Species.

The proposed clearing of indigenous vegetation will have a significant negative impact on the presence of invertebrates and specific operational activities such as the large scale use of pesticides will have additional negative consequences. For these reasons it is important that adequate refuge and ecological corridors as well as buffer areas are provided to ensure that the present invertebrate assemblage is maintained in the local area.

### **5.6 Pollinators**

Pollinators provide an essential ecosystem service that result in the out-crossing and sexual reproduction of many plants. They benefit society by increasing food security in agricultural and natural ecosystem and they play an important role in conserving biological biodiversity (Eardly et al. 2006). Pollinator diversity includes an immense range of fauna, ranging from the tiniest invertebrates to relatively large vertebrates. Often, pollinators form part of a highly specific niche in pollinator-plant relationships and the ecosystem integrity as a whole. The loss of a single important habitat requirement (e.g. hides and cover objects, larval hosts, availability of water, etc.) for pollinators in an ecosystem could have far reaching effects, ultimately resulting in extinction. Fragmentation of habitats will undoubtedly also have a negative impact on the occurrence and distribution of pollinators and consequently on the genetic and population integrity of ecosystems. The successful survival of pollinators is thus further motivation for the conservation of undisturbed and unimpaired, interconnected ecological corridors crossing property boundaries in local areas.

Furthermore, the land user is largely dependent on natural pollinators to fertilize the flowers to ensure production of nuts and will take care with all construction and operational activities to encourage their presence.

## **6. Sensitivity and Impact Assessment**

### **6.1 Sensitivity rating and buffer zones**

The sensitivity zoning (based upon natural integrity, fauna potential and ecological functions) for the different ecological units is delineated in Figure. 1 and summarized as follows:

Table 4.1 Habitat sensitivity and minimum buffer zones

Habitat	Sensitivity Rating	Surface area
Transformed land: Infrastructure	Very low	16Ha
Pioneer grassland: Old lands	Low-medium	1908Ha
Disturbed grassland: Old meadows	Medium	44Ha
Climax grassland	High	180Ha
Rocky outcrop habitat	High	130Ha
Riparian zones & aquatic ecosystems	High	170Ha
Wetlands	High	539Ha
Buffer zones	(Also include other habitat)	613Ha
<b>Total:</b>		<b>3614Ha</b>
<b>Total land cover</b> that qualify per definition as indigenous vegetation		1952Ha

The investigation indicates that several habitat types are sensitive habitats where large scale development is not recommended. By implication, only relatively level areas (without sensitive bio-ecological features) and previously disturbed areas can be considered for development. These areas include the pioneer grassland (old lands) and disturbed grassland. In order to provide adequate protection of the sensitive habitats and to provide refuge for biota, buffer areas and corridors must be provided.

The MTPA minimum requirement is a 30m buffer zone around rock outcrops which is implemented with this report. A 100m buffer is required around NFEPA wetlands and rivers. This requirement may be applicable in cases to protect pristine ecosystems but in this instance it will sterilize a large surface area of land available for cultivation in an already disturbed ecosystem. A more objective approach was to use the DWS buffer guideline / tool (Macfarlane & Bredin, 2017) for determining appropriate buffer zones and to combine this with site conditions in order to provide a suitable buffer zone. Determination of this buffer zone has been calculated in the Freshwater Ecosystems Report and the results are integrated into this report as well.

One exception where the buffer size can be relaxed is where roads and infrastructure are present where a large buffer is illogical and will not serve a purpose but will sterilize unnecessary large surface areas for cultivation.

## 6.2 Ecological corridors and priority areas

Considering the fact that these properties formed part of a Protected Area and the fact that the MTPA provides for ecological corridors in the site area, special consideration must be given to provide land to for corridors and to conserve important biodiversity and ecosystems. The proposed corridors and conservation areas has been designed with the objective to create functional ecological corridors to connect habitats and to conserve habitats with a high ecological importance. The buffer zones and corridors are projected in Figures 1.2; 1.2 and 1.3.

## 6.2 Discussion and Impact assessment

The single most important impact on biodiversity as consequence of transforming virgin land to agriculture is the loss of vegetation and loss and fragmentation of

natural habitats and consequently the loss of fauna. The typical ecosystem / vegetation type of this region is under pressure by the widespread clearing of vegetation for the purposes of cultivation of fruit and nut trees. If not mitigated, the loss of this type of indigenous vegetation will have high significance on site and local level and mitigation is required to lessen the significance of the impact.

The potential and present impacts related to the above discussion were assessed by applying the following methodology:

- The *nature* of the impact entails a description of the cause of the impact, what will be affected and how it will be affected;
- The *extent* refers to the area where the impact will be significant e.g. on site, local area, regional, provincial, national or international;
- The *duration* refers to the lifetime of the impact:
  - Short term: 0-5 years
  - Medium term: 5-15 years
  - Long term: >15 years
  - Permanent
- The *probability* describes the likelihood of the impact occurring during the duration:
  - Improbable (Low likelihood)
  - Probable (Distinct possibility)
  - Highly Probable (Most likely)
  - Definite (Impact to occur regardless of any preventative measures)
- The *significance* is determined by analyzing the above subjects and is assessed as low, medium or high.

The impact assessment is propagated in Table 4 and additional mitigation measures in order to ensure that potential impacts are minimized are listed in Table 4.2. The way of reasoning discussed in the preceding paragraphs and the impact assessment indicates the area that may be considered for development (Figure 1.1 and Figure 1.2). This gives a total of approximately 1952Ha available for cultivation.

## 7. Conclusion and Recommendations

The biodiversity assessment concludes that significant areas on the site are of **high** biological and ecological importance and sensitivity. These areas must be conserved and buffer zones must be provided to ensure that any potential impacts are mitigated to an efficient extent. However, specific areas may be considered for development where potential impacts on the natural environment can be managed to an acceptable level. These areas include the pioneer grassland (old lands) and disturbed grassland as indicated on the delineation figures.

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These include members of the IUCN Species Survival Commission Specialist Groups, IUCN Red List Partners, and many others, including experts from universities, museums, research institutes and non-governmental organizations. Website: [www.iucn.org/redlist](http://www.iucn.org/redlist)

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## **Appendixes**

# **APPENDIX 1: SPECIALIST DETAILS**