



SPECIALIST BIODIVERSITY REPORT

**General Biodiversity and Ecology Report:
Clearing of vegetation on various portion of the farm
Gemsbokspruit 229JR, Thembisile Hani Local Municipality,
Mpumalanga Province**

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Specialist Environmental & Biodiversity Assessments

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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: 2021-04-24

EXECUTIVE SUMMARY

The applicant intends to develop a township on the property. As partial requirement for the EIA application a terrestrial ecological assessment was recommended by the environmental consultant. *Afrika Enviro & Biology* was appointed to conduct a site sensitivity verification and bio-ecological assessment to assist in recommending suitable locations for these activities in support of the application process.

The property is approximately 116Ha in size and is rectangular in shape. The property is located immediately to the east of the village called Gemsbokspruit as well as the R544 (Absalom Road). A gravel district road transects the site from west to east and there is a distinct difference in the vegetation assemblage to the north and south of the road. This may be attributed to the fact that this area forms a watershed and more importantly there is a difference in the geology. It appears that the rock formations to the north consist of dolerite and the rock formations to the south of the road consist of sandstone and the soil is derived thereof. The site is vacant and the land use consists of grazing of communal cattle. Old agriculture lands are located on the south-western section. A rock dump site and an unused borrow pit, the legacy of historic road construction activities, is located on the northern section. The remainder of the site is naturally vegetated and varies from closed woodland to short shrubland as well as grassland. Prominent rock outcrops are located on the northern section. Wetlands are located to the west and south of the site (off-site).

The sensitivity zoning (based upon natural integrity, fauna potential and ecological functions) for the different ecological units are summarized as follows:

Vegetation Community	Sensitivity Rating
Modified land	Low
Short closed shrubland	Medium
Vachellia woodland	Medium
Rocky outcrop habitat	High

The single most important impact on biodiversity as consequence of transforming land is the loss of vegetation and loss and fragmentation of natural habitats and consequently the loss of fauna. The transformation of land will have a relatively large ecological footprint it is important to mitigate potential impacts in order to reduce the magnitude of the potential impacts on the natural environment. The assessment considers the fact that the development area is not pristine and negative impacts are already present on site. Furthermore, the habitat types and biodiversity that are affected is also well represented in the local surrounding area. The sensitivity analysis recommends that only the areas with low – medium ecological sensitivity are considered for development (pending efficient mitigation). These facts and circumstances were considered with the impact assessment.

It is concluded that although the transformation of land for this project will have a relatively large ecological footprint, the potential negative impacts and consequences can be mitigated to an acceptable to reduce the magnitude of the potential impacts on the natural environment.

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1. INTRODUCTION

1.1 Background and objectives

The applicant intends to develop a township on the property of approximately 116Ha in extent. As partial requirement for the EIA application a terrestrial ecological assessment was recommended by the environmental consultant. *Afrika Enviro & Biology* was appointed to conduct a site sensitivity verification and bio-ecological assessment to assist in recommending suitable locations for these activities in support of the application process. The terms of reference for this investigation are as follows: Biodiversity Assessment with the following objectives:

- Site sensitivity verification (select suitable sites for the activity footprints)
- Important communities and habitats;
- Important- and indicator species and their relevance;
- Red Data potential and actual species found;
- Ecological mapping and sensitivity zoning of relevant areas;
- Habitat delineation;
- Invasive/Exotic species and weeds;
- Impact assessment, recommendations and mitigation measures;

For the purposes of this report, the site was investigated on 2021-04-22.

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

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.

The fauna investigation was not a comprehensive specialist survey as required by the Mpumalanga Tourism and Parks Agency (MTPA) *Minimum requirements for environmental study reports when applying for authorization for an activity that may have a detrimental effect on the environment*.

The reasoning is that sensitive faunal habitats have been identified during the first phase of the assessment and are excluded from the development plan and will be protected by buffer zones from the development activities (Figure 1). The proposed activities will thus not have a detrimental effect on the environment / sensitive areas with a high fauna / flora / ecological potential. Specialist studies to cover each subject or taxon will require considerable time and the employment of additional specialists to complete. This will be a very expensive task and the results will be subjective as it is more than likely that only a small percentage of the fauna that actually have the potential of being present (or are actually present) will be recorded.

Furthermore, in recent time, reference and specialist literature, data basis', and distribution lists have become available that are accurate and reliable. By employing these sources, a desktop investigation (supported by physical habitat investigations) of the potential fauna can be cross-referenced with the available habitat in order to predict the fauna potential of a specific area or habitat type. These results will be reliable to be used for planning purposes. The author has confidence that the results of the desktop study combined with the onsite assessments provide sufficient information to make conclusions and provide recommendations regarding the fauna assemblage of the site.

However, in case that habitats may be destroyed that have potential to harbour high concentrations of biodiversity or threatened species and sensitive ecosystems the studies required by MTPA requirements will be of value to provide detailed results to be considered for the application process.

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 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 with section 4.

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). 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 (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 site and local level 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 in order to establish the faunal potential. 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. 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 1.1).

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 and riparian sensitivity is measured only on its maintenance of biodiversity and basic ecological functions at this basic level of assessment.

Table 1.1 Criteria used for sensitivity rating of habitats

Ecological Importance/Biodiversity Value	Sensitivity Rating
Terrestrial and Riparian 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>
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>
Habitats and ecosystems 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>
Habitats and ecosystems which have been modified from the reference state with the result that habitats have been fragmented and the trend is in a negative direction. Ecological importance as well as biodiversity value is low. External impacts will not have a significant impact on its status.	<i>Low</i>
No ecological significance. Highly transformed, dominated by infrastructure development. Ecological functions may be considered irreversibly impaired.	<i>Very Low</i>

3. Background Information

3.1 Biophysical description of the study area

The general study area consists of the wooded plains of the savannah Biome of western Mpumalanga. Seasonal summer-rainfall and very dry winters (MAP: 500-700mm) and mean monthly temperatures vary from -3.1°C in winter to 35.5°C during the summer. The winters can produce cold spells but the occurrence of frost is infrequent. The southern and eastern areas are underlain by granite of the Lebowa Granite Suite. In the north sedimentary rocks of the Waterberg Group are most important. Rock formations are dominated by sandstone, conglomerate, siltstone and shale. Soils vary from deep Hutton to Clovelly and shallow Glenrosa soil types.

3.2 Ecology & biodiversity

Nationally, the site is situated within the Mixed Bushveld (A18) veld type according to Acocks (1988), and Mixed Bushveld according to Low & Rebelo (1998). However, these classifications are very broad and may include several vegetation communities of importance. Regionally, the more accurate vegetation classification system of Mucina & Rutherford (2006) is used to classify the vegetation unit occurring at the study site. According to these authors the vegetation unit present on this property is classified as Central Sandy Bushveld (SVcb 12). This vegetation unit is found at an altitude of 850-1450m. Central Sandy Bushveld is rated as Vulnerable and only 3% is conserved (mainly in the Doorndraai Dam and Skuinsdraai Nature Reserves) according to Mucina & Rutherford, 2006. Approximately 19% has been transformed due to cultivation and 4% due to urbanization.

3.3 Conservation planning

Mpumalanga Biodiversity Sector Plan (MTPA, 2014)

The Mpumalanga Biodiversity Sector Plan (MBSP) is a systematic conservation plan developed and adopted by the Province (DARDLEA) in order to aid in environmental and conservation planning of the province. The categories relevant to this project are projected in Appendix 2 and listed in Table 1.2.

Table 1.2 MBCP and NFEPA categories relevant to the site

Freshwater ecosystems / NFEPA inventory		
Category	Subcategory	Content
Other Natural Areas	Other Natural Areas	-
Terrestrial Ecology		
Category	Subcategory	Content
Other Natural Areas	Other Natural Areas	-
Heavily or moderately modified	Moderately modified	Old lands

4. Vegetation & habitat report and general biophysical descriptions

4.1 General site and activity descriptions

The property is approximately 90Ha in size and is rectangular in shape. The property is located immediately to the east of the village called Gemsbokspruit as well as the R544 (Absalom Road). A gravel district road transects the site from west to east and there is a distinct difference in the vegetation assemblage to the north and south of the road. This may be attributed to the fact that this area forms a watershed and more importantly there is a difference in the geology. It appears that the rock formations to the north consist of dolerite and the rock formations to the south of the road consist of sandstone and the soil is derived thereof. The site is vacant and the land use consists of grazing of communal cattle. Old agriculture lands are located on the south-western section. A rock dump site and an unused borrow pit, the legacy of historic road construction activities, is located on the northern section. The remainder of the site is naturally vegetated and varies from closed woodland to short shrubland as well as grassland. Prominent rock outcrops are located on the northern section. Wetlands are located to the west and south of the site (off-site). The following habitats were defined on the study area:



The proposed site is located immediately to the east of the Gemsbokspruit township crossroads

i) Modified land

These areas include disturbed surface areas such as the rock dump site, the borrow pit and land that have been cultivated in the past. As these land uses / activities have ceased in the historic past, the related areas has naturalized as pioneer vegetation colonized it. The old lands and borrow pit is largely grass covered (*Heteropogon contortus*, *Melinis repens* and *Aristida congesta*). Small thickets of *Searsia lanceolata*, *Euclea undulata* and the alien invader, *Lantana camara*, are randomly present and the forb, *Lippia javanica*, is abundant. Biodiversity is low and ecological functions are limited. The ecological sensitivity of this land is low.



The rock dump area is low in biodiversity and offers limited ecological functions

ii) Short closed shrubland

This natural habitat remains intact on the southern and northwestern sections of the proposed development area. The vegetation structure is classified as short closed shrubland as the shrub *Lopholaena coriifolia* is locally dominant. Shallow, solid sandstone outcrops are present and where the abovementioned species forms dense stands in broken areas and around the outcrops. Other woody vegetation is present in the shelter provided by the outcrops typically include *Gymnosporia buxifolia*, *Searsia lancea*, *Searsia pyriodes* and *Euclea undulata*. Forbs and wild flowers are sparse and limited to sandy areas. Species present are *Babiana hypogea*, *Crossandra fruticulosa*, *Helichrysum cephaloideum*, *Helichrysum rugulosum* and *Senecio affinis*. As is evident on aerial images the area is subject to overgrazing and trampling by cattle and this fact is affirmed by large stands of the invasive forb, *Stoebe vulgaris*, which is an indicator of poor veld management.

Grass cover is dominated by *Hyparrhenia hirta*, *Aristida adscensionsis* and *A. congesta*. No Red Data Listed (RDL) or endemic species were recorded. Biodiversity is relatively low and the ecological importance and sensitivity is **Medium**.



The shrubland is dominated by *Lopholaena coriifolia*, small outcrops with woody vegetation is present in the lower lying section to the south

iii) *Vachellia* woodland

This habitat is found mainly to the north of the road and is dominated by shrubs and small trees of *Vachellia karroo*. It varies from an open to a closed structure, with less trees in the eastern section. It is evident that larger trees of this species is absent as result of wood harvesting by the local human population. Grass cover is dominated by *Hyparrhenia hirta* and *Loudetia simplex*. Forbs and wild flower diversity is very low, with examples of *Dicoma anomala*, *Helichrysum rugulosum*, *Berkheya radula* and *Hermannia transvaalensis* being recorded.

Other shrubs and small trees present are *Euclea undulata*, *Senegalia caffra*, *Dichrostachys cinerea*, *Aloe marlothii*, stunted examples of *Sclerocarya birrea* and *Protea caffra* (very few present). No Red Data Listed (RDL) or endemic species were recorded. Biodiversity is relatively low and the ecological importance and sensitivity is **Medium**.



Shrubs and small trees dominate this veld type and biodiversity is relatively low

iv) Rocky outcrop habitat

This habitat includes the dolerite outcrops to the north of the road. These outcrops vary from small, low outcrops to prominent outcrops forming a ridge in the northern section. The small outcrops are mainly barren but the large outcrops and ridge is well covered with woody vegetation. Shrubs and small trees include *Rhoicissus dentata*, *Grewia flava*, *Euclea undulata*, *Vachellia karroo*, *Senegalia caffra*, *Combretum molle*, *Dombeya rotundifolia*, *Erythrina lysistemon*, *Searsia lancea*, *Rhoicissus dentata*, *Gymnosporia buxifolia*, *Ozoroa paniculosa* and *Faurea saligna*.

Succulents include *Aloe marlothii* and *Aloe greatheadii*.

These outcrops also provide a niche for specialized fauna and a refuge for fauna in general. No Red Data Listed (RDL) or endemic species were recorded. Biodiversity is medium and the ecological importance and sensitivity is **High**.



The dolerite outcrops are wooded with a good diversity of shrubs and trees and provide refuge to specialized fauna and fauna in general

v) Wetlands and hydrological features

This scope of this study does not include a wetland investigation and it is important to note that there are no wetlands present on site. Wetlands are located nearby and off-site:

- The topography on the southern section of the site is relatively flat but slopes towards the main drainage line to the south of the site. The slope is gentle and becomes steeper to the south where a valley bottom wetland forms the main drainage basin on a west - east axis.
- A spring and seepage wetlands is located on the slope to the south of the site and tribute to the valley bottom wetland.

A sufficient buffer area is present between the development area and the wetlands.



A seepage wetland and a valley bottom wetland are present to the south of the site - these will not be directly impacted by the proposed development as a sufficient buffer is present

5. 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. Legislation that protect flora in South Africa and specifically in Limpopo 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). Using SANBI Data and literature references a Red Data List (RDL) for the local study area was compiled (Table 2.1). No RDL taxa were recorded. Protected taxa that were recorded are listed in Table 2.2.

Table 2.1 National RDL species potential for the relevant quarter degree grid

FAMILY	Scientific Name	RDL Status	Growth form
CELASTRACEAE	<i>Lydenburgia cassinoides</i>	NT (Endemic)	Shrub, tree
MESEMBRYANTHEMACEAE	<i>Frithia humilis</i>	EN (Endemic)	Small, stem less succulent

Table 2.2 Protected flora recorded in the study area

Scientific Name	RDL Status	Regulating Act
<i>Sclerocarya birrea</i>	Least concern	MNCA; NFA
<i>Faurea saligna</i>	Least concern	MNCA
<i>Protea caffra</i>	Least concern	MNCA
<i>Aloe greatheadii</i>	Least concern	MNCA
<i>Aloe marlothii</i>	Least concern	MNCA

6. 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 literature study. However, the site was investigated to record fauna that is actually present as well as field signs of fauna present. The results of the investigation follow under the following headings.

6.1 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 3.1).

Table 3.1 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	Savannah, grassland, thickets,	78	Least Concern Endemic
<i>Breviceps mossambicus</i> Mozambique Rain frog	Savannah, grassland, Rainfall >700mm.	184	Least Concern Endemic Sthrn A
<i>Cacosternum nanum nanum</i> Bronze Caco	Wide variety of habitats. Savannah, 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. The main negative impact on this taxon will be fragmentation and degradation of habitat.

6.2 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 3.2).

Table 3.2 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 vittiver vittiver</i> p195 Transvaal girdled lizard	Grassland: In cracks in small rock outcrops. Rocky outcrops in bushveld, open woodland, grassland crevices, under rocks.	Endemic
<i>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. Savannah and grassland. Moister regions of SA.	Endemic Protected
<i>Lamprophis guttatus</i> p74 Spotted house snake	Rocky areas, preferring dry habitats.	Endemic Protected

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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 vansoni</i> p262 Van Son's thicktoed gecko	Land type: Varied – karoo 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 rhombaetus</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 3.2). A total of 23 Endemic; 9 Near Endemic; 4 Red Data species are included. Grassland species that may be directly affected includes a total of 26 species. None of 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.

6.3. 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 3.3).

Table 3.3 Red Data Listed birds that may be present in the study area.

Scientific name Common name (p Roberts)	Habitat requirements	National RDL Status	Potential presence on site
<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>Anthus chloris</i> (<i>Yellow-breasted pipit</i>)	Favours lush montane grassland with grass about 15-30 cm high on flat or gently sloping ground;	VU Endemic	Unlikely. Expected at higher altitudes.
<i>Balearica 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 Endemic	Possible foraging visitor. Habitat inadequate for breeding.
<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.

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<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> Lanner Falcon (p556)	Open grassland and cleared woodland habitats. Cliff-nester, also in old nests in trees.	NT	Possible resident or visitor. 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>Grus carunculata</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>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 grassland, 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: Savannah, open woodland, grassland and dwarf shrubland.	NT	Likely foraging visitor.
<i>Sarothrura ayresii</i> Striped flufftail	High-altitude wetlands of South Africa	CR	Unlikely. Expected at higher altitudes.
<i>Turnix nanus</i> Black-rumped buttonquail	Generally prefers short grassland with patches of bare clay ground, especially with <i>Thesium brevibarbatum</i> , <i>Themeda triandra</i> and other grasses. It may also move into open savannah, cultivated fields and marshy ground at the edge of irrigated sugar cane fields.	EN	Possible visitor. Habitat adequate but human impacts will discourage permanent residence.
<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; Sthrn A = Southern Africa):

As is evident from Table 3.3 the larger study area will provide habitat for a diverse range of birds including RDL and endemic species. The presence of none of the RDL species could be confirmed during the assessment. With view of the site location, historic and present land use as well as nearby human activities it is assumed that the bird assemblage and diversity is impoverished. No sensitive or threatened taxa are expected to be present but may still visit the site.

6.4. Mammals

Table 3.4 summarize 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 included. 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).

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Table 3.4 Red Data listed mammals of the study area (Friedman & Daly, 2004)

Classification	Habitat	Status
Order: Insectivora		
Family: Soricidae		
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
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
Family: Chrysochloridae		
Robust Golden Mole <i>Amblysomus robustus</i>	Endemic. Known from only the Steenkampsberg Mountain Plateau and in the Dullstroom and Belfast areas. Prefer friable soils, from sands to quite heavy clays, but avoid shallow substrates and waterlogged soil.	Vulnerable Endemic
Highveld golden mole (<i>Amblysomus septentrionalis</i>)	Moist sandy Highveld grassland. Typically occurs within meadows and edges of marshes in high-altitude grasslands	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
Rough-haired golden mole <i>Chrysopalax villosus</i>	Grassland, dry ground on the fringes of marshes or damp vleis. Excavate burrows; loose piles of soil. Very rare.	Vulnerable Endemic
Family: Erinaceidae		
Hedgehog (<i>Atelerix frontalis</i>)	Temperate climate. Grassland and savannah.	Near threatened
Order: Chiroptera		
Family: Vespertilionidae		
Schreiber's' long-fingered bat (<i>Miniopterus schreibersii</i>)	Cave dweller : Caves and sub-terranean 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
Family: Rhinolophidae		
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
Order: Carnivora		
Family: Proteleidae		
Aardwolf (<i>Proteles cristatus</i>)	Savannah woodland and grassland. Nocturnal, solitary. Termites.	Protected
Family: Hyaenidae		
Brown hyaena (<i>Hyaena brunnea</i>)	Semi-desert, rocky grassland: open scrub and open woodland savannah. Nocturnal.	Near threatened Protected
Family: Felidae		
Serval (<i>Felis serval</i>)	Proximity to water; tall grass	Near threatened
Family: Mustelidae		
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
Order: Tubulidentata		
Family: Orycteropodidae		
Aardvark / Ant bear (<i>Orycteropus afer</i>)	Widespread. Wide habitat tolerance. Open woodland, scrub and grassland.	Least Concern Protected
Order: Artiodactyla		
Family: Bovidae		
Blesbok	Grasslands: Highveld grasslands where water is available.	Endemic

(<i>Damaliscus dorcas phillipsi</i>)		
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
Family: Bathyergidae		
Cape Molerat (<i>Georychus capensis</i>)	Sandy coastal dunes as well as unconsolidated soils along rivers.	Endemic
Family: Muridae		
Water rat (<i>Dasymys incommutus</i>)	Swamps, wet vleis and reed beds along rivers.	Near threatened
Family: Gliridae		
Rock Dormouse (<i>Graphiurus platyops</i>)	Near or on rocky outcrops. Association with dassies.	Data Deficient

The presence of none of the RDL species could be confirmed during the assessment. With view of the site location, historic and present land uses as well as nearby human activities it is assumed that the mammal assemblage and diversity is very low. No sensitive or threatened taxa are expected to be present.

6.5 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. The transformation of this land will have a large ecological footprint and it is anticipated that it will have a significant impact on invertebrates at site level if the natural habitat is lost.

6.6. Synopsis of fauna assemblage

With view of the consequences of past and present impacts and the frequent daily human activities on and around the development site, it is expected that fauna sensitive to these disturbances and impacts have already moved away or have been lost due to poaching. It can therefore be expected that only taxa that are visitors or are unaffected by these impacts will be present. The fauna assemblage can be assumed to be impoverished if compared to the reference state. The habitat types on site are also well represented in the larger local area where the local fauna assemblage will be able to maintain its presence.

7. Sensitivity and Impact Assessment

7.1 Sensitivity & 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:

Vegetation Community	Sensitivity Rating
Modified land	Low
Short closed shrubland	Medium
Vachellia woodland	Medium
Rocky outcrop habitat	High

Development can be considered on the habitats with a low – medium ecological sensitivity (pending efficient mitigation). The rocky outcrop habitat has a high ecological sensitivity and must be conserved with a 20m buffer zone.

7.2 Discussion and Impact assessment

The single most important impact on biodiversity as consequence of transforming land is the loss of vegetation and loss and fragmentation of natural habitats and consequently the loss of fauna. The transformation of land will have a relatively large ecological footprint it is important to mitigate potential impacts in order to reduce the magnitude of the potential impacts on the natural environment. The assessment considers the fact that the development area is not pristine and negative impacts are already present on site. Furthermore, the habitat types and biodiversity that are affected is also well represented in the local surrounding area. The sensitivity analysis recommends that only the areas with low – medium ecological sensitivity are considered for development (pending efficient mitigation). These facts and circumstances were considered with the impact assessment. The following method of assessment was used:

- 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; 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.

Impacts and consequences that were assessed are discussed in the section below and are summarized in Table 4.

7.2.1. Loss and fragmentation of habitat

Site preparation will include vegetation clearing leading to the loss and fragmentation of habitat. This impact has a high significance and is irreversible. Mitigation is considered bearing in mind that the habitat is well represented in the surrounding

local area and the impact consequence will be localized to the extent of the site. By considering the following mitigation measures the significance can be reduced to low.

- Select the site with the objective to minimize negative impacts on biodiversity and ecology. E.g. site selection is located adjacent to an existing township as opposed to a site further afield which will result in additional fragmentation of habitat.
- Conserve sensitive ecosystems (rocky outcrop habitat) with high biodiversity and concentration of biota.
- Limit the disturbance to the development footprint only.
- Conserve as much as possible of the natural vegetation within the immediate surroundings.
- Employ an alien invasive management plan to ensure that invasive vegetation does not establish on site or the surrounding area after completion.

7.2.2. Loss of vegetation

Site clearing will lead to the loss of indigenous vegetation. This impact has a high significance. With mitigation the significance can be reduced to medium – low. Mitigation is considered bearing in mind that the habitat is well represented in the surrounding local area as well and the impact consequence will be localized. The same mitigation measures given above will also serve this impact.

7.2.3. Loss of important biota (fauna & flora)

Site clearing will lead to the loss of important flora communities and individuals. This may include prominent stands of trees and habitats that provide refuge to high concentrations of biota.

The following mitigation measures are proposed:

- Include all the measures listed under point (1).

7.2.4. Loss of fauna

Site clearing will lead to the indirect (loss of habitat) and direct (physical) loss of fauna individuals. As most fauna are quite mobile and will be able to move away from the development area once activities commence, some taxa may not be able to do this. E.g. this will include slow moving and fossorial species (tortoises, snakes, scorpions, spiders, other reptiles) and arboreal taxa (small mammals, reptiles) as well as nesting birds. The following mitigation measures are proposed:

- The potential loss of fauna and their habitat can be mitigated by employing the measures given under the abovementioned headings. Subsequently only the habitat limited to the development footprint will be lost which will not have a significant impact on the distribution and assemblage of fauna in the local area.
- Before construction commence the site must be investigated for the possible presence of slow moving and sub terrain fauna that must be relocated or assisted.
- Once site preparation commences, any fauna that are disturbed and comes out of hiding must be allowed to escape to the natural surroundings.

7.2.5. Ecological connectivity and priority areas

By implementing the abovementioned mitigation measures the potential impact on the local ecology will be mitigated to an acceptable level.

8. Conclusion & recommendations

It is concluded that although the transformation of land for this project will have a relatively large ecological footprint, the potential negative impacts and consequences can be mitigated to an acceptable level to reduce the magnitude of the potential impacts on the natural environment.

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APPENDIXES

APPENDIX 1: SPECIALIST DETAILS

CURRICULUM VITAE Louis Daniel van der Walt

1. Background Information

1.1 Personal Details

Name: Louis Daniël van der Walt (Danie).
I.D. No. 6805305147080
Residential address: 01 Tambotie Street, Kingsview, White River.
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Telephone: (013) 256 9464 or 084 510 9054
Fax: 086 603 8875
Email: danie.aeb@gmail.com
Marital status: Married
Date of Birth: 1968-05-30
Nationality: Republic of South Africa.

1.2 Secondary Education

Senior certificate examination at Linden Hoërskool, Johannesburg, 1985.

1.3 Tertiary Education

Completed the following degrees at the Rand Afrikaans University:

- **B.Sc. (Biol. Sciences)**, 1989: Majoring in Zoology and Botany.
- **B.Sc. Honoribus (Zoology)**, 1990: Subjects including Ichthyology & Aquaculture, Ecology, Physiology, Genetics, Entomology & Parasitology, Nematology, Evolution and Philosophy.
- **M.Sc. (Zoology) cum laude**, 1993. Title of script: An evaluation of the allozyme variation as well as the effect of cryopreservation of semen on the genetic selection of the African catfish (*Clarias gariepinus*).

Certified copies of these degrees and the abstract of the M.Sc. script are included with Appendix A.

1.4 Accredited Courses

I have successfully completed the following courses:

- Implementing integrated management systems (SHEQ): ISO9001, ISO14001 and OHSAS18001. Centre for Environmental Management, North-west University, Potchefstroom, October 30 – November 4, 2005.
- Wetland Training: Delineation, Functions and Rehabilitation of Wetlands. University of Pretoria, Rietvlei Nature Reserve, May, 2006.
- Environmental Impact Assessment (NEMA Regulations). Centre for Environmental Management, Northwest University, Potchefstroom, May, 2007.
- OHS Act and Regulations (Act 85 of 1993). Department of Labour, Gauteng, September, 2010.

1.5 Short Courses and Practical Workshops

- Fish Index Validation: Field Testing. DWAF Guidelines. Waterval-Boven. August 2006
- Short Course: Soil Classification and Wetland Delineation. Terrasoil Science. Nelspruit. February 2009.
- SASS5 Biomonitoring Course. Nepid Consultants. Sabie. March 2013.

1.6 Publications and contributions

During my tertiary education as well as my professional career, I have published several scientific reports and attended and contributed to various workshops and congresses. These are listed in Appendix B.

2. Previous Employment and Experience

Rand Afrikaans University, JHB

January 1990 - December 1993: Laboratory and field assistant.

1992: Aquarium and Technical assistant to Department of Zoology.

Duties included:

- Managing the zoology aquarium;
- Designing and construction of fish breeding and holding systems;
- Technical and field assistant to various research projects;
- Mentor to students in methods to collect and identify wild fish specimens and aquatic invertebrate specimens;

Silver Creek Aquaculture, Hazyview

January 1994 - May 1997: Biologist and manager of aquaculture, specializing in African Sharptooth Catfish, Tilapia and the large scale production of ornamental fish.

Duties included:

- Designing and construction of fish breeding and holding systems;
- Developing and maintenance of production systems and methods;
- Genetic selection of brood stock;
- Artificial and controlled propagation of fish;
- Managing of abattoir and fish processing;
- Marketing of fish products.

Aquaculture Consultant and Biologist

May 1997 – Present. In parallel with my present full time occupation, I also manage my own aquaculture business, specializing in ornamental fish, e.g. Goldfish, Japanese Koi and tropical fish.

Duties include:

- Designing and construction of fish breeding and holding systems;
- Developing and maintenance of production systems and methods;
- Genetic selection of brood stock;
- Artificial and controlled propagation of fish;
- Diagnoses and treatment of fish diseases;

3. Present Employment

3.1 Environmental Assessments

Since 2004, I am employed as an Environmental Assessment Practitioner and Environmental Scientist. Under this appointment my work description entails the execution of the environmental impact assessment process as prescribed by the present EIA regulations. My duties include scoping and public participation, authority consultations, interpretation of scientific studies, impact assessments, report writing, etc. The main goal that I attempt with the EIA process is to investigate all the available alternatives and information in order to provide a basis for a manageable product or project that is environmentally sustainable and acceptable to all the stakeholders involved. Projects were completed under both ECA and NEMA regulations (Appendix C).

During five years of executing EIA's, I have covered many subjects, including ESKOM power lines and substations, communication towers, dam construction, township and industrial developments, abattoirs, subdivisions, filling stations, pipelines, borrow pits and roads, golf estates, country estates, etc. A list of EIA projects in which I was the leading agent is given

in Appendix C. It should be noted that, in the capacity of Biologist I also completed the biodiversity assessment reports, if so required, for these EIA projects.

3.2 Biodiversity Consultations

As part of my graduate and post graduate studies I was trained to do biodiversity assessments and monitoring and I assisted in several such research projects at the R.A.U. I was also fortunate enough to assist Dr. Andrew Deacon (South African National Parks Board, KNP, Skukuza) on many occasions in biodiversity assessments and monitoring projects. This training and the experience that I have gained as biologist I presently utilize to do biodiversity studies in several fields of study (as listed below), mainly for environmental processes (e.g. EIA, EMPR, EMP processes). These assessments and studies are compiled for specific terms of reference, e.g. basic assessments, scoping assessments, monitoring or comprehensive specialist surveys. For these biodiversity assessments I am subcontracted as *Afrika Enviro & Biology* in order to combine the specialist biological consultations under a single entity. I rely on my training as biologist to ensure that the assessments are conducted according to standard scientific methods and procedures in order to be scientifically correct and can therefore be used as reference by co-scientists.

3.3 Present scope of work

By combining my professional abilities as Environmental Scientist and Biologist, I am experienced in compiling the following environmental reports:

- Biodiversity Assessments (Inclusive of the above scope of work);
- Environmental Impact Assessments;
- Environmental Management Plans;
- Rehabilitation Plans;
- Environmental Compliance Monitoring and Reporting.

Completed biodiversity and aquaculture reports are available on request.

4. Experience and attributes

4.1 Environmental Scientist and Biodiversity Consultant

I have completed EIA projects as well as biodiversity assessments in a diverse range of environments and natural habitats, including very sensitive areas that required intensive research and detailed assessments. A short elaboration is as follows:

Due to Mpumalanga's diverse natural resources and topographic features, this province has several very special areas of natural and biological importance. Areas such as these where I have been fortunate enough to do assessments include:

- The Eastern Escarpment, including centurms of floral endemism such as Steenkamps Berg (Machadodorp – Dullstroom); the Wolkberg centre: Barberton, Pilgrims Rest and Lydenburg and its surrounds as well as Sekhukhune Land;
- The general Lowveld region stretching from Hazyview - Nelspruit - Komatipoort;
- The general Highveld area stretching from Delmas in the west to Dullstroom and Belfast in the east;

My area of work also covers other provinces, including Gauteng-, Limpopo- and North West Province. I have a comprehensive data basis for all of the areas mentioned above and I also have an impressive library, including all the most recent literature, as well as rare and out of print literature, to aid in research. Where necessary, the assessments include consultations and the co-operation of the relevant conservation authorities and scientists.

It should be noted that my reports is accepted by Mpumalanga Parks and Tourism Agency, Limpopo Parks and Tourism, Mpumalanga Department of Agriculture and Land Affairs, National Department of Water Affairs and Environment (DWA) and the National Department of Environmental Affairs and Tourism.

The integrity of my reports has never been questioned by any stakeholder and the quality and content of work has always been complimented.

5. Referees

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APPENDIX 2: MBCP maps