FULL ECOLOGICAL AND WETLAND ASSESSMENT OF THE PROPOSED LANSERIA COMMERCIAL DEVELOPMENT SITE

Prepared for

Bokamoso Landscape Architects and Environmental Consultants

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DECLARATION

I, S. Van Staden, hereby declare that neither I, nor any members of Scientific Aquatic Services CC, have any involvement or any further commitment other than the mentioned report with the proponent. The report is the product of a non-biased, objective scientific investigation by myself and the professional team as requested by the EAP (environmental assessment practitioner) appointed by the client.

Signed in Johannesburg on the 18th of January 2011

Digital documentation not signed for security purposes
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SENSITIVE INFORMATION

This report should not be included in any documentation for public viewing, but listed as an appendix to the environmental impact assessment report.

EXECUTIVE SUMMARY

After conclusion of this biodiversity assessment, it is the opinion of the ecologists that the proposed development of the 'subject property' be considered favourably provided that the recommendations below are adhered to:

- **Ecologically sensitive habitats were observed and a sensitivity map has been developed. It is recommended that this sensitivity map be considered during the planning and construction phases of the proposed development activities to aid in the conservation of ecology within the proposed development area.**
- **The outer wetland boundary is bordered by a well developed ferrycrete layer at relatively shallow level below the ground surface. It is deemed highly likely that groundwater movement occurs below this feature augmenting the flow in the valley bottom wetland. This water movement was not considered as part of this wetland survey although cognisance should be taken from the geotechnical report for the subject property.**
- **The plans for the proposed ecologically sensitive development should be strictly adhered to.**
- **Areas allocated with high sensitivity (wetland with buffer zone and proposed offset area) should remain undeveloped and designated as public or private open space during all development activities.**
- **The existing integrity of flora surrounding the proposed development should be upheld and no activities be carried out outside the footprint of the construction areas while keeping the development footprint as small as possible.**
- **Specific mitigation measures for the conservation of *Pyxicephalus adspersus* individuals and habitat include:**
    - **Wetland with associated 50 meter buffer as well a proposed offset area remains open space during all development activities.**
    - **Active removal and release of Giant Bullfrogs to offset are unearthed during construction.**
    - **Efforts should be taken to reduce the potential for individuals to be killed by vehicles. This could be achieved by limiting the footprint of the construction phase, and excluding Giant Bullfrogs from the area by using low (400 mm high) concrete walls. It is recommended that the concrete walls be placed along the eastern and western border of the 50 meter wetland buffer before construction begins, by so doing the migrating bullfrogs will be protected from all roads during construction as well as after utilisation of the development begins.**
    - **Fencing used on the southern and northern boundary of the subject property should be permeable (palisade fencing) as an alternative to a solid wall, this will provide a migratory corridor for the bullfrogs.**
- **Specimens of *Hypoxis hemerocallidea* and *Boophane disticha* should not be disturbed, or alternatively they should be rescued and relocated to a suitable protected area that has been designated as sensitive areas as part of this study. A rescue and relocation plan is included in Appendix D.**
- **All areas affected by construction should be rehabilitated upon completion of the construction phase of the development. Areas should be reseeded with indigenous grasses as required.**
- **All fencing used within the subject property as part of the development should consist of palisade fencing no brick walls should be constructed with special mention of portions close to sensitive areas, this will enable migration of faunal species.**
- **Adequate stormwater management must be incorporated into the design of the proposed development in order to prevent erosion and the associated sedimentation of the wetland areas.**
    - **Sheet runoff from paved surfaces and access roads needs to be curtailed.**
    - **Runoff from paved surfaces should be slowed down by the strategic placement of berms.**
    - **The wetland buffer zones should be left undisturbed to allow the climax terrestrial grassland community to establish in these areas.**
    - **As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping.**
- **In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998 landowners are legally responsible for the control of invasive alien plants on their properties and it is therefore recommended that the declared weed and invader species be removed.**
- **Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. Use of all gravel roads and footpaths currently located within wetland and buffer zones should be ceased.**
- **No fires whatsoever should be lit within the subject property.**
- **No animal trapping should be allowed during development activities.**
- **Although no RDL flora were observed on site, should any other RDL listed fauna or flora be identified, their position should be marked and a suitably qualified person should be consulted on the best options for conservation of the species which may include rescue and relocation or in situ conservation.**
- **No dirty water runoff must be permitted to reach the wetland resources.**
- **During the construction of the proposed development erosion berms should be installed to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms:**
    - **Where the track has slope of less than 2%, berms every 50m should be installed.**
    - **Where the track slopes between 2% and 10%, berms every 25m should be installed.**
    - **Where the track slopes between 10%-15%, berms every 20m should be installed.**
    - **Where the track has slope greater than 15%, berms every 10m should be installed.**
- **As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping.**
- **All areas of disturbed and compacted soils need to be ripped and reprofiled.**
- **No dumping of waste should take place within the wetland zone. If any spills occur, they should be immediately cleaned up.**

Scientific Aquatic Services (SAS) was appointed to conduct an ecological assessment encompassing an assessment of the terrestrial fauna and flora as well as identification of all sensitive habitats, including wetlands/riparian features for the proposed Lanseria commercial development, hereafter referred to as the 'subject property'.

The subject property is situated east of Malibongwe Drive and north of the N14 Highway, Gauteng. The majority of the Lanseria district consists of agricultural small holdings with primarily cattle grazing activity. Access to these surrounding sites could not be gained and therefore the ecological assessment was confined to the subject property and did not include surrounding properties. Neighbouring areas were however considered as part of the desktop assessment. Historical land use of the subject property consisted mainly of small holdings with isolated demolished residential farm houses encountered during the field visit. Since then, the western portion of the subject property was used as an informal settlement that was only recently removed and as a result all the expected vegetation transformation associated with informal settlements was encountered during the assessment. The eastern portion of the subject property has remained largely open veld with isolated areas with exotic vegetation noted mainly as a result of past residential developments.

The ecological assessment was undertaken to determine the overall condition and ecological status of the vegetation of the subject property, as well as the occurrences (and potential habitat) of any RDL faunal or floral as well as protected floral species. Various ecological study sites were chosen as focal points for the field assessment that represented the diversity of available habitats represented on the subject property. These sites were investigated during field assessments in November and December 2010 to determine the overall Present Ecological State (PES) of the subject property.

Specific outcomes required from this report include the following:

- habitat and community classification, including a description of the ecological state of the property;
- faunal and floral inventories for the property;
- wetland and riparian zone delineations;
- determine the presence of any red data species (fauna and flora) and the potential for such species to occur on the property; and
- discuss the spatial significance of the property and provide recommendations if required.

In order to achieve the objectives of the study, the following assessment procedure/ methodology was used:

- A desktop study to gain background information on the physical habitat, as well as generating potential faunal and floral biodiversity lists for the proposed development site and surrounding areas;
- A field assessment that identified the tree, grass, herb and exotic species that occur on the property. Additionally, during the assessment, faunal species were recorded based on visual identification, spoor, call or dung as well as selected trapping techniques;
- A Red Data List Assessment that focused on the identification of any listed plant species presently found on the site. To complement this, a Red Data Sensitivity Index Score (RDSIS) for the property was also calculated. RDSIS provides a measure for the sensitivity, while simultaneously generating a list of expected faunal species, by assessing different faunal taxons' (mammals, amphibians, reptiles, birds and invertebrates) historical distribution, habitat preferences and food requirements;
- Riparian and wetland zones were delineated in line with the DWAF 2005 guidelines: A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones was used.
- The wetland function and PES will be determined according to the protocol of Kotze *et al* 2005) and DWAF (1999) respectively.

The subject property occurs within the summer rainfall zone of South Africa and is characterised by dry winters and an annual precipitation of between 650 and 900mm. This assessment site falls within the *Grassland biome* (Rutherford & Westfall 1994). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic and physical features and processes at a regional scale. The 'subject property' is situated within the *Mesic Highveld Grassland*. The vegetation type of the 'subject property' consists of *Egoli Granite Grassland* (Musina & Rutherford 2006).

Three floral communities were identified during the assessment of the subject property. These differed in floral composition ranging from relatively high abundance and integrity in wetland areas to total transformation in areas with historical disturbance, such as residential developments and *Eucalyptus* stands. Floral identification proved to be difficult in some areas due to recent veld fire and therefore the species composition which has been determined is not a true representation of the total species composition. However, the data collected is deemed adequate to formulate accurate conclusions regarding the overall ecology of the subject property.

The following general conclusions were drawn on completion of the survey:

- Gauteng conservation plan has indicated no importance directly related to the subject property except for the river area that was assessed and delineated during the assessment.
- The subject property does not fall within one of the priority areas identified by the Grasslands program. This is mainly due significant impact from historical agricultural activities and residential infrastructure. Isolated areas within the grassland vegetation are starting to return to more natural grassland communities. However it is doubtful that the floral community will return to a pristine ecological state due to its isolation from similar habitat as well as increasing anthropogenic encroachment within surrounding areas.
- Presently ecological functioning and the condition of the subject property ranges from high in wetland areas to very low in areas where residences and farm infrastructure has been demolished. Isolated open veld areas can be considered to be in moderate ecological condition with moderate ecological functioning.
- In its present ecological state the subject property can be divided into three habitat units (wetland, transformed and open veld) based on ecological function as well as species composition noted during the assessment.
- Within the floral community results it is evident that the south-western portion of the open veld habitat unit has seen more disturbance than the remainder of the habitat unit. *Hyparrhenia hirta* dominated this area and species diversity decreases significantly towards this portion. The north-eastern portion has seen the least vegetation transformation with a significantly different floral community noted within the area. Only floral species with a high affinity for water were noted within the wetland habitat unit.
- The information gathered during the assessment of the subject property was used to determine the Vegetation Index Score (VIS). The subject property was divided into three dominant habitat types and VIS was applied to each habitat unit respectively. The VIS for habitat unit 1 (wetland habitat) was calculated at 11.75. The score falls within assessment class B according to the VIS final score definition – largely natural with few modifications. Habitat unit 2 (open veld) calculated a VIS score of 8.5. Less vegetation transformation resulted in a moderate VIS score class – Class C (largely natural with few modifications). The habitat unit 3 (transformed habitat) VIS score are remarkably lower than habitat unit 1 and 2 – assessment class E, the loss of natural habitat extensive. This is due significant vegetation transformation in areas were residential developments have been demolished as well as some areas totally left bare as a result of the recently removed informal settlement.
- No RDL floral species were identified during the assessment. However, two species namely *Hypoxis hemerocallidea* and *Boophane disticha* considered declining was identified during the site assessment. If any of these species will be disturbed during the proposed development activities they should be rescued and relocated to suitable open space areas as defined in the site sensitivity plan of this report.
- Only two floral species of concern calculated noteworthy POC scores, namely *Gunnera perpensa* (80%) and *Callilepis leptophylla* (73%). *Gunnera perpensa* has the potential to be located within the southern portion of the wetland feature were transformation is less severe and *Callilepis leptophylla* may occur on the subject property but will be restricted to the north-eastern grassland habitat.
- The subject property dominant alien/weed communities can be divided into two, namely the areas associated with the transformed habitat unit mainly dominated by *Tagetes minuta* and *Eucalyptus camaldulensis* and the areas associated with the wetland habitat unit mainly dominated by *Protasparagus laricinus* and *Populus x canescens.*
- Medicinal plant species encountered are all regarded as common and widespread species, with the exception of *Hypoxis hemerocallidea* and *Boophane disticha* listed as “declining” in the PRECIS red data plant list.
- GDARD identified the following mammal species with an affinity for wetlands, *Aonyx capensis, Atilax paludinosus, Chrysopalax villosus, Dasymys incomtus, Lutra maculicollis, Itomys*

angoniensis (Otomys angoniensis), and *Otomys irroratus*, to be of concern. The habitat and food requirements of these species were evaluated to determine the possibility of these species inhabiting the study area. Only *Dasymys incomtus, Itomys angoniensis and Otomys irroratus* had a *high* possibility of occurring within the subject property.

- Historically the subject property could have provided habitat to various larger mammal species, but anthropogenic activities such as agriculture, residential development as well as more recent informal settlements left the majority of the study area transformed. Migratory corridors have also been significantly impeded as a result of construction of roads on all sides of the subject property except for the eastern boundary as well as palisade fencing surrounding the entire subject property. The subject property in its present state is not considered to support larger mammal species, however the wetland habitat is considered important for the survival of various smaller wetland mammal species.
- The moderately tall, dense grasslands on the subject property may provide suitable habitat for the African Grass Owl (Vulnerable), and although none were encountered during the study there is the potential for them to occur within wetland buffers. Thus, if the wetland with associated buffer remains open space these species will be protected from any impact the proposed development will have on their habitat.
- One reptile species of concern calculated a POC of 68% namely *Homoroselaps dorsalis* (striped harlequin snake). Striped harlequin snakes are rare and are listed by the IUCN as 'near threatened'. Although not encountered during the assessment, the eastern portion of the grassland habitat in its present state may provide habitat for this snake species. The extended buffer will cater for the conservation of this species if it does inhabit the subject property.
- Two individuals of the amphibian species *Pyxicephalus adspersus* were encountered during the assessment of the subject property within the road reserve of the N14 bordering the southern portion of the subject property. This amphibian species is considered near threatened and uses the wetland zone for breeding habitat as well as a migration corridor. The Giant Bullfrog (*Pyxicephalus adspersus*) is the largest Southern African frog, and considered near threatened. The extended wetland buffer to 50 meters together with the proposed offset area is however deemed sufficient for the conservation of this species within the subject property. It is however deemed important that specific attention be paid to specific mitigation measures for the concervation of *Pyxicephalus adspersus* individuals and habitat as stipulated within the recommendations of this report.
- Evidence was encountered of the Mygalomorphae arachnids (Baboon spiders) in the western portion of the grassland habitat unit. After thorough searching only one burrow was identified, although it should be noted that these species are notoriously difficult to detect. All results obtained throughout the subject property assessment showed disturbance within the western portion of the grassland habitat unit, where the burrow was found. It is therefore the opinion of the specialists that an extended buffer of 50 meters on the eastern side of the wetland feature would be more valuable to the conservation of this species as well as various other faunal species that may inhabit the site.
- Suitable *Metisella meninx* (Marsh sylph) habitat was encountered within the subject property and the area falls within the distribution range noted for *this specie*. The marsh sylph (*M. meninx*) habitat comprises of wetland where marsh grass is dominant. One of these wetland grasses *Leersia hexandra* plays a vital role in the reproductive cycle of the specie (Roos and Henning, 2002). *L. hexandra* was found to inhabit wetland portions on the subject property and therefore the subject property is considered possible breeding habitat for this RDL specie.
- The RDSIS assessment of the property provided a medium score of 54%, indicating moderate importance to RDL faunal species conservation within the region.
- Presently ecological functioning and the condition of the subject property range from high in wetland areas to very low in areas where residences and farm infrastructure have been demolished. As a result the wetland with associated buffer area is considered as a highly sensitive area that should remain undeveloped and designated as private or public open space during all developmental activities. All areas included in the transformed habitat unit are considered as low sensitive areas. The open veld habitat unit can be considered to be comprised of moderate to low sensitivity areas.

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Glossary of Terms & Acronyms

Alien vegetation – Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally.

Biome – A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.

Bush encroachment – A state where undesirable woody elements gain dominance within grassland, leading to depletion of the grass component. Typically due to disturbances and transformations as a consequence of veldt mismanagement (overgrazing, incorrect burning, etc.).

Decrease grass – Grass abundant in veldt in good condition, which decreases when veldt is under- or over-utilized.

°C – Degrees Celsius.

Endangered – Organisms in danger of extinction if causal factors continue to operate.

Endemic species – Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.

Exotic vegetation – Vegetation species that originate from outside of the borders of the biome - usually international in origin.

Ex situ conservation – Where a plant (or community) cannot be allowed to remain in its original habitat and is removed and cultivated to allow for its ongoing survival.

Extrinsic – Factors that have their origin outside of the system.

GDACE – Gauteng Department of Agriculture, Conservation and Environment

ha – Hectares.

Indigenous vegetation – Vegetation occurring naturally within a defined area.

Increaser 1 grass – Grass species that increase in density when veld is under-utilized.

Increaser 2 grass – Grass species that increase in density in over-utilized, trampled or disturbed veld.

Increaser 3 grass – Grass species that increase in density in over and under-utilized veld.

In situ conservation – Where a plant (or community) is allowed to remain in its natural habitat with an allocated buffer zone to allow for its ongoing survival.

Karoid vegetation – A shrub-type vegetation that dominates in grasslands that have seen historical disturbances. Mainly due to over-grazing and mismanaged burning regimes. The shrubby vegetation eventually becomes dominant and out-competes the grassy layer.

m – Metres.

mm – Millimetres.

MAMSL – Metres above mean sea level.

MAP – Mean annual precipitation.

MAPE – Mean annual potential for evaporation.

MASMS – Mean annual soil moisture stress.

MAT – Mean annual temperature.

Orange Listed – Species that are not Red Data Listed, but are under threat and at risk of becoming RDL in the near future. Usually allocated to species with conservation status of *Near Threatened (NT), Least Concern (LC), Rare* and *Data Deficient (DD)*.

PES – Present Ecological State.

POC – Probability of occurrence.

PRECIS – Pretoria Computer Information Systems.

Pioneer species – A plant species that is stimulated to grow after a disturbance has taken place. This is the first step in natural veld succession after a disturbance has taken place.

QDS – Quarter degree square (1:50,000 topographical mapping references).

Rare – Organisms with small populations at present.

RDL (Red Data listed) species – Organisms that fall into the *Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU)* categories of ecological status.

RDSIS – Red Data Sensitivity Index Score.

SANBI – South African National Biodiversity Institute.

Veld retrogression – The ongoing and worsening ecological integrity state of a veld.

1. INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct an ecological and wetland assessment on the proposed Lanseria commercial development (Figure 1 and Figure 2). The total area of the subject property extends over approximately 130 ha and is situated east of Malibongwe Drive and north of the N14 Highway, within the Gauteng Province. The subject property is surrounded by privately owned agricultural smallholdings and therefore the ecological assessment was confined to the subject property and did not include an ecological assessment of surrounding properties. The surrounding area was however considered as part of the desktop assessment of the area.

The proposed development would entail the following activities:

- Site preparation;
- Earthworks (excavations, etc.);
- Construction of roads and services
- Construction of commercial facilities and
- Landscaping and rehabilitation of the development site after construction.

This report, after consideration and description of the ecological integrity of the property, must guide the property owner, authorities and potential developers, by means of recommendations, as to viability of the proposed development.

Figure 1: Arial photograph depicting location of the subject property in relation to surrounding areas.

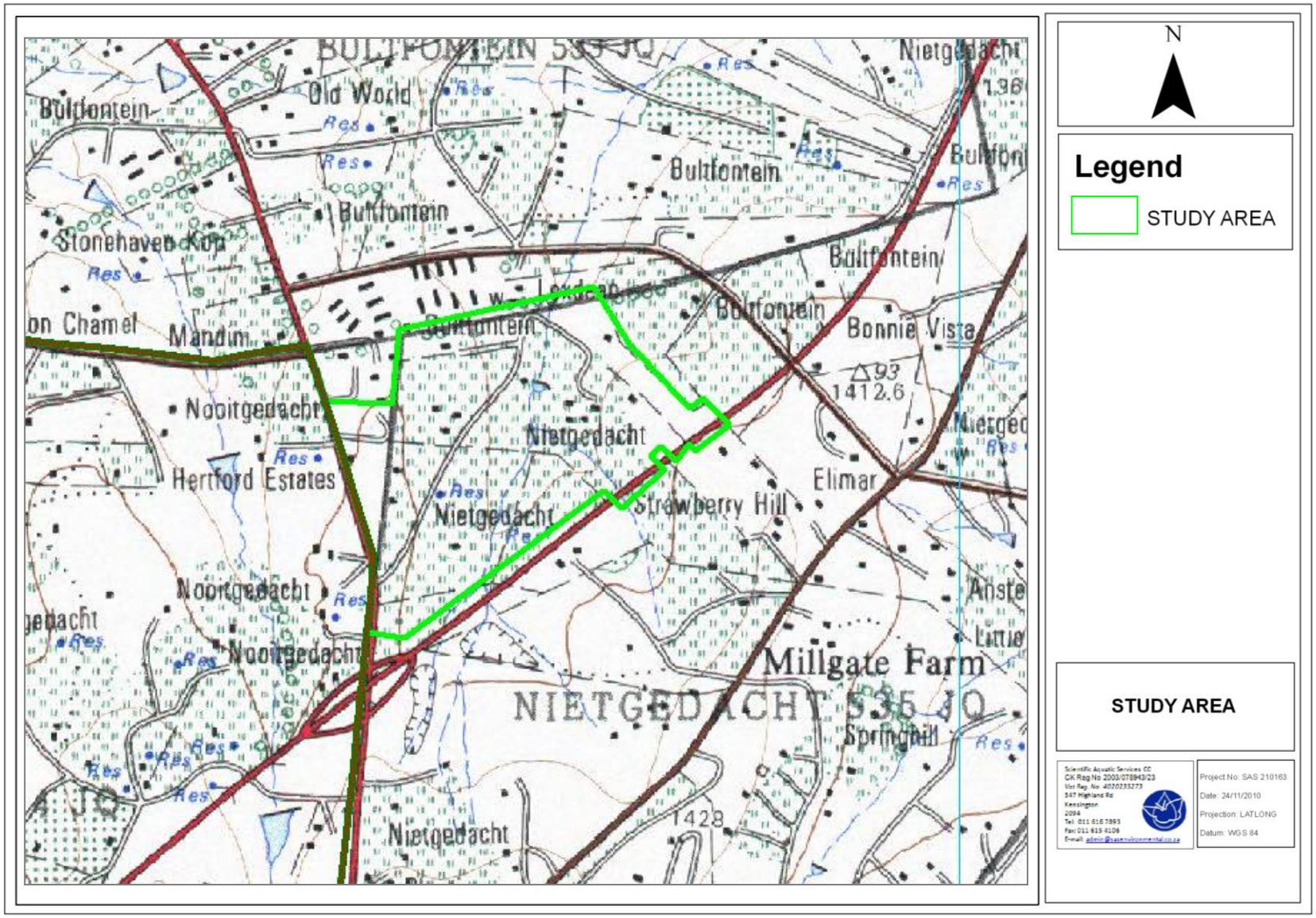


Figure 2: Subject property depicted on a 1:50 000 map in relation to its surrounding area.

1.2 Scope

Specific outcomes in terms of this report are as follows:

Ecological Assessment:

- red data species assessment, including potential for species to occur on the subject property and the implementation of a Red Data Sensitivity Index score for the study area;
- provide faunal and floral inventories of species as encountered on site;
- determine and describe habitats, communities and ecological state of the study area; and
- describe the spatial significance of the subject property with regards to surrounding natural areas.

Wetland Assessment:

- define the Present Ecological State of each wetland system within the study area;
- determine the functioning of each system and the environmental and socio-cultural services that the system provide;
- advocate a Recommended Ecological Category (REC) for each wetland feature;
- delineate all wetlands or riparian zones occurring within the assessment site.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The ecological assessment is confined to the subject property and does not include the neighbouring and adjacent properties.
- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary.
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. More accurate assessment would require that assessment take place in all seasons of the year however by undertaking assessments in the summer period it is deemed likely that most faunal and floral communities would have been adequately assessed and/or considered.
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa on the subject property may therefore been missed during the assessment.
- The wetland delineation as presented in this report is regarded as a best estimate of the wetland boundary based on the site conditions present at the time of assessment.

- Wetlands and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate wetland species. Within this transition zone some variation of opinion on the wetland boundary may occur, however if the DWAF 2005 method is followed, all assessors should get largely similar results.

2. METHODOLOGY

In order to accurately determine the Present Ecological State of the study area and capture comprehensive data with respect to faunal and floral taxa, the following methodology was used:

- Maps, aerial photographs and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the subject property was made in order to confirm the assumptions made during consultation of the maps.
- Literature review with respect to habitats, vegetation types and species distribution was conducted.
- Relevant data bases considered during the assessment of the study area included SANBI (Threatened species programme (TSP) and PRECIS).
- Biodiversity issues as presented by GDARD includes: Ridges, wetlands, vegetation and the species *Homoroselaps dorsalis* (Striped Harlequin Snake) and *Tyto capensis* (African Grass Owl).

3. Methods of Investigation

3.1 Desktop Study

Initially a desktop study was undertaken to gather background information regarding the site and its surrounding areas. All relevant authorities were consulted regarding conservational species lists, as well as all the latest available literature utilised to gain a thorough understanding of the area and its surrounding habitats. This information and further literature reviews were then used to determine the potential biodiversity lists for the proposed development site and surrounding areas. This information incorporated (amongst others) data on vegetation types, habitat suitability and biodiversity potential coupled to this information.

3.2 General site survey

Three site visits were undertaken during November and December 2010 to determine the ecological status of the proposed development sites and the surrounding area. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the study area and, following this, specific study sites were chosen that were representative of the habitats found within the area. Special emphasis was placed on potential areas that may support RDL species. Sites were investigated on foot to identify the occurrence of the *dominant* plant communities, species and habitat diversities. The presence of any faunal inhabitants of the subject property was also assessed through direct visual observation or identifying them through calls, tracks, scats and burrows and selected trapping methods, with emphasis being placed on determining if any RDL species occur within the study area.

3.3 Flora

Vegetation surveys were undertaken by first identifying different vegetation units and then analysing the floral species composition. Different transect lines were chosen within areas that were perceived to best represent the various plant communities. A walking stick was used that was placed every 1m and the plant species of biophysical feature falling closest to the point of the stick was identified. These points were done along a 100m transect line, making for 100 data points along a single transect. The data was then analysed and the percentage contribution of the various floral species for each transect line was calculated. These species lists were then also compared with the vegetation expected in the *Egoli Granite Grassland*, which provided an accurate indication of the ecological integrity and conservational value of the site where the proposed development is to be completed.

3.3.1 Vegetation Index Score

The Vegetation Index Score (VIS) was designed to determine the ecological state of each habitat unit defined within an assessment site. This enables an accurate and consistent description of the present ecological state (PES) concerning the subject property in question. The information gathered during these assessments also significantly contributes to sensitivity mapping, leading to a more truthful representation of ecological value and sensitive habitats.

Each defined management unit is assessed using separate data sheets (see Appendix C) and all the information gathered then contributes to the final VIS score. The VIS is derived using the following formulas:

VIS = [(EVC)+((SIxPVC)+(RIS))]

Where:

1. **EVC** is extent of vegetation cover;
2. **SI** is structural intactness;
3. **PVC** is percentage cover of indigenous species and
4. **RIS** is recruitment of indigenous species.

Each of these contributing factors is individually calculated as discussed below. All scores and tables indicated in blue are used in the final score calculation for each contributing factor.

1. *EVC=[[(EVC1+EVC2)/2]*

EVC 1 - Percentage natural vegetation cover:

Vegetation cover % Site score	0%	1-5%	6-25%	26-50%	51-75%	76-100%
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score Site score	0	Very Low	Low	Moderately	High	Very High
EVC 2 score	0	1	2	3	4	5

2. *SI=(SI1+SI2+SI3+SI4)/4)*

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous								
Clumped								
Scattered								
Sparse								

Present State (P/S) = Currently applicable for each habitat unit

Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

3. *PVC=[(EVC)-((exotic x 0.7) + (bare ground x 0.3))*

Percentage vegetation cover (exotic):

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
PVC Score	0	1	2	3	4	5

4. RIS

Extent of indigenous species recruitment	0	Very Low	Low	Moderate	High	Very High
RIS	**0**	**1**	**2**	**3**	**4**	**5**

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
12.5 to 15	**A**	Unmodified, natural
10 to 12.5	**B**	Largely natural with few modifications.
7.5 to 10	**C**	Moderately modified
5 to 7.5	**D**	Largely modified
2.5 to 5	**E**	The loss of natural habitat extensive
<2.5	**F**	Modified completely

3.4 Fauna

Small mammals are unlikely to be directly observed in the field because of their nocturnal/crepuscular and cryptic nature. A simple and effective solution to this problem is to use Sherman traps. A Sherman trap is a small aluminium box with a spring-loaded door. Once the animal is inside the trap, it steps on a small plate that causes the door to snap shut thereby capturing the individual. Trapping took place within relatively undisturbed small mammal habitat identified throughout the study area.

Larger faunal species were recorded during the subject property assessment with the use of visual identification, spoor, call and dung and positively identified. It is important to note that due to the nature and habits of fauna it is unlikely that all species will have been recorded during the site assessment.

3.5 Red Data Species Assessment

3.5.1 Flora

Prior to the field visit, a record of Red Data List plant species and their habitat requirements was acquired from SANBI for the quarter degree grid 2527DD. Throughout the floral assessment special attention was paid to identification of any of these RDL species as well as identification of suitable habitat that could potentially sustain these species.

The probability of occurrence (POC) for each floral species of concern (2527DD) was determined using the following calculation wherein the habitat requirements and habitat disturbance were considered. The accuracy of the calculation is based on the available knowledge about the species in question, with many of the species lacking in depth habitat research. Therefore it is important that the literature available is also considered during the calculation.

Each factor contributes an equal value to the calculation.

Literature availability

	No Literature available					Literature available
Site score						
Score	0	1	2	3	4	5

Habitat availability

	No Habitat					Habitat available

	available					
Site score						
Score	0	1	2	3	4	5

Habitat disturbance

	0	Very Low	Low	Moderately	High	Very High
Site score						
Score	0	1	2	3	4	5

[Literature availability + Habitat availability + Habitat disturbance] / 15 =POC%

3.5.2 Fauna and the Red Data Sensitivity Index

Given the restrictions of field assessments to identify all the faunal species that possibly occur on a particular property, the Red Data Sensitivity Index (RDSIS) has been developed to provide an indication of the potential red data faunal species that could reside in the area, while simultaneously providing a quantitative measure of the subject property's' value in terms of conserving faunal diversity. The RDSIS is based on the principles that when the knowledge of the specie's historical distribution is combined with a field assessment that identifies the degree to which the property supports a specie habitat and food requirements, inferences can be made about the chances of that particular specie residing on the property. Repeating this procedure for all the potential red data faunal species of the area and collating this information then provides a sensitivity measure of the property that has been investigated. The detailed methodology to determine the RDSIS of the property is presented below:

Probability of Occurrence (POC): Known distribution range (D), habitat suitability of the site (H) and availability of food sources (F) on site were determined for each of the species. Each of these variables is expressed a percentage (where 100% is a perfect score). The average of these scores provided a Probability of Occurrence (POC) score for each species. The POC value was categorised as follows:

- **0-20% = Low;**
- **21-40% = Low to Medium;**
- **41-60% = Medium;**
- **60-80% = Medium to High; and**
- **81-100% = High**

POC = (D+H+F)/3

Total Species Score (TSS): Species with POC of more than 60% (High-medium) were considered when applying the RDSIS. A weighting factor was assigned to the different IUCN categories providing species with a higher conservation status, a higher score. This weighting factor was then multiplied with the POC to calculate the total species score (TSS) for each species. The weighting as assigned to the various categories is as follows:

- **Data Deficient = 0.2;**
- **Rare = 0.5;**
- **Near Threatened = 0.7;**
- **Vulnerable = 1.2;**
- **Endangered = 1.7; and**
- **Critically Endangered = 2.0**.

TSS = (IUCN weighting*POC) where POC > 60%

Average Total Species (Ave TSS) and Threatened Taxa Score (Ave TT): The average of all TSS potentially occurring on the site is calculated. The average of all the Threatened taxa (TT) (*Near threatened*, *Vulnerable*, *Endangered* and *Critically Endangered)* TSS scores are also calculated. The average of these two scores (Ave TSS and Ave TT) was then calculated in order to add more weight to threatened taxa with POC higher than 60%.

Ave = Ave TSS [TSS/No of Spp] + Ave TT [TT TSS/No of Spp]/2

Red Data Sensitivity Index Score (RDSIS): The average score obtained above and the sum of the percentage of species with a POC of 60% or higher of the total number of Red Data Listed species listed for the area was then calculated. The average of these two scores, expressed as a percentage, gives the RDSIS for the area investigated.

RDSIS = Ave + [Spp with POC>60%/Total no Of Spp*100]/2

RDSIS interpretation:

Table 1: RDSIS value interpretation with regards to RDL mammal importance on the subject property.

RDSIS Score	RDL mammal importance
0-20%	Low
21-40%	Low-Medium
41-60%	Medium
60-80%	High-Medium
81-100%	High

3.5.3 Invertebrate Survey

A desktop survey was initially undertaken to determine if any RDL invertebrate species had historical records in association with the proposed development site, as well as immediate surrounding areas. A "walk about" throughout the proposed development site was undertaken to assess the potential of the habitats of supporting various RDL invertebrate species. Rock turning was also employed on areas of the subject property where rocky outcrops were located. Sweep netting in selected wetland areas also took place in order to determine species composition of the flying insects within the wetland areas.

3.6 Wetland Wetland Assessment Methodology

3.6.1 South African Wetland Assessment Classification System

All wetland and riparian features encountered within the study area were assessed using *the South African Wetland Classification System* as ascribed within the *Resource Directed Measures for Protection of Water Resources* (1999). This was done in order to achieve the Recommended Ecological Category (REC) of the wetland features. The methodology followed is illustrated in the figure below, followed by a detailed discussion of each section.

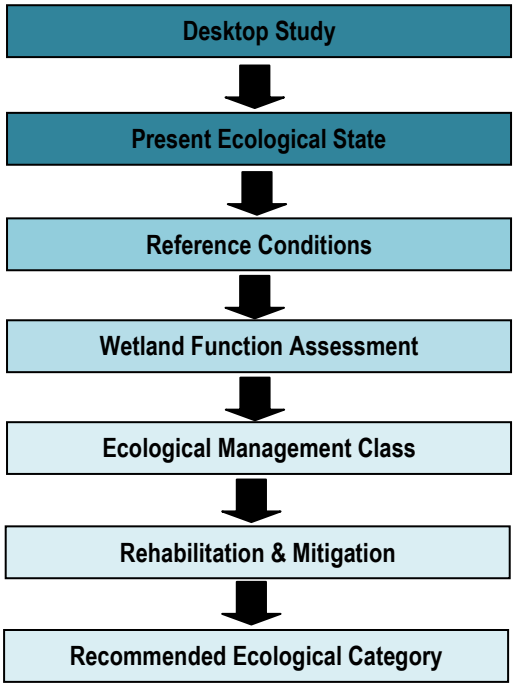


Figure 3: Wetland determination flow chart.

3.6.2 Ecoregion

When assessing the ecology of any area (aquatic or terrestrial), it is important to know which ecoregion the study area is located within. This knowledge allows for improved interpretation of data, since reference information and representative species lists are often available on this level of assessment to guide the assessment.

3.6.3 Ecostatus

Studies undertaken by the Institute for Water Quality Studies assessed all quaternary catchments as part of the Resource Directed Measures for Protection of Water Resources. In these assessments, the Ecological Importance and Sensitivity (EIS), Present Ecological Management Class (PEMC) and Desired Ecological Management Class (DEMC) were defined, and serve as a useful guideline in determining the importance and sensitivity of aquatic ecosystems prior to assessment, or as part of a desktop assessment.

Water resources are generally classified according to the degree of modification or level of impairment. The classes used by the South African River Health Program (RHP) are presented in the table below and will be used as the basis of classification of the systems in this field, and desktop study.

Table 2: Classification of river health assessment classes in line with the RHP

Class	Description
A	Unmodified, natural.
B	Largely natural, with few modifications.
C	Moderately modified.
D	Largely modified.
E	Extensively modified.
F	Critically modified.

3.6.4 Present Ecological State

A site visit was undertaken in order to identify all natural characteristics of the wetland features within the study area, followed by characterisation of all wetland systems using the flow chart with definitions as stipulated below.

Water surface – This is found in all systems and includes all water surfaces with a vegetative cover of less than 30%.
Non-vegetated – Includes surfaces with less than 30% surface area cover of vegetation other than pioneer species. Common examples include rocky shores along Marine coastlines, Marine and Estuarine mud, and sand flats, exposed shores on the margins of lakes and dams, and riverine sand bars.
Reef – Includes ridge-like or mound-like structures formed by the colonization and growth of sedentary invertebrates.
Aquatic Bed – Includes habitats dominated by plants that growing principally on or below the water surface for most of the growing season in most years. These habitats are usually found in water less than 2meter deep. They represent a diverse group of plant communities that require surface water for optimal growth and reproduction.
Emergent – Characterised by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years, usually maintaining the same appearance form one year to another. Perennial species tend to dominant Emergent Habitats. Areas that are dominated by pioneer species, which become established during periods of low water, are not Emergent Wetlands and should be classified as Non-vegetated.
Scrub-Shrub – Includes areas dominated by woody vegetation less than 6 meter tall. It is characterised by true shrubs, young trees, and trees or shrubs that are small or stunted as a result of environmental conditions. Such communities may represent a successional stage leading to forested Wetland, or they may be relatively stable.
Forested – This class is characterised by woody vegetation that is taller than 6 meter. These habitats normally possess an overstorey of trees, an understorey of young trees or shrubs, and herbaceous layer.

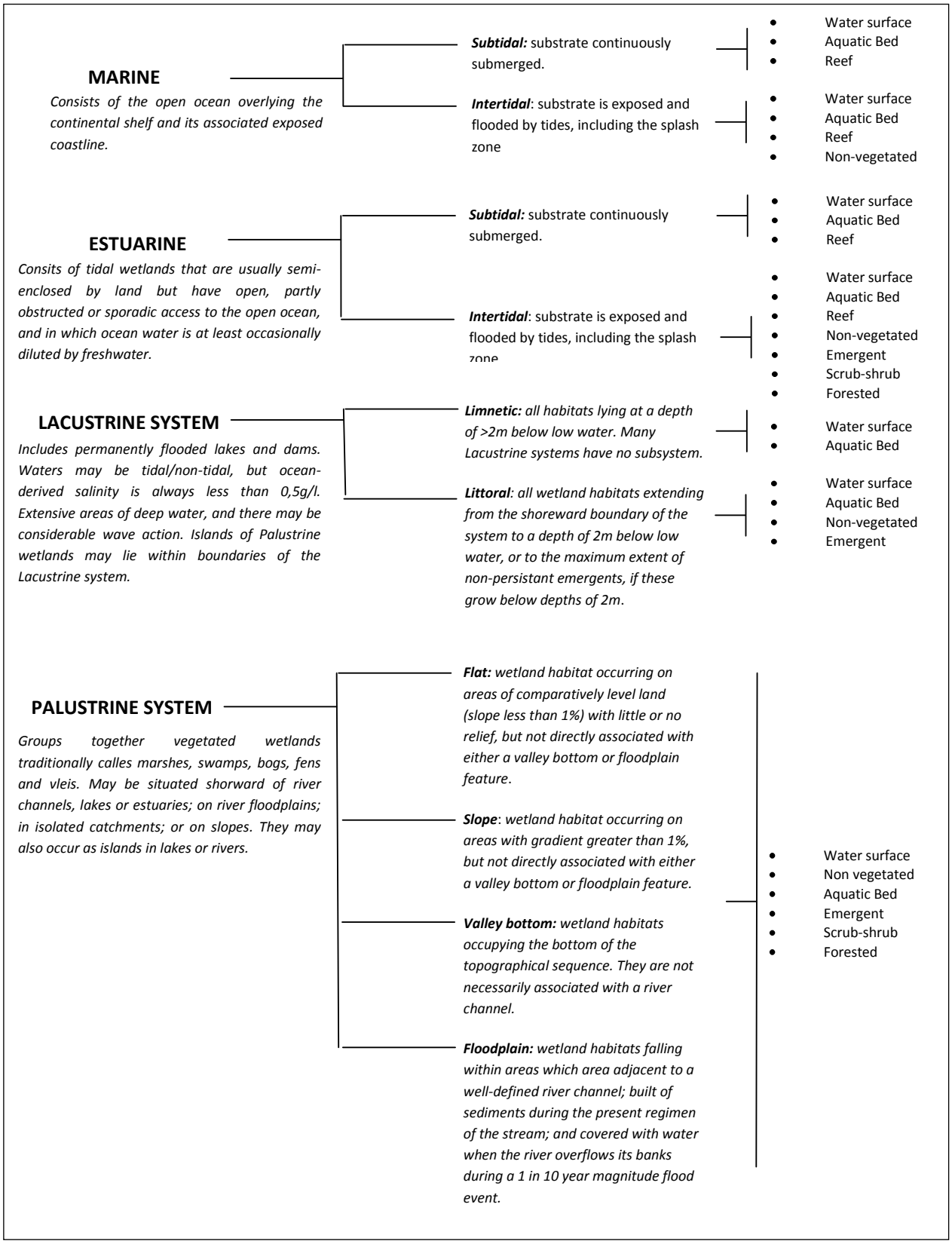


Figure 4: Wetland system characterisation.

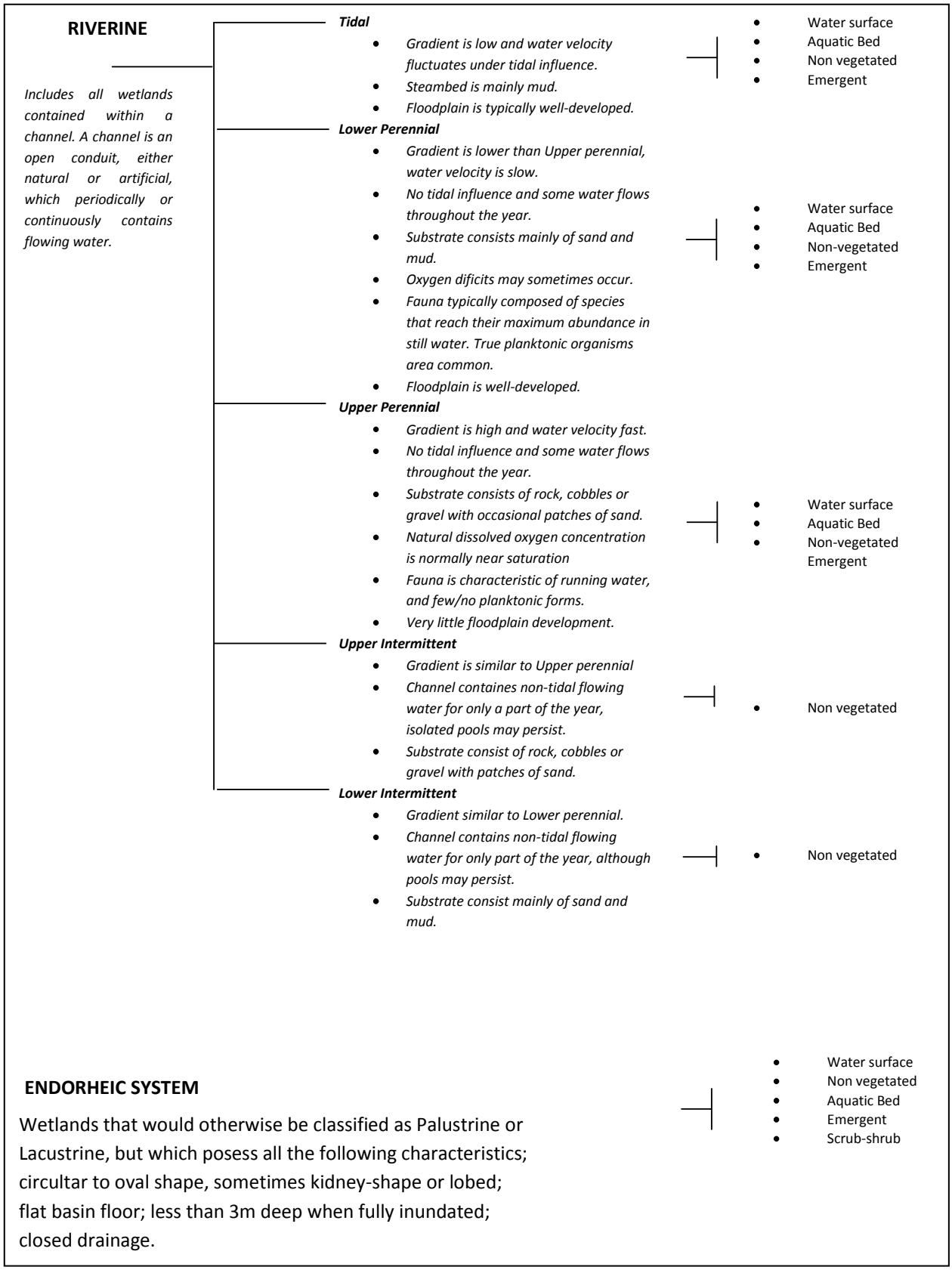


Figure 5: Wetland system characterisation[1] (continued).

Department of Water Affairs and Forestry, South Africa *Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999* [Appendix W1][1]

After wetland systems have been classified according to the characteristics stipulated above it is important to determine any modifying aspects that may have altered the natural ecological state of the wetland system. *Resource Directed Measures (*RDM) (Dini, J; Cowan, G. & Goodman, P. First Draft: DWAF, *Version 1.0, 1999*) identifies three groups of modifiers: Water Regime Modifiers, Water Chemistry Modifiers, and Artificial Modifiers. A desktop study as well as the field assessment was used in order to determine any of these modifiers present at the subject property.

All the information gathered above as well as hydrology-, hydraulic/geomorphic-, biological criteria and water quality were then used to assign a Present Ecological Status (PES) for the wetland features. The table below lists the attributes as well as criteria assessed during the PES assessment.

Table 3: Criteria and attributes assessed during the determination of the PES.

Criteria and attributes	
Hydrologic	**Hydraulic/Geomorphic**
Flow modification	Canalisation
Permanent Inundation	Topographic Alteration
Water Quality	**Biota**
Water Quality Modification	Terrestrial Encroachment
Sediment load modification	Indigenous Vegetation Removal
	Invasive plant encroachment
	Alien fauna
	Overutilisation of biota

Each of the attributes where given a score according to ecological state observed during the site visit, as well as a confidence score to indicate areas of uncertainty (table below).

Table 4: Scoring guidelines.

Scoring guidelines		Relative confidence score	
Natural, unmodified	5	Very high	4
Largely natural	4	High	3
Moderately modified	3	Moderate	2
Largely modified	2	Low	1
Seriously modified	1		
Critically modified	0		

A mean score for all attributes were then calculated and the final score was then used in the Present Ecological Status category determination as indicated in the table below.

Table 5: Present Ecological Status Category descriptions[2]

Score	Class	Description
>4	A	Unmodified, natural
>3 and <=4	B	Largely natural with few modifications
>2 and <=3	C	Moderately modified
2	D	Largely modified
>0 and <2	E	Seriously modified
0	F	Critically modified

3.6.5 Reference Conditions

"Reference conditions refer to the natural un-impacted condition of the wetland feature prior to changes due to human settlement, utilisation of the wetland feature and its resources."[3] To determine, accurate reference conditions the historical geomorphology (terrain unit, landform, substrate type, substrate erodibility, sediment dynamics), hydrology (water source, saturation zones, extent, period and depth of inundation, flow volumes) and biological attributes (vegetation communities and zonation, faunal communities, occurrence of threatened species) were determined. The reference conditions were then used as a "bench-mark" to determine an appropriate EMC class.

3.6.6 Wetland function assessment

"The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class".[4] The assessment of the ecosystem services supplied by the identified wetlands was conducted according to the guidelines as described by Kotze *et* al (2005). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the service is provided:

- · Flood attenuation
- · Stream flow regulation
- · Sediment trapping
- · Phosphate trapping
- · Nitrate removal
- · Toxicant removal

[2] Department of Water Affairs and Forestry, South Afica *Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999* [Table G2].

[3] Department of Water Affairs and Forestry, South Afica *Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999* [Appendix W3].

[4] Department of Water Affairs and Forestry, South Afica *Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999*

- · Erosion control
- · Carbon storage
- · Maintenance of biodiversity
- · Water supply for human use
- · Natural resources
- · Cultivated foods
- · Cultural significance
- · Tourism and recreation
- · Education and research

The characteristics were used to quantitatively determine the value, and by extension sensitivity, of the wetlands. Each characteristic was scored to give the likelihood that the service is being provided. The scores for each service were then averaged to give an overall score to the wetland.

Table 6: Classes for determining the likely extent to which a benefit is being supplied.

Score	Rating of the likely extent to which the benefit is being supplied
<0.5	Low
0.5-1.2	Moderately low
1.3-2	Intermediate
2.1-3	Moderately high
>3	High

3.6.7 Ecological Management Class

"A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability, but carries a higher risk of ecosystem failure." [5]

The Ecological Management Class (EMC) was determined based on the results obtained from the PES, reference conditions and Ecological Importance and Sensitivity of the resource (sections above). Followed by realistic recommendations, mitigation, and rehabilitation measures to achieve the desired EMC.

A wetland may receive the same class for the PES, as the EMC if the wetland is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate EMC

[5] Department of Water Affairs and Forestry, South Africa *Version 1.0 of Resource Directed Measures for Protection of Water Resources 1999*

should be assigned in order to prevent any further degradation as well as to enhance the PES of the wetland feature.

Table 7: Description of EMC classes.

Class	Description
A	Unmodified, natural
B	Largely natural with few modifications
C	Moderately modified
D	Largely modified

3.6.8 Wetland delineation

For the purposes of this investigation, a wetland habitat is defined in the National Water Act (1998) as including the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.

The wetland zone delineation took place according to the method presented in the final draft of "A practical field procedure for identification and delineation of wetlands and riparian areas" published by the department of Water Affairs and Forestry in February 2005. The foundation of the method is based on the fact that wetlands and riparian zones have several distinguishing factors including the following:

- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils;
- Vegetation adapted to saturated soils and
- The presence of alluvial soils in stream systems.

By observing the evidence of these features, in the form of indicators, wetlands and riparian zones can be delineated and identified. If the use of these indicators and the interpretation of the findings are applied correctly, then the resulting delineation can be considered accurate (DWAF 2005).

Riparian and wetland zones can be divided into three zones (DWAF 2005). The permanent zone of wetness is nearly always saturated. The seasonal zone is saturated for a significant part of the rainy season and the temporary zone surrounds the seasonal zone and is only saturated for a short period of the year, but is saturated for a sufficient period, under normal

circumstances, to allow for the formation of hydromorphic soils and the growth of wetland vegetation. The object of this study was to identify the outer boundary of the temporary zone and then to identify a suitable buffer zone around the wetland area.

4. Ecological Description of the Property

4.1 Biome and bioregion

Biomes are broad ecological units that represent major life zones extending over large natural areas (Rutherford 1997). This assessment site falls within the *Grassland biome* (Figure 6) (Rutherford & Westfall, 1994). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic and physical features, and processes at a regional scale. This assessment site is situated within the *Mesic Highveld Grassland Bioregion* (Figure 8) (Musina & Rutherford, 2006).

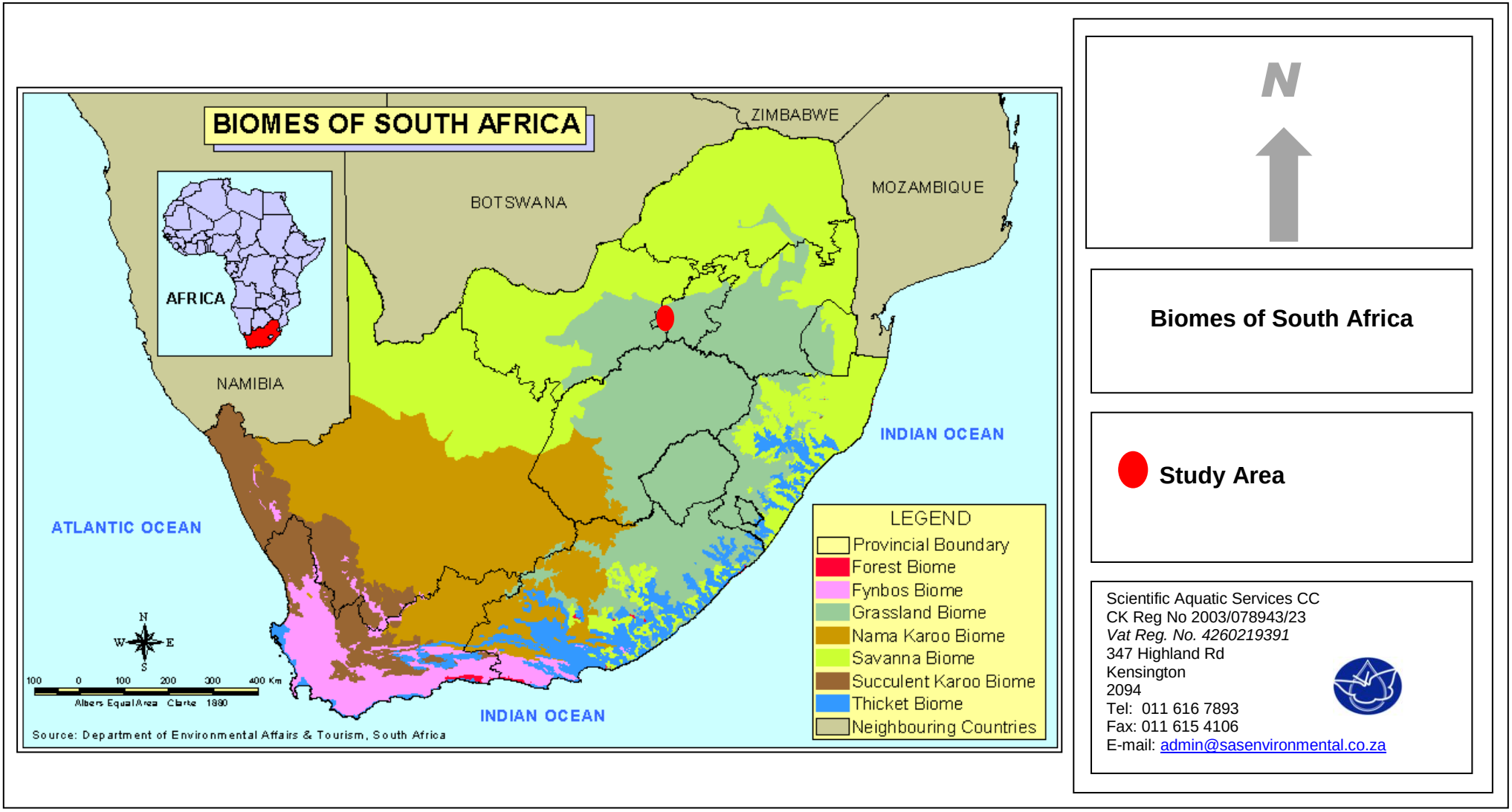


Figure 6: Biomes of South Africa.

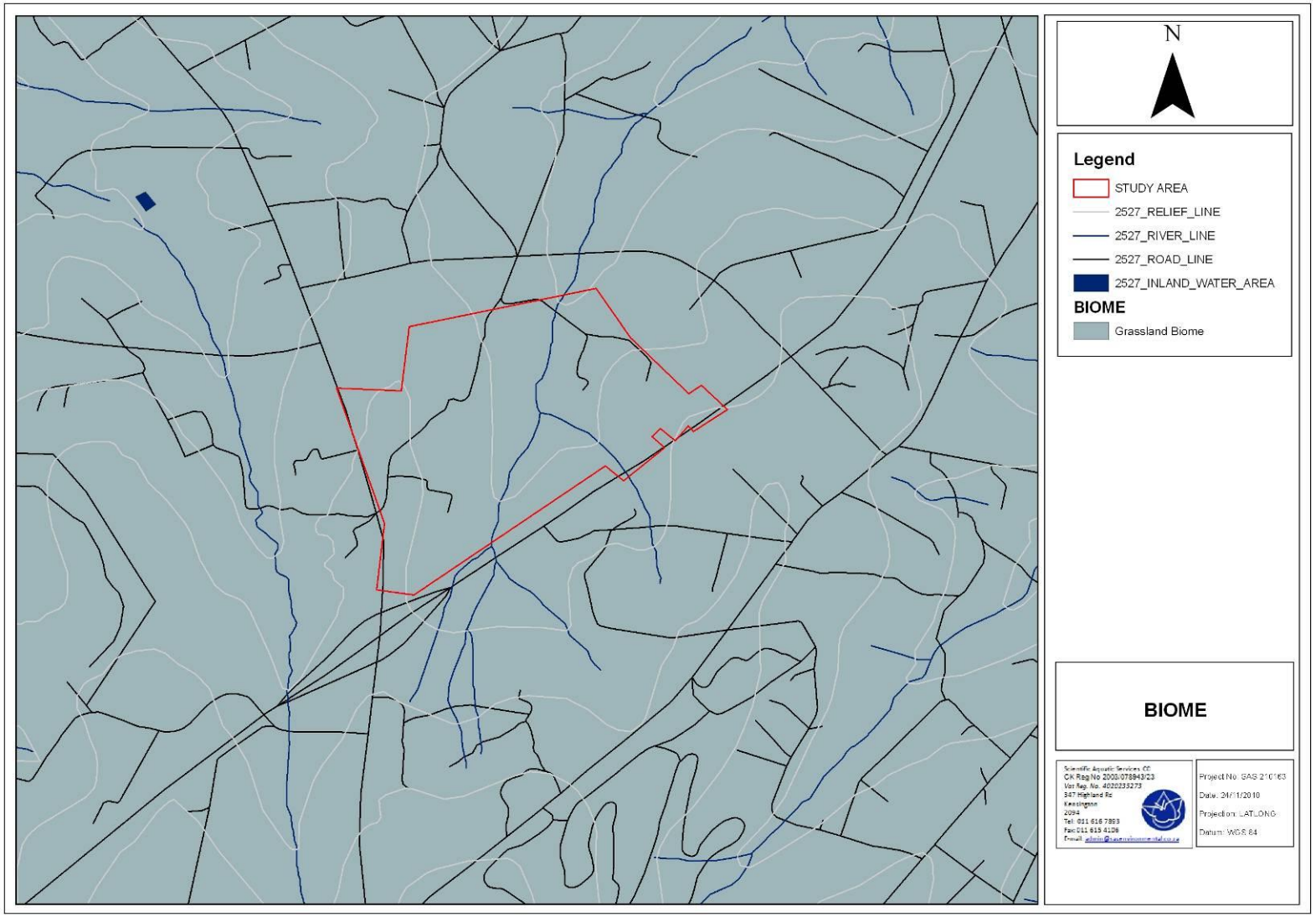


Figure 7: Biomes associated with the subject property (Mucina & Rutherford, 2006).

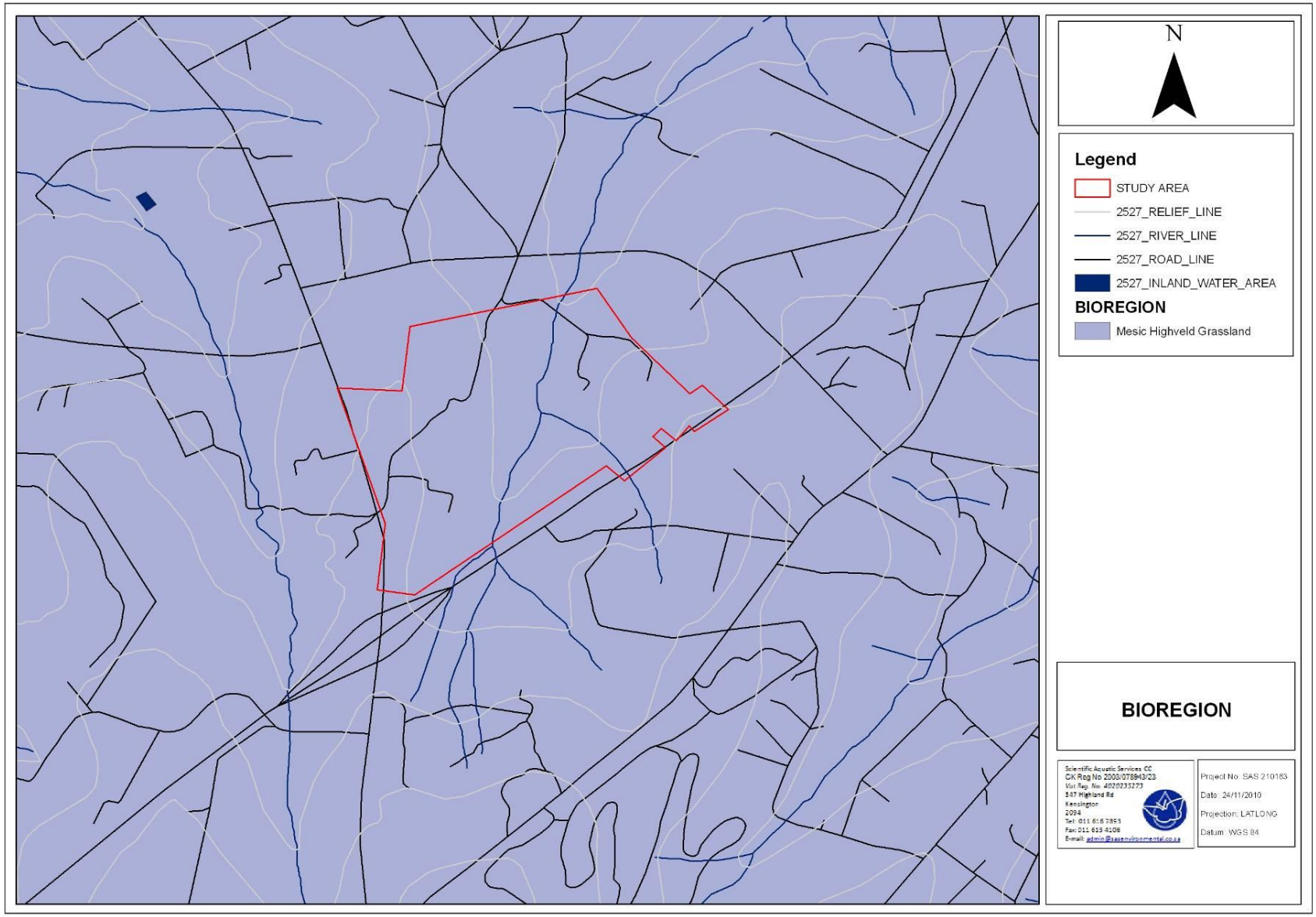


Figure 8: Bioregions associated with the study area (Mucina & Rutherford, 2006).

4.2 Vegetation type and Landscape Characteristics

While biomes and bioregions are valuable as they describe broad ecological patterns, they provide limited information on the actual species that are expected to be found in an area. Knowing which vegetation type an area belongs to provides an indication of the floral composition that would be found if the assessment site was in a pristine condition, which can then be compared to the observed floral list and so give an accurate and timely description of the ecological integrity of the assessment site. When the boundary of the assessment site is superimposed on the vegetation types of the surrounding area (Figure 10), it is evident that the subject property falls within the *Egoli Granite Grassland* vegetation type (Musina & Rutherford, 2006).

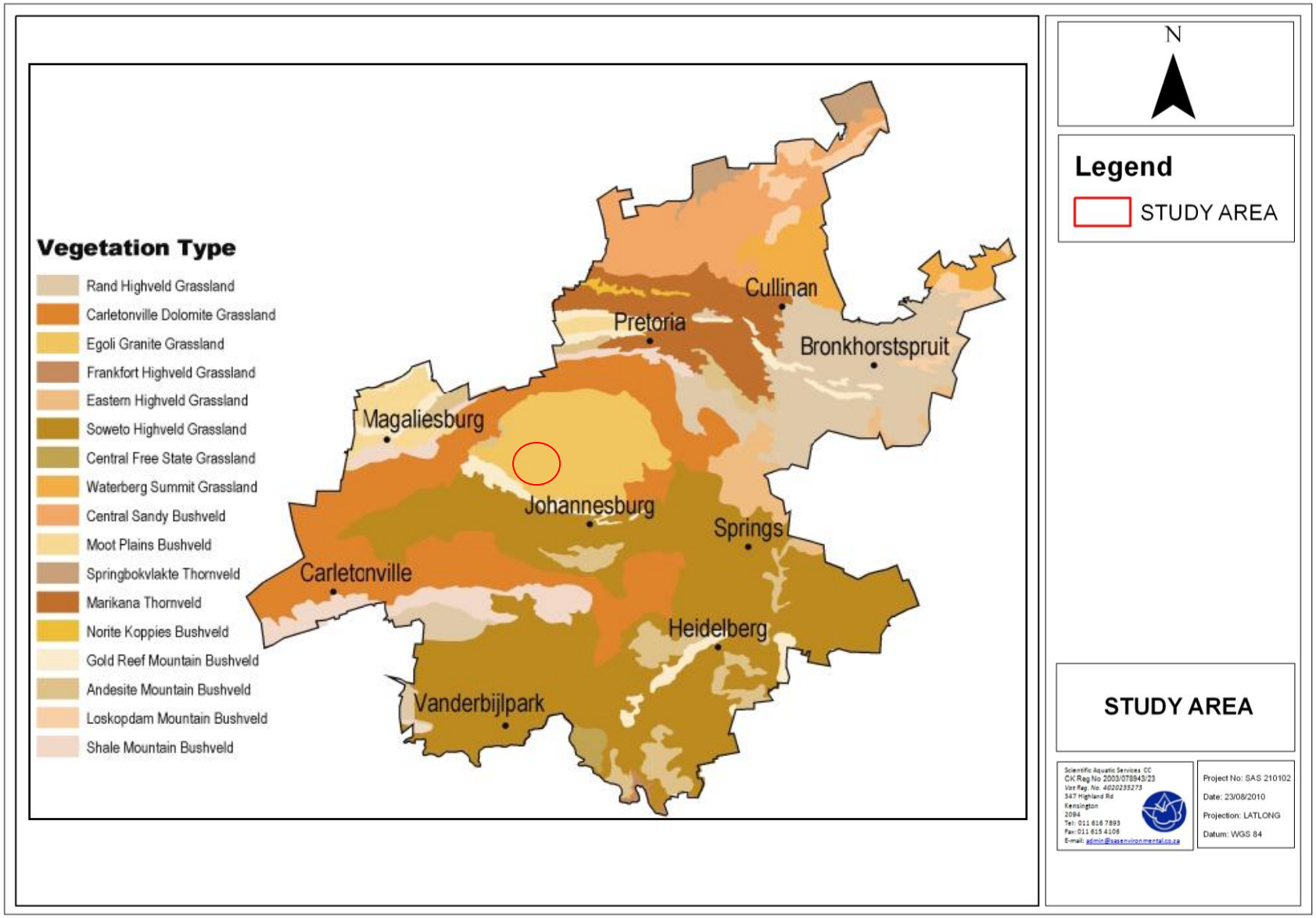


Figure 9: Vegetation types of Gauteng (NBI vegetation map, Mucina, Rutherford, 2003).

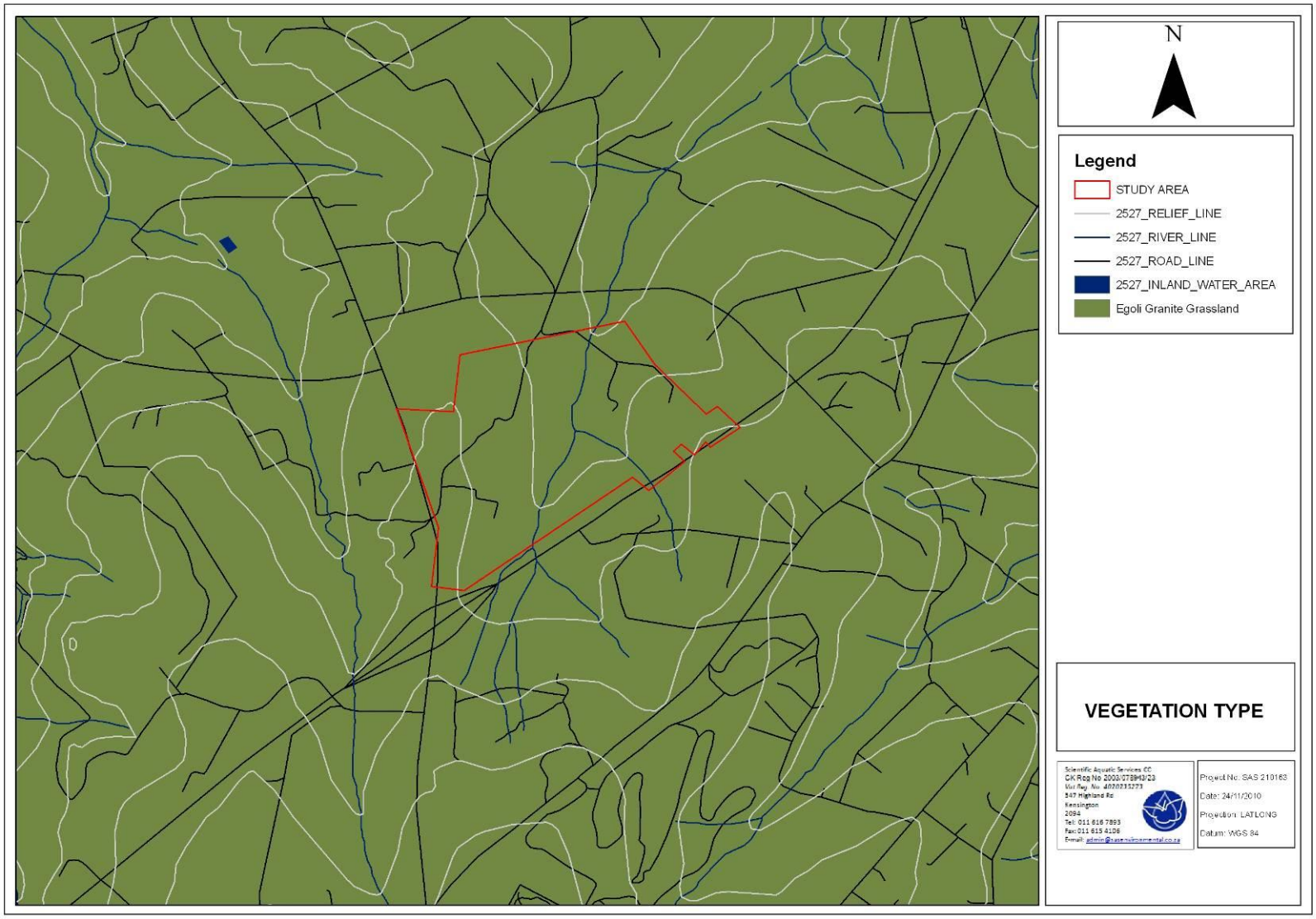


Figure 10: Vegetation type associated with the subject property (Mucina & Rutherford, 2006).

4.3 Distribution

Its distribution is limited to Gauteng Province, and occurs within the Johannesburg Dome, extending in the region between northern Johannesburg (in the south), and from near Lanseria Airport and Centurion (south of Pretoria) to the north, westwards to about Muldersdrif and eastwards to Tembisa (Musina & Rutherford, 2006).

4.4 Climate

Egoli Granite Grassland falls within a strongly-seasonal summer-rainfall region, with very dry winters. The mean annual precipitation (MAP) is 620-800mm (overall average of 682mm) (Table below). The variation of the MAP is from 24-27% across the unit, showing the variation and unreliability of the rainfall. Incidences of frost are frequent within the vegetation type, being higher in the southern than in the northern areas (Mucina & Rutherford, 2006).

Average climatic values shows the region to have an average precipitation value of 682mm. The MASMS value for the region is 75%. These values, when compared to the MAT and MAPE averages of 16.0°C and 2,194mm, respectively, show the region to be a relatively water-stressed area. Conservation of surface (and ground) water resources is therefore imperative to biodiversity conservation within the region.

Table 8: General climatic information for *Egoli Granite Grassland* (Mucina & Rutherford, 2006).

Bioregion	Vegetation types	Altitude (m)	MAP* (mm)	MAT* (°C)	MAPE* (mm)	MASMS* (%)
Mesic Highveld Grassland	Egoli Granite Grassland	1,280-1,660	682	16.0	2,194	75

***MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply).**

4.5 Geology and soils

The geology of *Egoli Granite Grassland* is dominated by Archaean Granite and Gneiss of the Halfway House granites at the core of the Johannesburg Dome, supporting leached, shallow, coarsely-grained and sandy soil poor in nutrients of the Glenrosa form. Small areas are built by ultramafics (DEAT, 2001; Mucina & Rutherford, 2006). The lithology for the area is also dominated by Iron, Jaspilite, Syenite, Hornblende Granite, Foskorite, Gabro, Potassic Granite and Dionite (ENPAT, 2001).

4.6 Conservation

This vegetation type is formally classified as an *Endangered* vegetation type that has only approximately 3% (provincial conservation target is 24%) of it conserved in statutory reserves (Diepsloot and Melville Koppies Nature Reserve). Other conserved areas include the Walter Sisulu National Botanical Gardens. More than two thirds of the vegetation unit has already undergone transformation mostly due to urbanisation, cultivation or by road construction. Current rates of transformation threaten most of the remaining unconserved areas. There is no serious alien infestation in this unit, although species such as *Eucalyptus grandis*, *Eucalyptus camaldulensis* and *Eucalyptus sideroxylon*, as well as exotic *Acacia* species, are commonly found. Erosion is moderate and very low

5. Floral characteristics of the study area

5.1 Important Taxa of the Egoli Granite Grassland

The proposed development site falls within the *Grassland* Biome and *Mesic Highveld Grassland* Bioregion of Gauteng. It is represented by one vegetation unit, namely *Egoli Granite Grassland*, which is an *Endangered* vegetation type. It occurs on moderately to strongly undulating plains and low hills supporting tall, usually *Hyparrhenia hirta*-dominated grasslands, with some woody species on rocky outcrops or rock sheets. The rocky habitat show a high diversity of woody species, which occur in the form of scattered shrub groups or solitary small trees. The dominant and typical floral species of *Egoli Granite Grassland* are presented in the table below.

Table 9: Dominant and typical floristic species of *Egoli Granite Grassland* (Mucina & Rutherford, 2006).

Grass species	Forb species	Tree/Shrub Species
Aristida canescens (d)	*Acalypha angustata*	*Vangueria infausta*
Aristida congesta (d)	*Acalypha peduncularis*	*Rhus pyroides*
Cynodon dactylon (d)	*Becium obovatum*	*Anthospermum hispidulum*
Digitaria monodactyla (d)	*Berkheya insignis*	*Anthospermum rigidum* subsp. *pumilum*
Eragrostis capensis (d)	*Crabbea hirsute*	*Gnidia capitata*
*Eragrostis chloromelas (*d)	*Cyanotis speciosa*	*Helichrysum kraussii*
Eragrostis curvula (d)	*Dicoma anomala*	*Ziziphus zeyheriana*
Eragrostis racemosa (d)	*Helichrysum rugulosum*	*Lopholaena coriifolia*
Heteropogon contortus (d)	*Justicia anagalloides*	
Hyparrhenia hirta (d)	*Kohautia amatymbica*	
Melinis repens subsp. *repens* (d)	*Nidorella hottentotica*	
Monocymbium ceresiiforme (d)	*Pentanisia prunelloides* subsp. *latifolia*	
Setaria sphacelata (d)	*Pseudognaphalium luteo-album*	
Themeda triandra (d)	*Senecio venosus*	

Grass species	Forb species	Tree/Shrub Species
Tristachya leucothrix (d) *Andropogon eucomus* (c) *Aristida aequiglumis* (c) *Aristida diffusa* (c) *Aristida scabrivalvis* subsp. *borumensis* (c) *Bewsia biflora* (c) *Brachiaria serrata* (c) *Bulbostylis burchelli* (c) *Cymbopogon caesius* (c) *Digitaria tricholaeoides* (c) *Diheteropogon amplectens* (c) *Eragrostis gummiflua* (c) *Eragrostis sclerantha* (c) *Panicum natalense* (c) *Schizachyrium sanguineum* (c) *Setaria nigrirostris* (c) *Tristachya rehmannii* (c) *Urelytrum agropyroides* (c)	Geophytic herbs: *Cheilanthes deltoidea* *Cheilanthes hirta*	

(*(d) – Dominant species for the vegetation type; (c) – Common species for the vegetation type.)

6. General Importance of subject property

6.1 Importance According to Gauteng Conservation Plan

Gauteng conservation plan has indicated no importance directly related to the subject property except for the wetland area that was assessed and delineated during the assessment. Ridge and irreplaceable areas are indicated relatively close to the study area, but the proposed development is not deemed a threat to these areas.

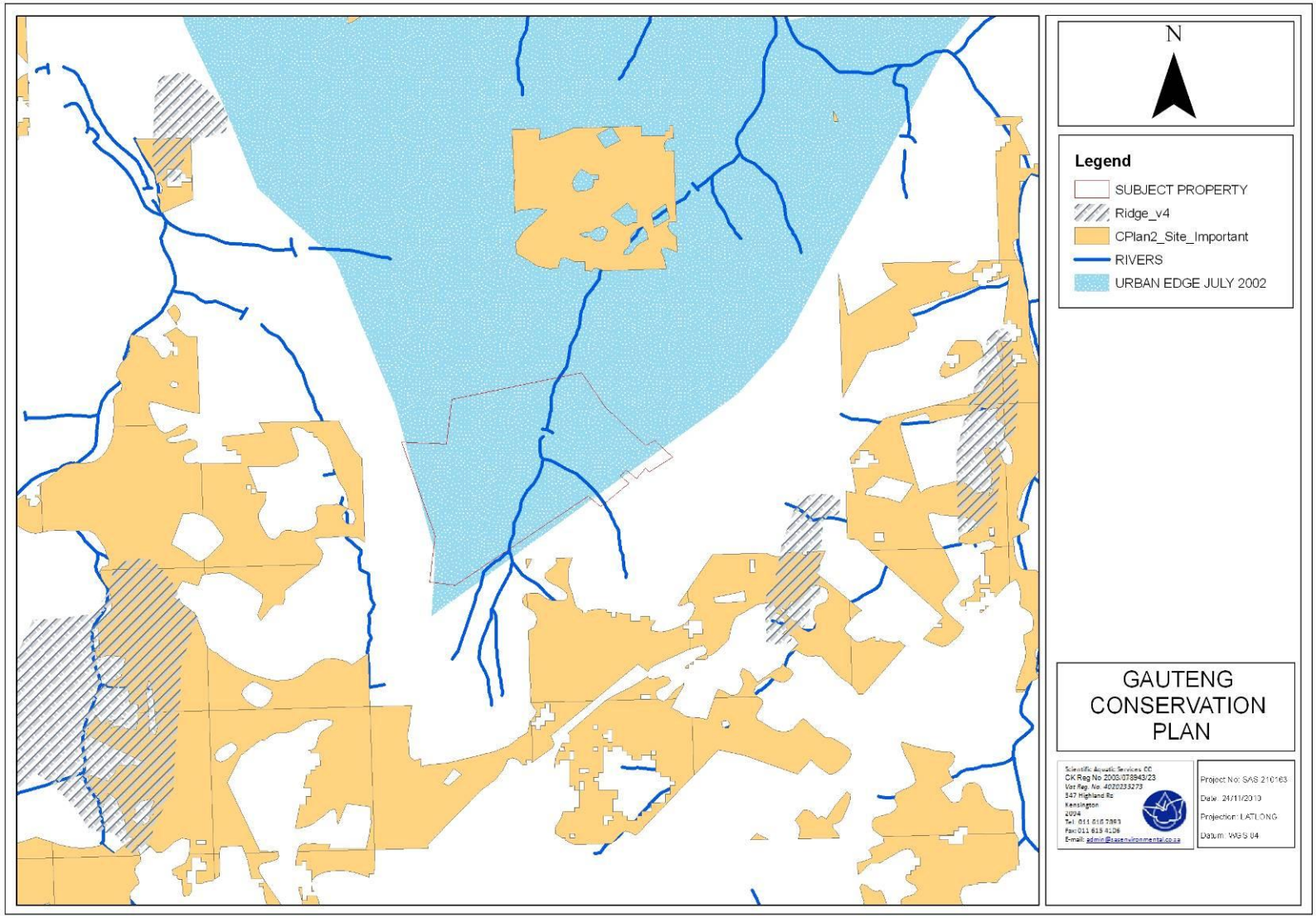


Figure 11: Importance indicated by GDACE C-Plan V2.

6.2 South African Grasslands Program

The grassland biome is considered unique with 80 vegetation types, 42 river ecosystems and 3 370 different plant species. Therefore the grassland biome provides essential ecosystem services and provides special habitat for various floral and faunal species. However, the grassland biome also sustains South Africa's major economic, agricultural, industrial and urban edges and therefore is under major threat from urban expansion, cultivation and mining. It is therefore considered important to conserve and protect these sensitive areas within South Africa. The South African Grasslands program identified various priority zones within the grassland biome, see figure below.

The subject property does not fall within one of the priority areas identified by the Grasslands program. This is mainly due significant impact from historical agricultural activities and residential infrastructure. Isolated areas within the grassland vegetation are starting to return to more natural grassland communities. However it is doubtful that the floral community will return to a pristine ecological state due to its isolation from similar habitat as well as increasing anthropogenic encroachment within surrounding areas.

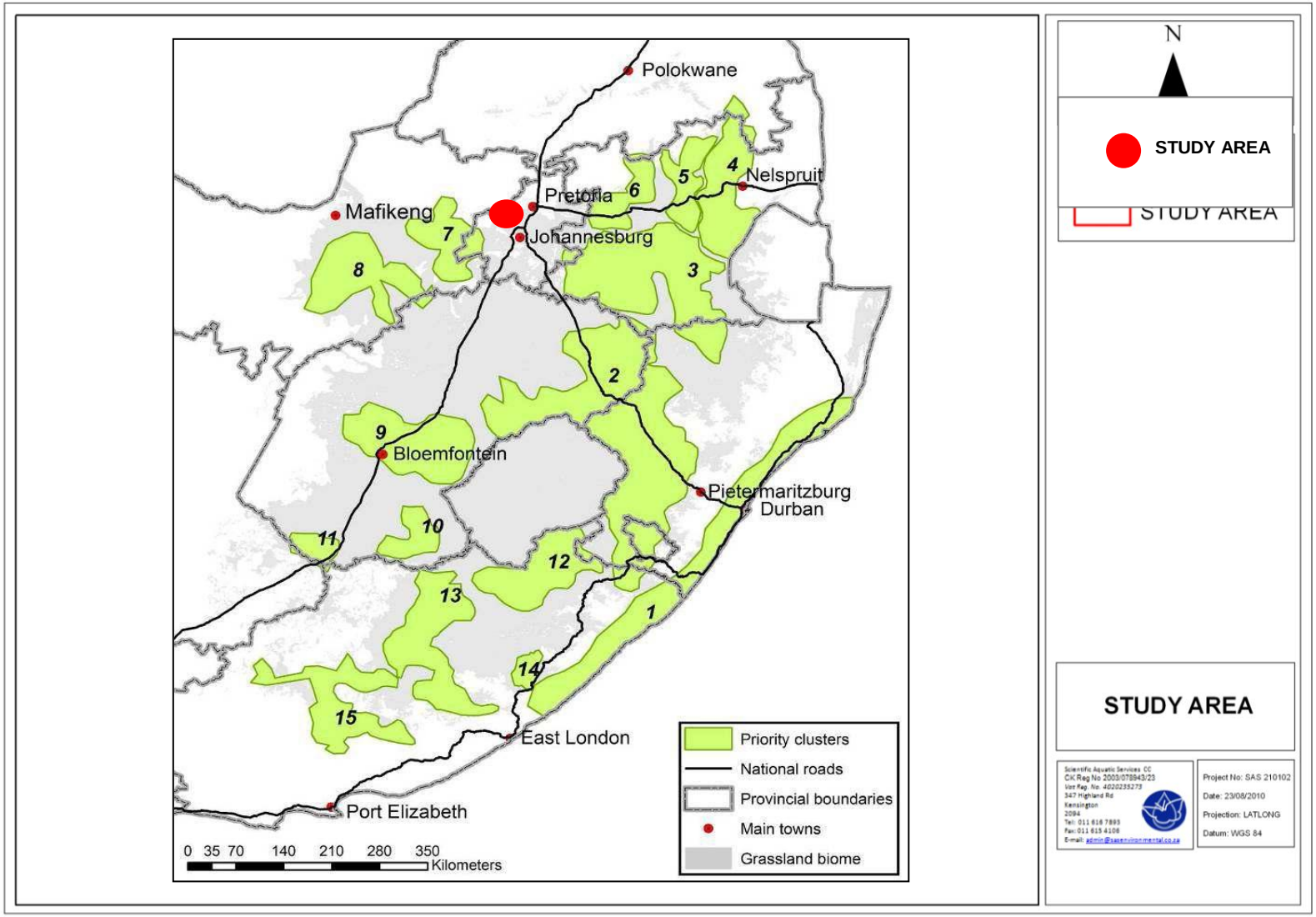


Figure 12: Priority areas within the grassland biome as identified by the Grassland program (www.grasslands.org.za).

7. Results of Investigation

7.1 Surrounding Properties/Land Uses

The subject property is located within an area used as agricultural smallholdings. However increasing commercial and residential development within the larger area has led to a decline in overall ecological state with only isolated areas considered of higher ecological value.

Historically the subject property was utilised as agriculture smallholdings with evidence of crop cultivation still evident throughout the majority of the study area. The land has since been left open space leading to some overall improvement of vegetation. However, an informal settlement erected in the past year or two has led to a significant decline in overall ecological condition.

7.2 Ecological condition and functioning

Presently ecological functioning and the condition of the subject property range from high in wetland areas to very low in areas where residences and farm infrastructure has been demolished. Isolated open veld areas can be considered to be in moderate ecological condition with moderate ecological functioning.

7.3 Habitat descriptions

7.3.1 Habitat unit 1: Sensitive and ecologically important wetland areas

Figure 13: Wetland habitat of the subject property.

One wetland system was identified within the subject property, which was delineated and is discussed in detail within the wetland assessment section. Isolated areas of the wetland feature have remained largely undisturbed and as a result are regarded of higher ecological importance. The wetland feature in its present state still provides habitat for various wetland floral and faunal species as well as migratory corridors for more mobile faunal species. Evidence was encountered of *Otomys angoniensis* within the central portions of the wetland zones and although considered Least Concern by the IUCN it is not encountered frequently within Gauteng wetlands and therefore its habitat is considered worth a conservation effort. Two *Pyxicephalus adspersus* individuals were identified within the road reserve of the N14 bordering the southern portion of the subject property. This amphibian species are considered near threatened and uses the wetland zone for breeding habitat as well as a migration corridor. A 60 meter buffer from the edge of the wetland temporary zone is advocated for this amphibian species by GDARD (2009). The northern portion of the wetland was dominated by *Leersia hexandra,* a grass species known to provide breeding habitat for *Metisella meninx* and although no individuals were identified it is deemed possible that this endangered butterfly may occur within the wetland zones of the subject property.

Although a 32-meter buffer is advocated by GDARD for the wetland feature, after consideration of the above species and associated habitats it was deemed necessary to extend the buffer zone to 50 meters and dedicate a suitable offset area within the subject property for these species. These areas should all be designated sensitive and remain undeveloped and designated as public or private open space during the lifetime of the development. However, within some areas of the wetland feature anthropogenic activities were noted such as bridges, palisade fencing and impoundments leading to vegetation transformation. These areas should be rehabilitated and all alien and weed species should be removed to enhance the PES of the wetland feature.

The extended buffer as well as the offset area can be used for the rescue and relocation of the grassland floral species observed within the remainder of the subject property such as *Hypoxis hemerocallidea* and *Boophane disticha* listed as “declining” within the PRECIS red data plant list identified within the subject property.

7.3.2 Habitat unit 3: Open veld

As with the surrounding areas the subject property historical land use consisted of agricultural smallholdings. As a result the open veld habitat unit in its present state can be divided into two portions based on present ecological state, namely the eastern portion and the western portion

divided by the wetland feature. Evidence of crop cultivation is still evident within the majority of the western portion; however the land has since been left fallow leading to some overall improvement of vegetation. As a result these areas are considered in a moderate ecological condition with a relatively diverse floral community. However these areas are isolated and function as ecological islands; it is therefore doubtful that these areas will return to pristine grassland.

Figure 14: Open veld habitat unit.

The eastern portion of the study area has seen fewer disturbances and as a result has a higher present ecological state in comparison to the western portion, but is still not deemed to be in a significantly high ecological condition. This portion is not as isolated as the western portion with similar grassland habitat located to the east, but areas with residential development and urban gardens within this portion do impact on the continuity of the habitat as well as natural species composition.

Exotic and weed floral species are confined to the transformed areas, with almost no spread of these species to the grassland habitat unit was observed, but if these species are not eradicated within the bordering transformed areas they will spread to the grassland portions and lead to a further decline in PES.

7.3.3 Habitat unit 2: Transformed areas

Figure 15: Areas impacted by informal settlements.

Dispersed in the open veld habitat unit, remnants of old farm infrastructure and residential developments were encountered. These buildings have all been demolished and presently do not provide any suitable habitat for any indigenous faunal or floral species. The only faunal species expected within this habitat unit are species known to occur in close association to human activity and the only floral species noted were either alien or plants that formed part of the urban gardens. The recent establishment of an informal settlement extended this habitat unit further into historical open veld areas. Within these areas no sensitive faunal or floral species are expected to occur mainly due to significant habitat destruction. It is therefore deemed that the transformed habitat unit has a very low ecological importance and that the proposed development will not have a significant impact on the overall present ecological state of the habitat unit.

8. Floral assessment

The overall floral diversity within open veld and wetland habitat units were deemed high in comparison to the transformed habitat unit. However, the floral community composition observed within the open veld and wetland habitat units were significantly different. A complete list of floral species identified during the assessment is included in Appendix A.

8.1 Floral Community Assessment

Floral communities can provide information regarding the ecological status of specific areas within a study area. If the species composition is quantitatively determined and characteristics of all components of the floral community are taken into consideration, it is possible to determine the Present Ecological State of the portion of land represented by the assessment point.

Any given grass species is specifically adapted to specific growth conditions. This sensitivity to specific conditions make grasses good indicators of veld conditions. The sections below summarise the dominant floral species identified within each transect with their associated habitats and optimal growth conditions with reference to the table and figure below. It should be noted that transect locations were chosen within all areas moderately representative of vegetation in pristine condition, therefore areas with complete vegetation transformation, such as areas utilised by the informal settlement, were not assessed using this method. These transformed areas were however assessed using the Vegetation Index Score (see section below).

Table 10: Grouping of grasses (Van Oudtshoorn, 2006).

Pioneer	Hardened, annual plants that can grow in very unfavourable conditions. In time improves growth conditions for perennial grasses.
Subclimax	Weak perennials denser than pioneer grasses. Protects soils leading to more moisture, which leads to a denser stand, which deposits more organic material on the surface. As growth conditions improve climax grasses are replaced by subclimax grasses.
Climax	Strong perennial plants adapted to optimal growth conditions.
Decreaser	Grasses abundant in good veld.
Increaser I	Grasses abundant in underutilized veld.
Increaser II	Grasses abundant in overgrazed veld.
Increaser III	Grasses commonly found in overgrazed veld.

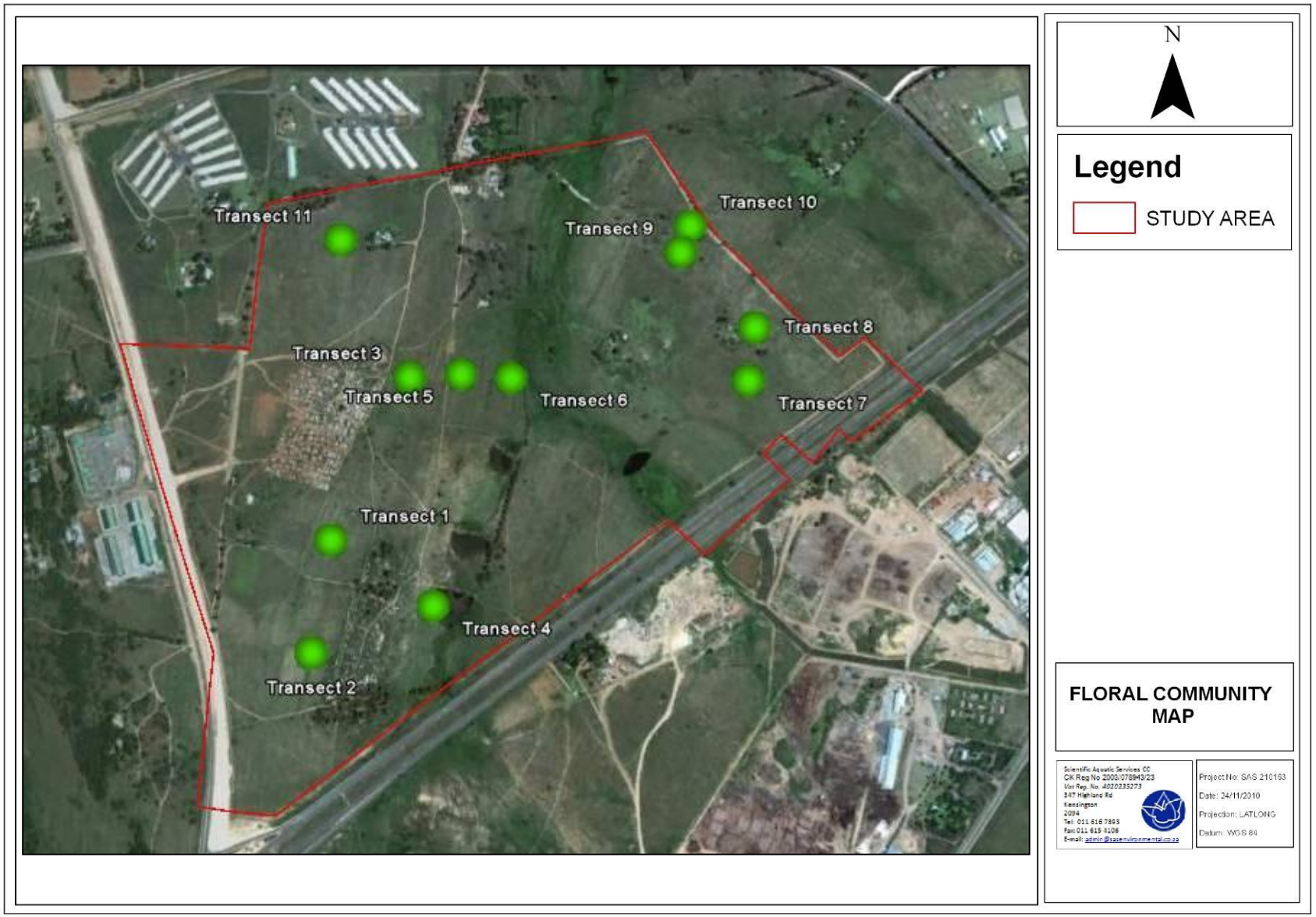
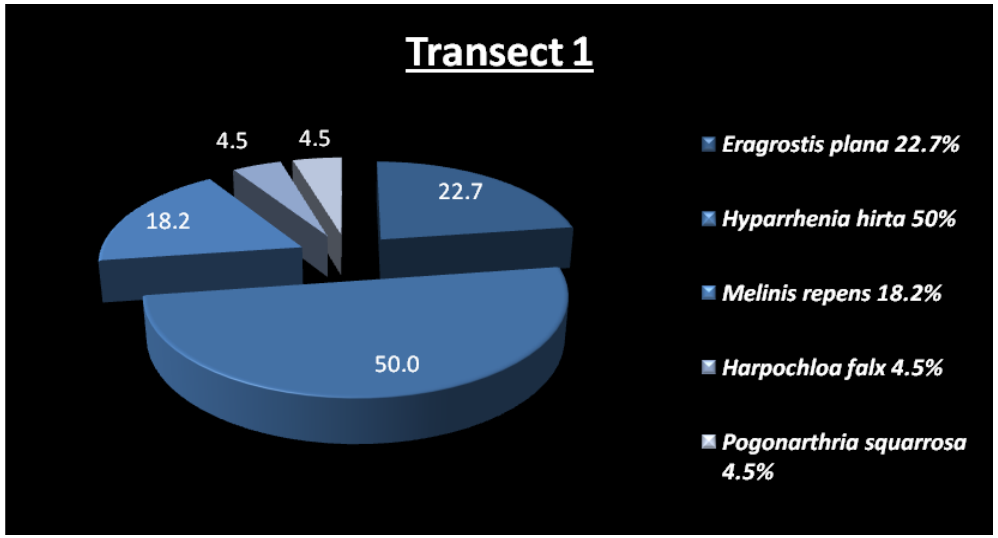


Figure 16: Arial map depicting locations of individual transects.



Transect 1 – Centre of western portion (grassland)

- *Eragrostis plana* (Tough love grass) [Increaser II; Subclimax grass]. Tough love grass grows in disturbed places such as old cultivated lands, road reserves and also tramples places such as feedlots and water points; it grows in all types of soil; mostly in damp patches, especially in the more arid western parts of its area of distribution.
- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Harpochloa falx* (Catepillar Grass) [Climax grass, Increaser I]. Catepillar grass grows on stony slopes in well drained soil, usually in areas with a high rainfall. It is mosly found in undisturbed mountainous grassland.
- *Pogonarthia squarrosa* (Herringbone grass) [Increaser II; Subclimax grass]. Herringbone grass grows in disturbed places such as roadsides but is also sparsely distributed in undisturbed veld. It grows mostly in sandy soil.

Egoli Granite Grassland Indicators:

- *Hyparrhenia hirta*
- *Melinis repens*

Conclusion: 95% of the species encountered are associated with historical disturbance such as old cultivated land.

Figure 17: Transect 1.

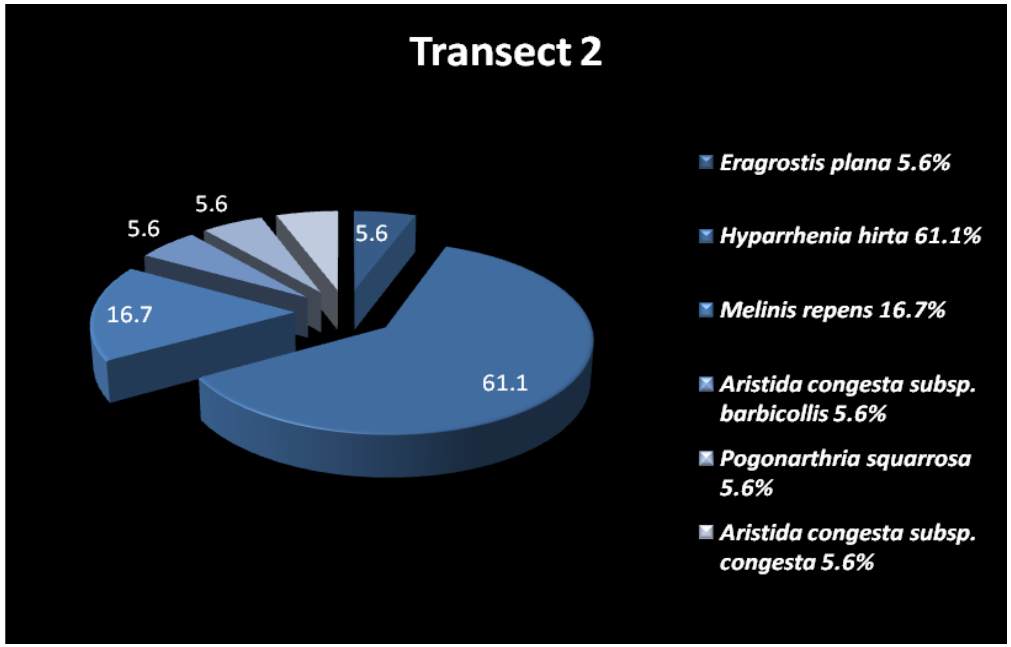


Figure 18: Transect 2.

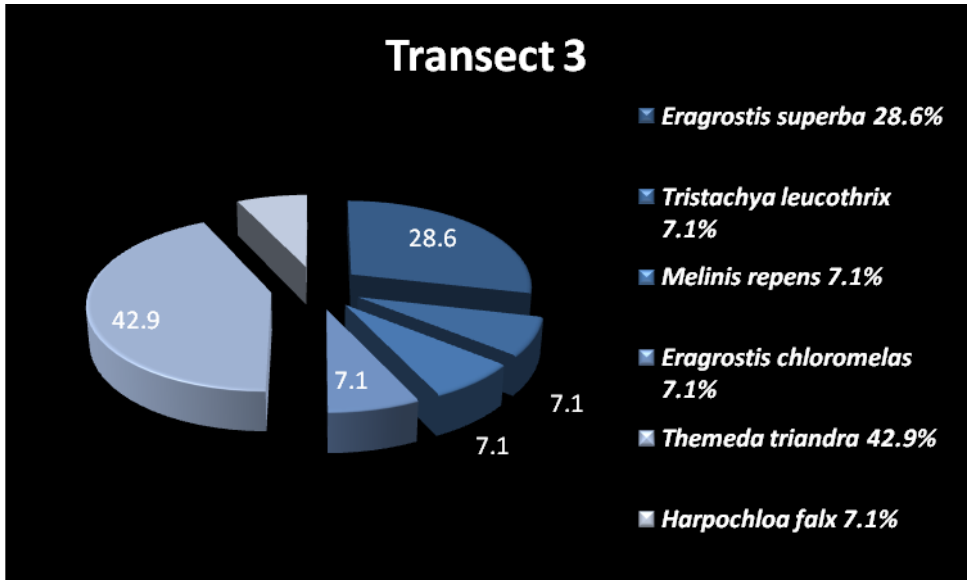
Transect 2 – South-western portion (Grassland)

- *Eragrostis plana* (Tough love grass) [Increaser II; Subclimax grass]. Tough love grass grows in disturbed places such as old cultivated lands, road reserves and also tramples places such as feedlots and water points; it grows in all types of soil; mostly in damp patches, especially in the more arid western parts of its area of distribution.
- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Aristida congesta subsp. barbicollis* (Spreading three-awn) [Increaser II, Pioneer grass]. Spreading three-awn occurs in disturbed places like old cultivated lands, road reserves and bare patches in overgrazed veld. It grows in all types of soil, but mostly in loam soil.
- *Pogonarthia squarrosa* (Herringbone grass) [[Increaser II; Subclimax grass]. Herringbone grass grows in disturbed places such as roadsides but is also sparsely distributed in undisturbed veld. It grows mostly in sandy soil.
- *Aristida congesta* subsp. *congesta* (Tassel three awn) [Pioneer grass; Increaser II]. Tassel three awn occurs in disturbed places such as road reserves, old cultivated lands and bare patches in overgrazed veld.

Egoli Granite Grassland Indicators:

- *Hyparrhenia hirta*
- *Melinis repens*
- *Aristida congesta* subsp. *congesta*

Conclusion: All the species encountered are associated with historical disturbance. Three species are Egoli Granite Indicators, but all three are known to occur in disturbed places. If the grassland was of higher ecological value there would have been more diversity in floral species, with special mention of Egoli Granite Indicators.



Transect 3 – North western portion (Transformed Grassland)

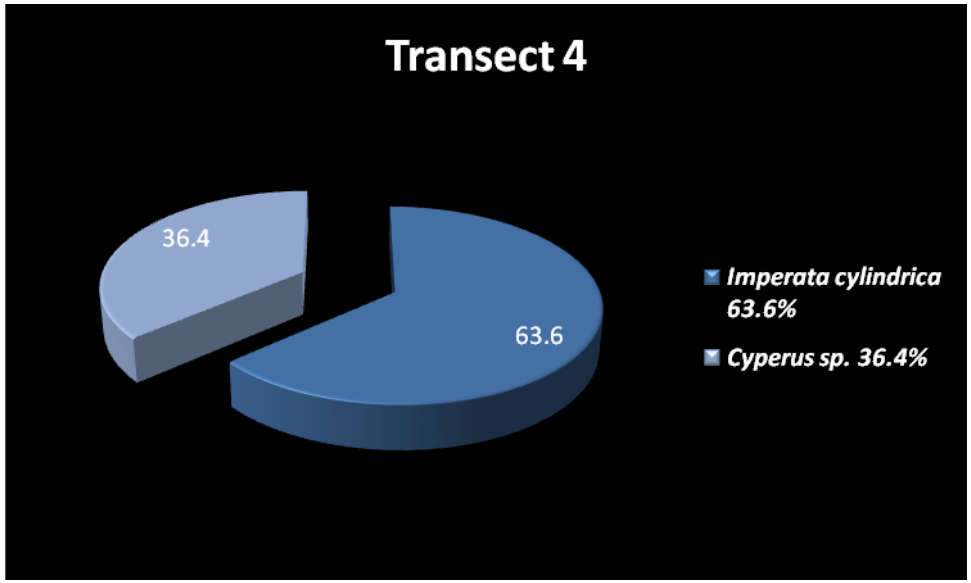
- *Eragrostis superba* (Saw toothed love grass) [Increaser II, subclimax grass]. Saw toothed love grass grows in disturbed places such as bare pathes in veld and along roadsides. It mostly grows in sand, loam and gravelly soil, but sometimes in clay soil.
- *Tristachya leucothrix* (Hairy trident grass) [Climax grass; Increaser I]. Hairy trident grass usually grows in open grassland on stony slopes and in marshy places. It mostly occurs in sandy soil in veld that is under-utilised and infrequently burnt.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Harpochloa falx* (Catepillar Grass) [Climax grass, Increaser I]. Catepillar grass grows on stony slopes in well drained soil, usually in areas with a high rainfall. It is mosly found in undisturbed mountainous grassland.
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.
- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Melinis repens*
- *Themeda triandra*
- *Aristida congesta* subsp. *congesta*

Conclusion: Less transformation evident with a different variety of species encountered. The species are indicative of the stony slopes associated with the Egoli Granite Grassland.

Figure 19: Transect 3.



Transect 4 – Southern portion (Wetland)

- *Imperata cylindrica* (Cottonwool grass) [Increaser I]. Cottonwool grass grows in poorly drained, damp soil such as vleis and riverbanks where it can form dense stands. It also grows in other habitat types in areas with a high rainfall.

Conclusion: Only one grass species identified and although not indicative of Egoli Granite Grassland its high affinity for water makes *Imperata cylindrica* a very good wetland indicator.

Figure 20: Transect 4.

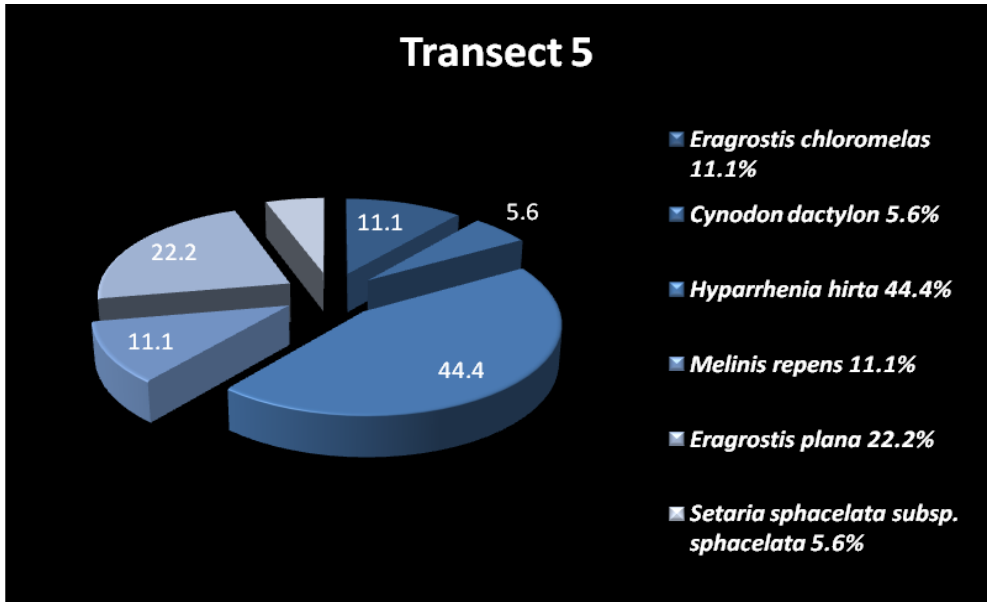


Figure 21: Transect 5.

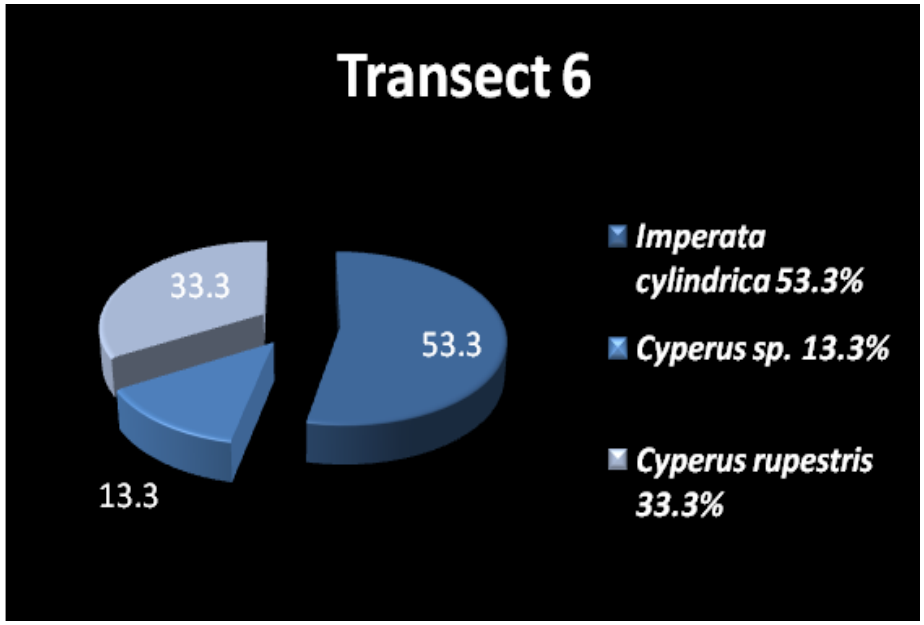
Transect 5 – Centre (Grassland)

- *Cynodon dactylon* (Couch grass) [Pioneer grass; Increaser II]. Couch grass grows in all types of soil, especially sandy soil and fertile soil. It is found in disturbed places such as road reserves, gardens and cultivated lands, often also in damp places.
- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.
- *Setaria sphacelata* var. *sphacelata* (common bristle grass) Decreaser, climax grass Common bristle grass usually grows on stony slopes or sometimes next to streams in damp soil. It utilises a wide range of habitat types.
- *Eragrostis plana* (Tough love grass) [Increaser II; Subclimax grass]. Tough love grass grows in disturbed places such as old cultivated lands, road reserves and also tramples places such as feedlots and water points; it grows in all types of soil; mostly in damp patches, especially in the more arid western parts of its area of distribution.
- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Cynodon dactylon*
- *Melinis repens*
- *Hyparrhenia hirta*
- *Setaria sphacelata* var. *sphacelata*

Conclusion: The majority of the species are associated with historical disturbance; however species diversity is higher in comparison to the extreme south-western portion of the subject property.

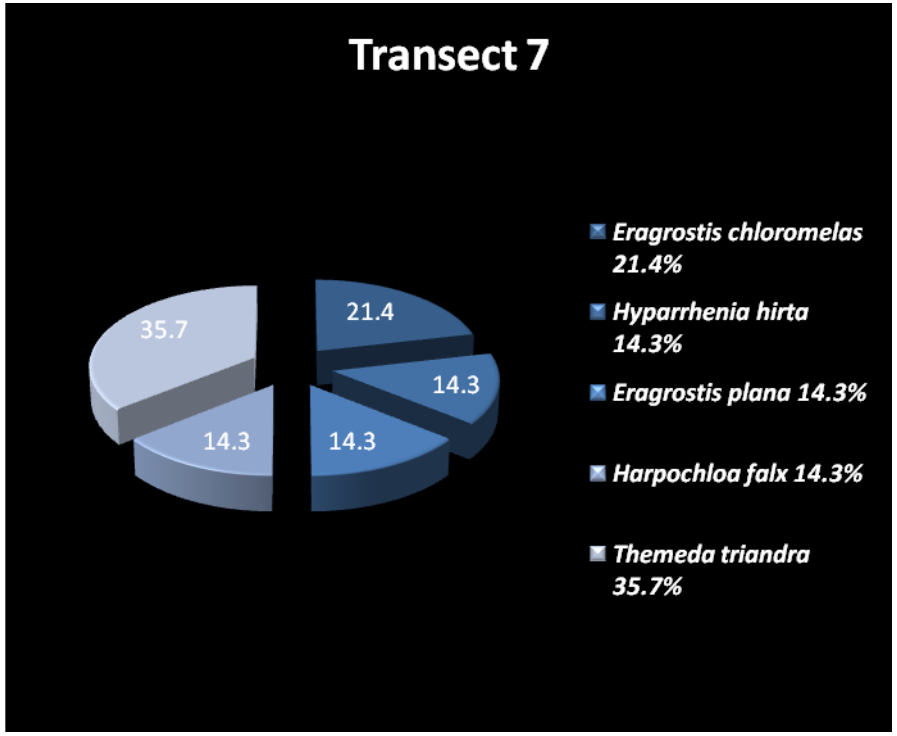


Transect 6– Centre portion (Wetland)

- *Imperata cylindrica* (Cottonwool grass) [Increaser I]. Cottonwool grass grows in poorly drained, damp soil such as vleis and riverbanks where it can form dense stands. It also grows in other habitat types in areas with a high rainfall.

Conclusion: *Cyperus rupestri*s is commonly found close to rock sheets in association with shallow soils close to rain pools. Therefore all the species identified indicates wetland habitat.

Figure 22: Transect 6.



Transect 7 – South eastern portion (Grassland)

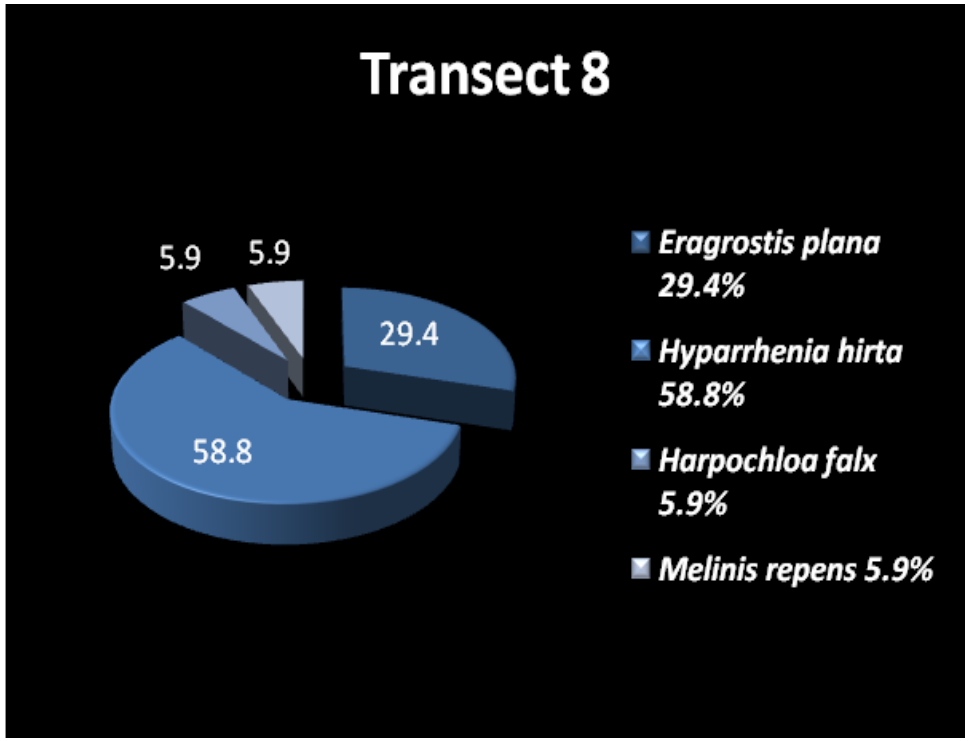
- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.
- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Eragrostis plana* (Tough love grass) [Increaser II; Subclimax grass]. Tough love grass grows in disturbed places such as old cultivated lands, road reserves and also tramples places such as feedlots and water points; it grows in all types of soil; mostly in damp patches, especially in the more arid western parts of its area of distribution.
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.
- *Harpochloa falx* (Catepillar Grass) [Climax grass, Increaser I]. Catepillar grass grows on stony slopes in well drained soil, usually in areas with a high rainfall. It is mosly found in undisturbed mountainous grassland.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Themeda triandra*
- *Melinis repens*
- *Hyparrhenia hirta*

Conclusion: *H. hirta* percentage is significantly lower than in previous transects and the percentages of grass species are more equal. Therefore the area surrounding transect 7 has seen less disturbance than the previous transect locations with the exception of the areas associated with wetlands.

Figure 23: Transect 7.



Transect 8 – South eastern portion (Grassland)

- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Eragrostis plana* (Tough love grass) [Increaser II; Subclimax grass]. Tough love grass grows in disturbed places such as old cultivated lands, road reserves and also tramples places such as feedlots and water points; it grows in all types of soil; mostly in damp patches, especially in the more arid western parts of its area of distribution.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Harpochloa falx* (Catepillar Grass) [Climax grass, Increaser I]. Catepillar grass grows on stony slopes in well drained soil, usually in areas with a high rainfall. It is mosly found in undisturbed mountainous grassland.

Egoli Granite Grassland Indicators:

- *Melinis repens*
- *Hyparrhenia hirta*

Conclusion: This area has fewer species and *H. hirta* and *E. plana* are again dominating the area, therefore historical disturbance within the immediate area are noticeable.

Figure 24: Transect 8.

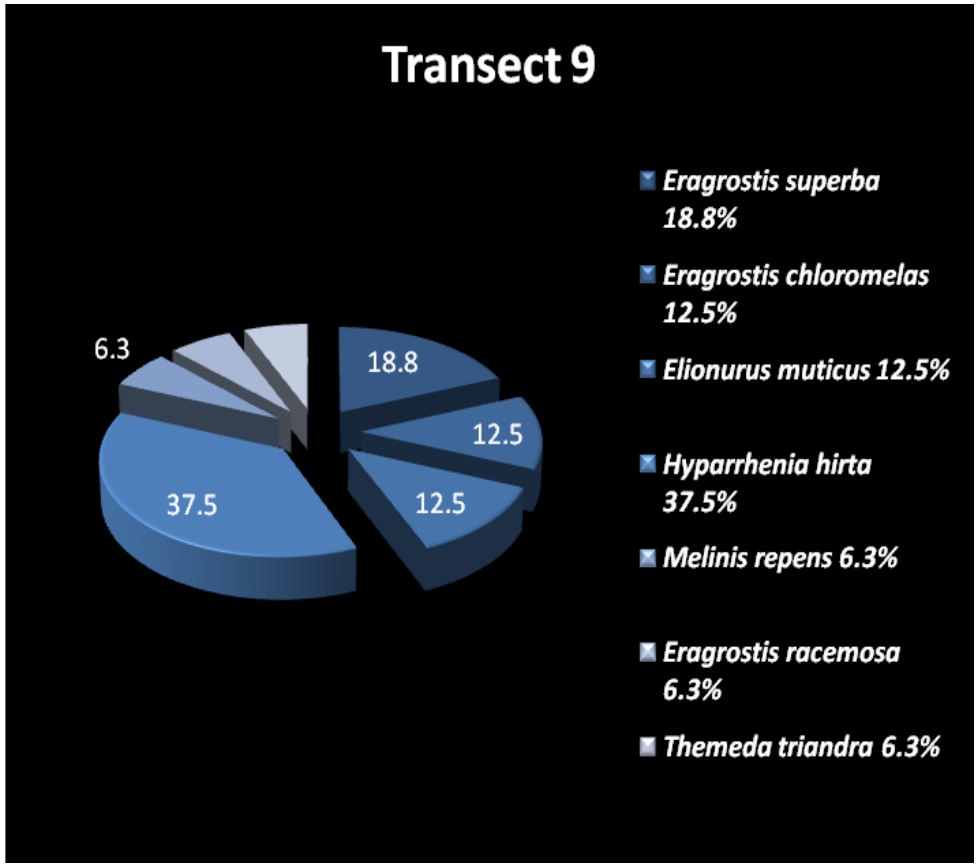


Figure 25: Transect 9.

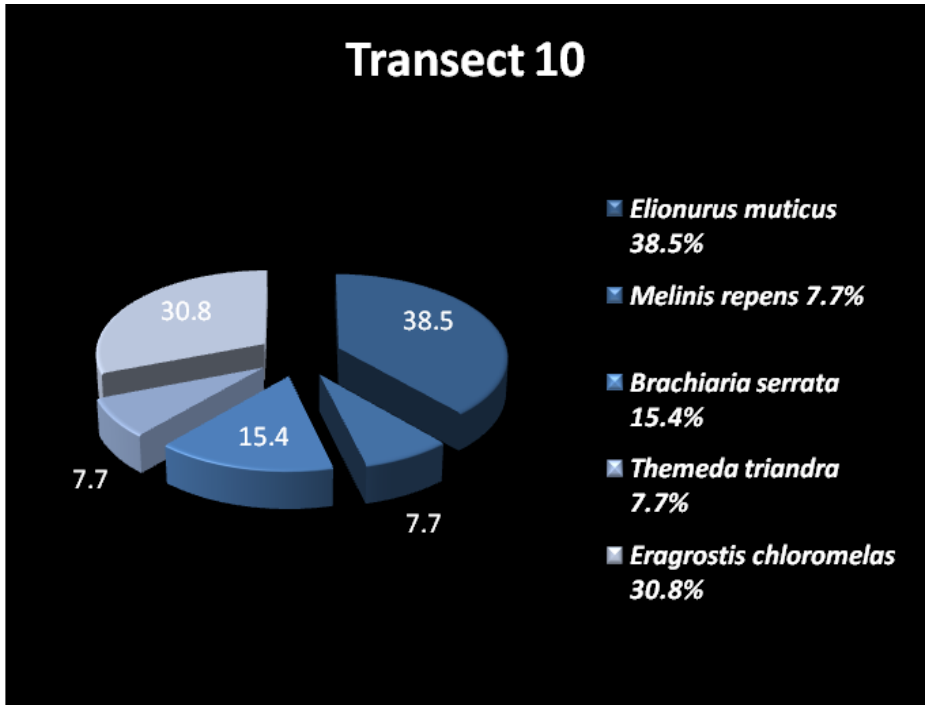
Transect 9 – North eastern portion (Grassland)

- *Eragrostis superba* (Saw toothed love grass) [Increaser II, Subclimax grass]. Saw toothed love grass grows in disturbed places such as bare pathes in veld and along roadsides. It mostly grows in sand, loam and gravelly soil, but sometimes in clay soil.
- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.
- *Elionurus muticus (*Wire grass) [Climax; Increaser III]. Wire grass grows mostly in open sour grassland in sandy soil, but is also commonly found in mixed bushveld and other sandveld regions. It is particularly common in overgrazed veld.
- *Hyparrhenia hirta* (Common thatching grass) [Increaser I, Climax grass]. Grows well in drained soil, especially gravelly soil, in open grassland, as well as in bushveld. It is often found in disturbed places such as old cultivated lands and road reserves. It is also sometimes found along riversides on heavier soil.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Eragrostis racemosa* (Narrow heart love grass) [Increaser II, Subclimax grass]. Narrow heart love grass grows in a large variety of habitat types, mostly in shallow sandy or gravelly soil in damp places
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Themeda triandra*
- *Melinis repens*
- *Hyparrhenia hirta*
- *Eragrostis racemosa*

Conclusion: Species diversity is much higher than any other portion of the subject property. This area has seen the least disturbance.



Transect 10 – North eastern portion (Grassland)

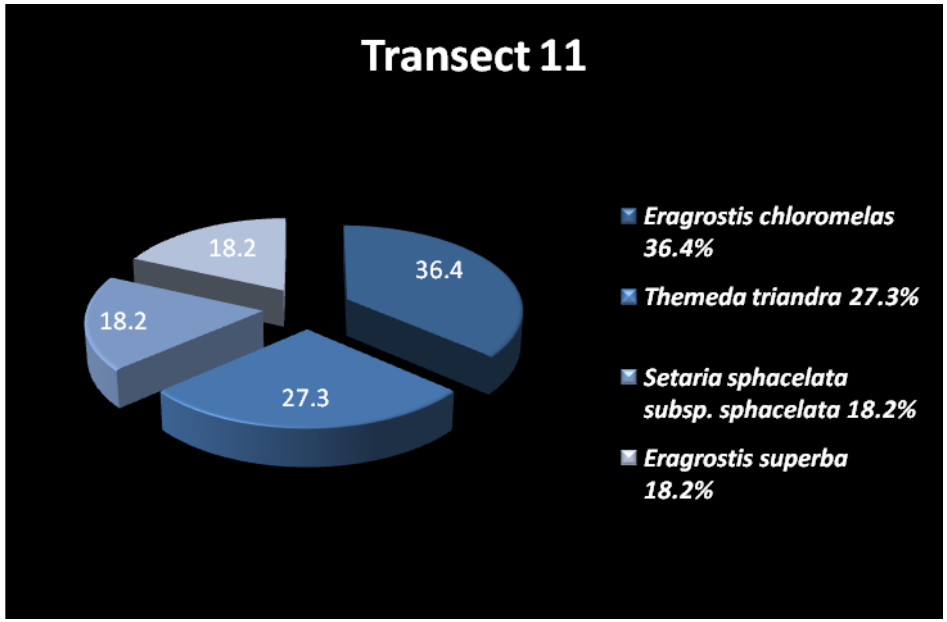
- *Elionurus muticus (*Wire grass) [Climax; Increaser III]. Wire grass grows mostly in open sour grassland in sandy soil, but is also commonly found in mixed bushveld and other sandveld regions. It is particularly common in overgrazed veld.
- *Melinis repens (*Natal Red top) [Subclimax grass, Increaser II]. Natal red top grows in disturbed places such as roadsides and old cultivated lands (subsp. *repens*) or in summy dry places (subsp. *grandiflora*), in all soil types, but especially in well drained soil.
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.
- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.
- *Brachiaria serrata (*Velvet Signal Grass) [Climax grass; Decreaser]. Velvet signal grass mostly occurs in stony places in undisturbed veld. It also utilises a wide range of other habitat types such as sandveld and vlei areas.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Themeda triandra*
- *Melinis repens*
- *Brachiaria serrata*

Conclusion: Species composition is different from other areas within the subject property leaning towards more natural grassland.

Figure 26: Transect 10.



Transect 11 – Northern portion (Grassland)

- *Eragrostis chloromelas* (Narrow curly leaf) [Climax grass; Increaser II]. Curly leaf grows on stony slopes in sandy and loam soil. It is more common in open grassland than in the bushveld.
- *Themeda triandra* (Red grass) [Climax grass; Decreaser]. Red grass is abundant in undisturbed open grassland and bushveld in parts with an average to high rainfall. It grows in any type of soil, but mostly in clay soil.
- *Setaria sphacelata* var. *sphacelata* (common bristle grass) [Decreaser, Climax grass]. Common bristle grass usually grows on stony slopes or sometimes next to streams in damp soil. It utilises a wide range of habitat types.
- *Eragrostis superba* (saw toothed love grass) [Increaser II, Subclimax grass]. Saw toothed love grass grows in disturbed places such as bare pathes in veld and along roadsides. It mostly grows in sand, loam and gravelly soil, but sometimes in clay soil.

Egoli Granite Grassland Indicators:

- *Eragrostis chloromelas*
- *Themeda triandra*
- *Setaria sphacelata* var. *sphacelata*

Conclusion: This area has also seen fewer disturbances with *T. triandra* dominating the area.

Figure 27: Transect 11.

From the floral community results above it is evident that the south-western portion of grassland has seen more disturbance in comparison to the remainder of the grassland habitat unit. *Hyparrhenia hirta* dominated this area and species diversity decreases significantly towards this portion of the grassland habitat unit. The northern-eastern portion has seen the least vegetation transformation with a significantly diverse floral community noted within the area. Only floral species with a high affinity for water was noted within the wetland habitat unit, the wetland transect locations was chosen within the southern portion of the wetland feature, mainly because of the transformation within the northern portion leading to significant vegetation transformation with limited natural wetland species noted at the time of the assessment.

8.2 Vegetation Index Score

The information gathered during the assessment of the subject property was used to determine the Vegetation Index Score (VIS) - see appendix C. The subject property was divided into three dominant habitat types and VIS was applied to each habitat unit.

The VIS for habitat unit 1 (wetland habitat) was calculated at 11.75. The score falls within assessment class B according to the VIS final score definition – largely natural with few modifications. Alien invasion (*Protasparagus laricinus* and *Populus x canescens*) was noted within some areas of the wetland that resulted in a lower VIS score than expected.

Habitat unit 2 (open veld) calculated a VIS score of 8.5. Less vegetation transformation resulted in a moderate VIS score class – Class C (largely natural with few modifications). This habitat unit could have provided a much higher VIS score, but due to historical cultivation as well as encroaching surrounding anthropogenic activity the VIS score was lowered.

The habitat unit 3 (transformed habitat) VIS score are remarkably lower than habitat unit 1 and 2 – assessment class E, the loss of natural habitat extensive. This is due to significant vegetation transformation in areas were residential developments have been demolished as well as some areas totally left bare as a result of the informal settlement.

8.3 RDL Floral Status Assessments

An assessment considering the presence of any RDL plant species, as well as suitable habitat to support any such species, was undertaken. The complete PRECIS (Pretoria Computer Information Systems) red data plant list for the grid reference (2527DD) was enquired from SANBI (South African National Biodiversity Institute) - see table below.

Table 11: IUCN Red Data List Categories – Version 3.1 as supplied by SANBI.

Category	Definition
EX	Extinct
EW	Extinct in the wild
CR	Critically endangered
EN	Endangered
VU	Vulnerable
NT	Near threatened
LC	Least concern
DD	Data deficient
NE	Not evaluated

Table 12: PRECIS red data plant list for the QDS 2527DD.

Family	Species	Threat status	Growth forms
AMARYLLIDACEAE	*Boophone disticha (L.f.) Herb.*	Declining	Geophyte, succulent
AQUIFOLIACEAE	*Ilex mitis (L.) Radlk. var. mitis*	Declining	Shrub, tree
ASTERACEAE	*Callilepis leptophylla Harv.*	Declining	Herb
CAPPARACEAE	*Cleome conrathii Burtt Davy*	NT	Herb
FABACEAE	*Melolobium subspicatum Conrath*	VU	Dwarf shrub
GUNNERACEAE	*Gunnera perpensa L.*	Declining	Herb, hydrophyte
HYACINTHACEAE	*Bowiea volubilis Harv. ex Hook.f. subsp. volubilis*	VU	Climber, geophyte, succulent
HYACINTHACEAE	*Drimia sanguinea (Schinz) Jessop*	NT	Geophyte
HYPOXIDACEAE	*Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.*	Declining	Geophyte
ORCHIDACEAE	*Habenaria mossii (G.Will.) J.C.Manning*	EN	Geophyte, herb

Table 13: POC for floral species of concern.

Species	Habitat	POC	Motivation
Boophone disticha (L.f.) Herb.	Grassland, often rocky places.	100%	Was found within the subject property.
Ilex mitis (L.) Radlk. var. mitis	Along streams in sheltered kloofs.	26%	Wetland feature on subject property not sheltered.
Callilepis leptophylla Harv.	Grassland, often rocky ridges.	73%	Will be restricted to the north-eastern grassland habitat.
Cleome conrathii Burtt Davy	On stony slopes, usually on sandy soil, open to closed deciduous woodland, quartzites, red sandy soil	53%	Sandy soil restricted to the south-western grassland habitat was transformation is significant.
Melolobium subspicatum Conrath	Grassland hillsides.	53%	Limited literature available. Will also be restricted to the north-eastern grassland habitat.

Gunnera perpensa L.	In cool continually moist localities, mainly along upland streambanks.	80%	Will be located within the southern portion of the wetland feature were transformation is less severe.
Bowiea volubilis Harv. ex Hook.f. subsp. volubilis	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	26%	No habitat available.
Drimia sanguinea (Schinz) Jessop	Open veld and scrubby woodland in a variety of soil types.	53%	Doubtful if suitable habitat exists on the subject property.
Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.	Occurs in a wide range of habitats, from sandy hills on the margins of dune forests to open rocky grassland; also grows on dry, stony, grassy slopes, mountain slopes and plateaux; appears to be drought and fire tolerant.	100%	Was identified throughout the subject property.
Habenaria mossii (G.Will.) J.C.Manning	Open grassland on dolomite or in black sandy soil	26%	No habitat available.

Two species namely *Hypoxis hemerocallidea* and *Boophane disticha* considered declining was identified during the site assessment (see map below). If any of these species will be disturbed during the proposed development activities they should be rescued and relocated preferably to the wetland buffer area or proposed offset area. A rescue and relocation plan is included in Appendix D. None of the other floral species considered to be of concern were identified during the assessment of the subject property. Only two species calculated noteworthy POC scores, namely *Gunnera perpensa* (80%) and *Callilepis leptophylla* (73%). *Gunnera perpensa* will be located within the southern portion of the wetland feature were transformation is less severe and *Callilepis leptophylla* will be restricted to the north-eastern grassland habitat. If these species do occur within the subject property the larger buffer zone will cater for *Gunnera perpensa* and the proposed offset area will provide habitat for *Callilepis leptophylla.*

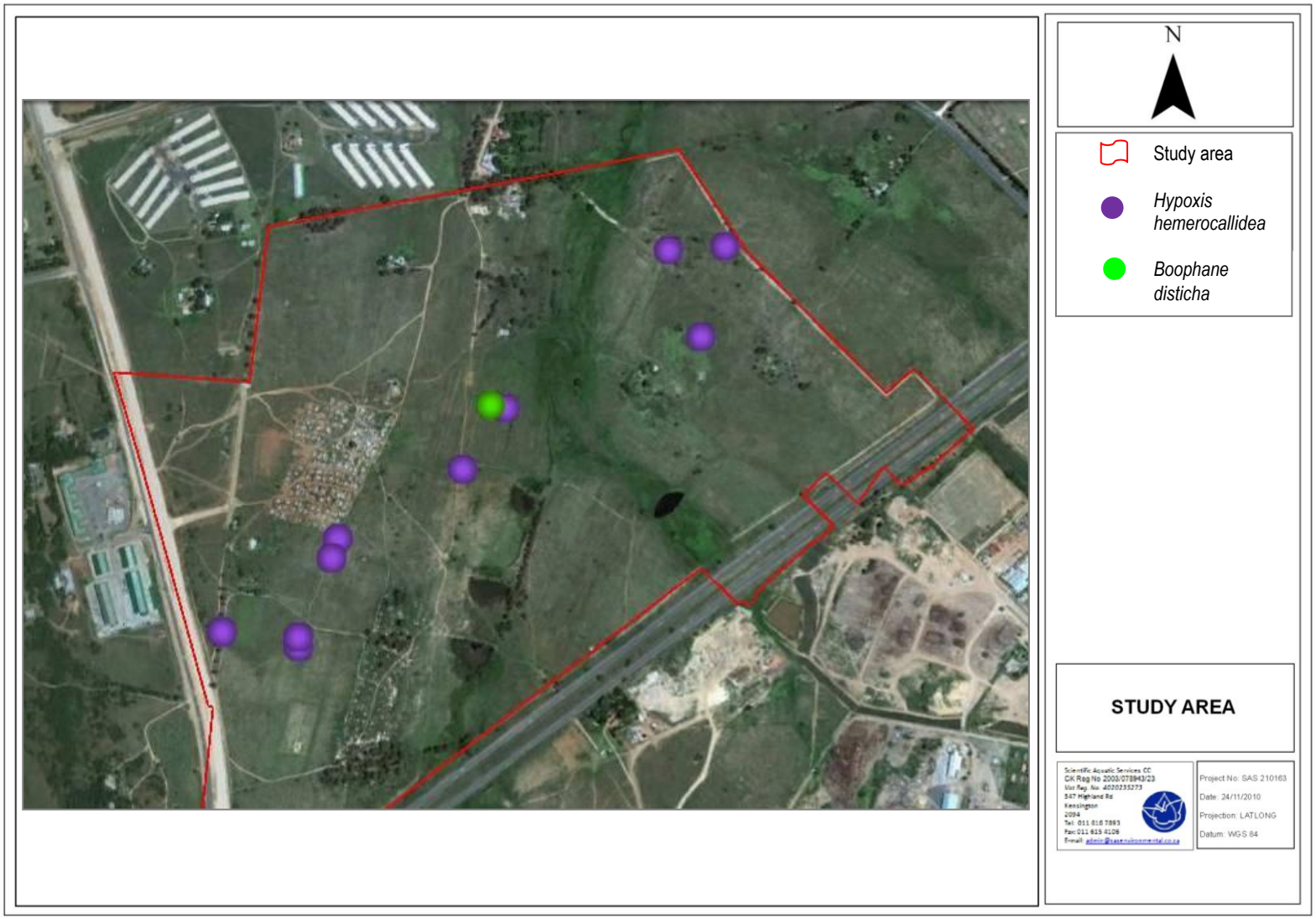


Figure 28: Locations of floral species listed as "declining" in the PRECIS red data plant list.

8.4 Exotic and Invader Species

Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin, but as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively-growing species within the ecosystem. Therefore, they are often the most dominant and noticeable within an area. Disturbances of the ground through trampling, excavations or landscaping often leads to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process, however, takes many years to occur, with the natural vegetation never reaching the balanced, pristine species composition prior to the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively-growing exotic counterparts.

Alien vegetation invasion causes degradation of the ecological integrity of an area, causing (Bromilow, 2001):

- a decline in species diversity;
- local extinction of indigenous species;
- ecological imbalance;
- decreased productivity of grazing pastures; and
- increased agricultural input costs.

Grasslands are particularly prone to bush encroachment and alien vegetation invasion, as this vegetation type is the most utilised for agricultural purposes. This is mainly for livestock grazing, or complete transformation for agronomy (crops). These areas suffer the highest degree of degrading factors that include overgrazing, trampling, incorrect fire management and removal, and grassland areas are traditionally sought after for agronomy, as they often occur on rich, fertile soils. These factors lead to an imbalance in the species composition and make the grasslands prone to alien vegetation invasion. Exotic trees and shrubs often invade grasslands, with the grass species not being able to compete with the deeper-rooted and taller trees for moisture and light and are therefore quickly displaced. A loss of floral and faunal species diversity then occurs that was once dependent on the grassland.

The subject property alien/weed communities can be divided into two, namely the areas associated with the transformed habitat unit mainly dominated by *Tagetes minuta* and *Eucalyptus camaldulensis* and the areas associated with the wetland habitat unit mainly dominated by *Protasparagus laricinus* and *Populus x canescens.* The remainder of the alien

and weed species listed in the table below were scattered throughout the remainder of the subject property and was not identified in specific areas.

Table 14: Dominant exotic vegetation species identified during the general area assessment.

Species	English name	Type or Origin	Category*
	Tress/ shrubs		
Salix babylonica	Weeping willow	Invader	2
Eucalyptus camuldulensis	Red river gum	Invader	2
Populus x canescens	Grey poplar	Native to Eurasia	2
Melia azederach	Syringa	Native to India	3
	Forbs		
Bidens pilosa	Common blackjack	Native to S America	NA
Plantago lanceolata	Buckhorn plantain	Native to Europe	NA
Rumex acetosella	Sheep sorrel	Native to Europe	NA
Conyza albida	Tall fleabane	Native to America	NA
Conyza canadensis	Horseweed fleabane	Native to America	NA
Datura stramonium	Common thornapple	Native to N America	1
Verbena tenuisecta	Fine-leaved verbena	Native to S. America	N/A
Morus nigra	Black mulberry	Native to N. China	N/A
Argemone ochroleuca	Mexican poppy	Native to C. America	1
Solanum mauritianum	Bugweed	Native to Asia	1
Protasparagus laricinus	Wild asparagus	Weed	N/A
Tipuana tipu	Tipu tree	Native to Brazil	3
Schkuhria pinnata	Dwarf marigold	Native to S America	NA
Schinus terebinthifolius	Pepper tree	Native to S. America	3
Tagetes minuta	Tall khakiweed	Native to S America	NA
Verbena bonariensis	Purple top	Native to S America	NA
Trifolium repens	White clover	Native to Europe	NA
Solanum elaeagnifolium	Silverleaf bitter apple	Native to America	1
Solanum sisymbrifolium	Dense thorned bitter apple	Weed	1
Hibiscus trionum	Wild stockrose	Native to Asia	NA
Datura ferox	Large thorn apple	Native to N America	1
Bidens Formosa	Cosmos	Native to Central America	NA
Asclepias fruticosa	Shrubby milkweed	Weed	Na

*__Category 1__ – Declared weeds. Prohibited plants, which must be controlled or eradicated.
__Category 2__ – Declared invader plants with a value. "Invaders" with certain useful qualities (i.e. commercial). Only allowed in controlled, demarcated areas.
__Category 3__ – Mostly ornamental plants. Alien plants presently growing in, or having escaped from, areas such as gardens, but are proven invaders. No further planting or trade in propogative material is allowed (Bromilow, 2001).

8.5 Medicinal plants

Medicinal plant species are not necessarily indigenous species, with many of them being regarded as alien invasive weeds. The majority of the medicinal plant species are located throughout the subject property and are not restricted to specific habitats within the subject

property. It should be noted that the species diversity observed was low due to the majority of the subject property being old cultivated land and disturbed areas. The table below presents a list of plant species with traditional medicinal value, plant parts traditionally used and their main applications, which were identified during the field assessment. These species are all regarded as common and widespread species, with the exception of *Hypoxis hemerocallidea* and *Boophane disticha* listed as “declining” in the PRECIS red data plant list.

Table 15: Traditional medicinal plants identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, et al., 1997; van Wyk and Gericke, 2000; van Wyk and Wink, 2004; van Wyk, Oudtshoorn, Gericke, 2009).

Species	Name	Plant parts used	Medicinal uses
Asclepias fruticosa	Milkweed	Mainly leaves, sometimes roots.	Snuff is prepared from ground leaves and used for treatment of headaches, tuberculosis and a general emetic to strengthen body.
Datura stramonium	Thornapple	Leaves and rarely the green fruit.	Generally as asthma treatment and pain reduction.
Helichrysum nudifolium	Hottentot's tea	Leaves and twigs mainly used, sometimes roots.	General remedy – coughs, colds, fever, infections, headaches, menstrual pain and wound dressing.
Boophane disticha	Bushman poison bulb	Bulb scales	Dry outer scales of the bulb are used as an outer dressing after circumcision and are applied to boils or septic wounds to alleviate pain. Weak decoctions are administered by mouth or as and enema for various complaints such as headaches, abdominal pain, weakness and eye conditions.
Plantago lanceolata	Ribwort plantain	Leaves	Anti-inflammatory and expectorant. Used to treat wounds, inflammation of skin and against catarrhs of the respiratory tract and inflammation of mouth and throat.
Conyza canadensis	Horseweed fleabane	Herb	Astringent, diarrhoea, diuretic, colds, insect repellent
Hypoxis hemerocallidea	African potato	Rootstock	Infusions of corm are used as emetics to treat dizziness, bladder disorders and insanity. Decoctions have been given to weak children as a tonic and the juice is reported to be applied to burns.
Vernonia oligocephala	Groenamara	Leaves and twigs	Infusions are taken as stomach bitters to treat abdominal pain and colic. Other ailments treated include rheumatism, dysentery and diabetes.
Acacia karroo	Sweet thorn	Bark, leaves and gum	The bark and leaves are a Cape remedy for diarrhoea and dysentery. The gum bark and leaves have also been used as an emollient and astringent for colds, conjunctivitis and haemorrhage.

9 Faunal Assessment

The faunal assessment included field observations (visual identification, spoor, call or dung) in conjunction with an extensive literature referencing as well as small mammal trapping. This is done due to the fact that many faunal species are nocturnal or climatic conditions during the assessment may not be suitable to enable observations to occur. In addition the levels of anthropogenic activity in the study area and surrounding area may determine whether species will be observed. A detailed discussion of the different faunal taxa follows in the sections below.

9.1 Mammals

Small mammal trapping was conducted in areas identified as suitable small mammal habitat. However no mammals were trapped. The unsuccessful trapping rate was considered a result of ongoing rain during the time the assessment and is not considered a true presentation of the small mammal species community that inhabits the subject property. Evidence of one small mammal species was encountered near the second trapping site (southern portion of the

wetland). *Otomys angoniensis* is considered Least Concern by the IUCN, but is considered a concern by GDARD and therefore its habitat is considered worth a conservation effort.

Figure 29: Evidence encountered of *Otomys angoniensis* within wetland zones of the subject property.

9.1.1 Wetland Faunal Assessment

GDARD identified the following mammal species with an affinity for wetlands, *Aonyx capensis, Atilax paludinosus, Chrysopalax villosus, Dasymys incomtus, Lutra maculicollis, Itomys angoniensis (Otomys angoniensis)*, and *Otomys irroratus*, to be of concern. The habitat and food requirements of these species are listed in the following tables as well as whether or not these requirements were met at the study site.

Atilax paludinosus

Table 16: Habitat and food requirements for *Atilax paludinosus* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004).

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Atilax paludinosus [Water (Marsh) mongoose]	Dense vegetation near water; Foragers from footpaths and muddy banks	Tall grass and reeds provide some cover. Impoundments may offer open water for foraging.	Frogs, crabs, mice, fish, insects and bird eggs. Mainly frogs and crabs	Medium low	Moderate possibility of species being found in the vicinity of the study area

Chrysopalax villosus

Table 17: Habitat and food requirements for *Chrysopalax villosus* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004).

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Chrysopalax villosus (Rough haired golden mole)	Grassland with dry sandy soils near marshes and streams	Riparian area is moderately suitable for this species. However, if buffer areas remain open space the conservation of this species will be largely catered for.	Invertebrates, especially giant earthworms and millipedes.	Moderately high.	Moderate possibility of species being found in the vicinity of the study area. However present as well as historical anthropogenic activity within the subject property does decrease the possibility of the species inhabiting the study area.

Dasymys incomtus

Table 18: Habitat and food requirements for *Dasymys incomtus* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004).

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Dasymys incomtus (Water rat)	Swamps and wet areas along rivers and streams	The wetland areas within the subject property does provide habitat.	Stems and ripening seeds of grass; reeds and other plants; as well as insects	High	High possibility of this species occurring in the wetland areas.

Lutra maculicollis

Table 19: Habitat and food requirements for *Lutra maculicollis* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004)

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Lutra maculicollis (Spotted Neck Otter)	Fresh water only, generally prefers deeper water that does not necessarily have to flow ; Must have dense vegetation and holes available	Impoundments in combination with dense vegetation were identified.	Primarily fish eater. 40% fish; 40 % crab and 20% frog	Low.	Moderately low possibility of being encountered. Impairments of water quality reduce the suitability of the site for this species.

Otomys angoniensis (Otomys angoniensis)

Table 20: Habitat and food requirements for *Otomys angoniensis* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004).

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Itomys angoniensis *Otomys angoniensis* (Angoni Vlei Rat)	Wet vleis/swampy areas; Grassland and bushveld next to rivers; Requires dense cover for protection from prey.	The dense cover of the vegetation in the permanent and seasonal wetland zones provides good habitat for this species.	Stems and rhizomes of grass and fine seeds; Own faeces.	Very high.	High possibility of this species occurring in the wetland areas. Evidence of the species noted during the assessment.

Otomys irroratus

Table 21: Habitat and food requirements for *Otomys irroratus* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004)

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Otomys irroratus (Vlei rat)	Vleis and swampy areas; Grassland next to wet areas; Found in wetter areas than *Otomys angoniensis* ; Wet soil and standing water	The dense cover of the vegetation in the permanent and seasonal wetland zones and the extensive inundated areas provides good habitat for this species.	Stems and leaves of grasses and reeds; Forbs and seeds; Bark from pine trees;	High.	High possibility of this species occurring in the wetland areas.

Aonyx capensis

Table 22: Habitat and food requirements for *Aonyx capensis* and the degree to which they are met on the proposed development site. This information was compiled using Apps (2000) and Cillie (2004).

Species	Habitat requirements	Habitat available on site	Food requirements	Food available on site	Overall
Aonyx capensis [African (Cape) clawless otter]	Fresh, unpolluted water, preferably flowing; Cover of dense vegetation; Require holes and rocks.	The combination of fresh, flowing, unpolluted water was not observed at the site. There is insufficient foraging habitat in the area.	In freshwater: 50-70 % crabs; 10-20 % frogs;15% dragonfly larvae, and 3-23 % fish	Low.	Site not suitable for species.

Evidence of only one larger mammal species namely *Lepus saxatilis* (Scrub hare) were encountered during the field assessment. Historically the subject property could have provided habitat for a diverse population of larger mammal species, but anthropogenic activities such as agriculture, residential development as well as more recent informal settlements left the majority of the study area transformed. Migratory corridors have also been significantly impeded as a result of construction of roads on all sides of the subject property except for the eastern boundary as well as palisade fencing surrounding the entire subject property. The subject property in its present state is not considered optimal habitat for larger mammal species, however the wetland habitat is considered important for the survival of various smaller wetland mammal species.

Four mammal species of concern have a probability of occurrence of more than 60% (table below). All these species can be regarded as small mammal species preferring habitat such as relatively undisturbed grassland habitat. It is therefore doubtful that any of these species will inhabit the transformed habitat unit as well as the western portion of the grassland habitat unit. Both *Chrysospalax villosus* and *Neamblysomus julianae* if present on the subject property will be confined to the grassland habitat unit, with special mention of the eastern portion which has seen less transformation when compared to the western portion. Evidence of *Otomys angoniensis* was encountered within the southern portion of the wetland. *Otomys angoniensis* is considered Least Concern by the IUCN, but is considered a concern by GDARD and therefore its habitat is considered worth a conservation effort. The allocated wetland buffer of 50 meter on the eastern side of the wetland feature will provide refuge as well as migratory corridors for these species if present.

Table 23: Mammal species with 60% or higher POC regarding the subject property.

Species	Common name	Conservation Status	POC
Chrysospalax villosus	Rough-haired Golden Mole	CR	68
Neamblysomus julianae	Juliana's Golden Mole	VU	60
Rhinolophus blasii	Peak-saddle Horseshoe Bat	VU	60
Otomys angoniensis	Angoni Vlei Rat	LC	100

9.2 Birds

All bird species seen or heard during this time of the assessment were recorded. This was done for the duration of two days in summer. Surveys were conducted across the entire subject property, with particular attention paid to the wetland areas. The table below lists all the bird

species identified during the assessment. The complete list of bird species expected for the QDS 2527DD (Roberts Multimedia Birds of Southern Africa) is included in Appendix B.

Table 24: Bird species recorded during the bird survey.

Common Name	Scientific Name	Conservation Status
Helmeted Guineafowl	*Numida meleagris*	Not Threatened
Red-billed Quelea	*Quelea quelea*	Not Threatened
Yellow-billed Duck	*Anas undulata*	Not Threatened
Common Swift	*Apus apus*	Not Threatened
African Black Swift	*Apus barbatus*	Not Threatened
Cape Turtle-Dove	*Streptopelia capicola*	Not Threatened
Red-knobbed Coot	*Fulica cristata*	Not Threatened
Spotted Thick-knee	*Burhinus capensis*	Not Threatened
Grassveld pipit	*Anthus cinnamomeus*	Not Threatened
Blacksmith Lapwing	*Vanellus armatus*	Not Threatened
Crowned Lapwing	*Vanellus coronatus*	Not Threatened
Black-shouldered Kite	*Elanus caeruleus*	Not Threatened
Reed Cormorant	*Phalacrocorax africanus*	Not Threatened
Cattle Egret	*Bubulcus ibis*	Not Threatened
Hadeda Ibis	*Bostrychia hagedash*	Not Threatened
Common Fiscal	*Lanius collaris*	Not Threatened
Red Bishop	*Euplectus orix*	Not Threatened
Golden Bishop	*Euplectus afer*	Not Threatened
Masked Weaver	*Ploceus velatus*	Not Threatened
Cape Sparrow	*Passer motitensis*	Not Threatened

The moderately tall, dense grasslands on the subject property may provide suitable habitat for the African Grass Owl (Vulnerable), and although none were encountered during the study, there are the potential for them to occur within wetland buffers. Thus, if the wetland with associated 50 meter buffer remains open space these species will be protected from any impact the proposed development will have on their habitat.

A total of 10 bird species showed a POC of more than 60 %. All RDL bird species with a POC of more than 60 % is listed in the table below. The majority of these bird species are known to reside in either wetland or grassland habitat. The wetland habitat within the subject property has remained relatively undisturbed and if wetland with associated buffer zones are left as open space during the proposed development activities it is deemed possible for some of these wetland bird species of concern to return to these wetland areas.

The western portion of the grassland habitat unit has seen more vegetation transformation due to anthropogenic activities such as agriculture, gravel roads as well as residential developments

than the eastern portion. As a result the bird species of concern as listed below that inhabits grasslands are more likely to be found on the eastern portion of the subject property. Thus the extended buffer on the eastern side will provide protection for grassland inhabitants and their habitat.

Table 25: Gauteng threatened bird species with a POC of more than 60%.

Scientific name	Common name	Conservation Status	POC
Botaurus stellaris	Bittern	CR	65
Spizocorys fringillaris	Botha's Lark	EN	63
Circus ranivorus	African Marsh Harrier	VU	65
Falco naumanni	Lesser Kestrel	VU	63
Podica senegalensis	African Finfoot	VU	72
Tyto capensis	African Grass Owl	VU	77
Anthus chloris	Yellowbreasted Pipit	VU	63
Falco biarmicus	Lanner Falcon	NT	68
Eupodotis caerulescens	Blue Korhaan	NT	63
Eupodotis barrowii	Barrow's (Southern White-bellied) Korhaan	VU	63

9.3 Reptiles

Only two reptile species were identified during the assessment, namely *Hemachatus haemachatus* (Rinkhals) and *Pelomedusa subrufa* (Marsh Terrapin). More common reptiles are not necessarily affected by habitat transformation and as a result the subject property does offer habitat for various other reptile species within all the identified habitat units. However reptile species of concern will be restricted to areas with less anthropogenic activities such as the eastern portion of the subject property.

One reptile species of concern calculated a POC of 68% namely *Homoroselaps dorsalis* (striped harlequin snake). Striped harlequin snakes are rare and are listed by the IUCN as 'near threatened'. These snakes are very seldom encountered due to their small size (200 to 320mm) and habit of residing in moribund termite bounds. *Homoroselaps dorsalis* are primarily grassland specialists, but grassland in combination with termite mounds provide optimum habitat for the species. Land transformation due to agriculture is thought to pose a significant threat to the species mainly because ploughing destroys suitable termite mounds.

Although not encountered during the assessment, the eastern portion of the grassland habitat in its present state may provide habitat for this snake species. The extended buffer as well as the

proposed offset area will conserve suitable habitat for this species if it does inhabit the subject property.

9.4 Amphibians

The visits to the subject property confirmed the presence of two amphibian species (*Cacosternum boettgeri* and *Afrana angolensis*) within the wetland zone, both considered common for the area. The wetland feature within the subject property is deemed the most important for conservation of amphibian species. Two individuals of the amphibian species *Pyxicephalus adspersus* were encountered during the assessment of the subject property within the road reserve of the N14 bordering the southern portion of the subject property. This amphibian species are considered near threatened and uses the wetland zone for breeding habitat as well as a migration corridor. The Giant Bullfrog (*Pyxicephalus adspersus*) is the largest Southern African frog, and considered near threatened. Bullfrogs are opportunistic feeders and will prey upon any creature small enough to swallow, including small mammals, birds, snakes, lizards even other frog species. The wetland feature within the study area does provide suitable food resources for this species of frog as well as shallow seasonal pans with sandy soils for breeding on the site. Bullfrogs require these shallow seasonal habitats to breed successfully, as the eggs are fertilized externally. When the seasonal ponds start drying up, bullfrogs bury themselves backwards into the moist margins of the pans or migrate away from the pan to sandier soils and burrows may extend for well over a metre (Cook *et al*. 1996). A 60 meter buffer from the edge of the wetland temporary zone is advocated for this amphibian species by GDARD (2009). The extended wetland buffer of 50 meters together with the proposed offset area is however deemed sufficient for the conservation of this specie within the subject property.

9.5 Invertebrates

The invertebrate assessment conducted was a general assessment with the purpose of identifying common species and taxa in the study area. As such the invertebrate assessment will not be an indication of the complete invertebrate diversity potential of the proposed development site and surrounding area. Representatives of commonly encountered families in the Insecta class that was observed during the assessment are listed in the table below.

Table 26: General results from invertebrate collecting during the assessment of the subject property.

Insects	Comments
Order: Lepidoptera (Butterflies & Moths) Family: Nymphalidae Subfamily Danainae *Danaus chrysippus aegyptius* (African monarch) Subfamily: Nymphalinae *Junonia hierta cebrene* (Yellow pansy) Family: Pieridae *Eurema brigitta* (Broad-bordered Grass Yellow) *Pontia helice* (Meadow White)	Visual observations.
Order: Orthoptera (Grasshoppers, Crickets & Locusts) Family: Acrididae Family: Gryllidae	Visual observations and sweep-netting.
Order: Hymenoptera & Isoptera (Ants, Wasps & Termites) Family: Formicidae Family: Vespidae Family: Termitidae	Visual observations.
Order: Hemiptera (Bugs) Family: Pentatomidae	Visual observations.
Order: Diptera (Flies) Family: Tabanidae *Haematopota* (Clegs)	Visual observations
Order: Odonata Family: Coenagrionidae (Pond damsels) Africallagma glaucum (Swamp bluet)	Visual observations and sweep netting

Suitable *Metisella meninx* (Marsh sylph) habitat was encountered within the subject property and the area falls within the distribution range noted for *this specie*. The marsh sylph (*M. meninx*) habitat comprises of wetland where marsh grass is dominant. One of these wetland grasses *Leersia hexandra* plays a vital role in the reproductive cycle of the specie (Roos and Henning, 2002). *L. hexandra* was found to inhabit wetland portions on the subject property and therefore the subject property is considered possible breeding habitat for this RDL specie with a POC calculated at 80%. Optimum *L. hexandra* habitat however is within permanently inundated wetland zones and as a result the breeding habitat of *M. meninx* will be protected if wetland zones remain open space.

Figure 30: *Metisella meninx*.

9.6 Araneae

Evidence was encountered of the Mygalomorphae arachnids (Baboon spiders) in the western portion of the grassland habitat unit. After thorough searching only one burrow was identified, although it should be noted that these species are notoriously difficult to detect. All results obtained during the subject property assessment showed disturbance within the western portion of the grassland habitat unit, the portion where burrow was found. It is therefore the opinion of the specialists that an extended buffer of 50 meters as well as the proposed offset area would be more valuable to the conservation of this species as well as various other faunal species that may inhabit the grassland habitat unit within the subject property.

Figure 31: Burrow encountered of the Mygalomorphae family.

10 Faunal red data species assessment

All the faunal species that were assessed during the calculation of the RDSIS for the site are included in Appendix A. However, only the species that was found to have a 60% or greater chance of being found on the site and therefore involved in the calculation of the sensitivity score are presented in the table below. 17 species were found to have a POC of 60% or greater, discussed in detail in the sections above.

Table 27: Threatened faunal species with a 60% or greater Probability of Occurrence (POC) on the subject property

Species	Common Name	Red List Status	POC
Chrysospalax villosus	Rough-haired Golden Mole	CR	68
Neamblysomus julianae	Juliana's Golden Mole	VU	60
Otomys angoniensis	Angoni Vlei Rat	LC	100
Rhinolophus blasii	Peak-saddle Horseshoe Bat	VU	60
Botaurus stellaris	Bittern	CR	65
Spizocorys fringillaris	Botha's Lark	EN	63
Circus ranivorus	African Marsh Harrier	VU	65
Falco naumanni	Lesser Kestrel	VU	63
Podica senegalensis	African Finfoot	VU	72
Tyto capensis	African Grass Owl	VU	77
Anthus chloris	Yellowbreasted Pipit	VU	63
Falco biarmicus	Lanner Falcon	NT	68
Eupodotis barrowii	Barrow's (Southern White-bellied) Korhaan	VU	63
Eupodotis caerulescens	Blue Korhaan	NT	63
Homoroselaps dorsalis	Striped Harlequin Snake	VU	68
Pyxicephalus adspersus	Giant Bullfrog	VU	100
Metisella meninx	Marsh Sylph	VU	80

The 17 species presented in the table above were then used to calculate the RDSIS for the site, the results of which are presented in the following table.

Table 28: Red Data Sensitivity Index Score calculated for the subject property.

Red Data Sensitivity Index Score	
Average Total Species Score	**88**
Average Threatened Taxa Score	**88**
Average (Ave TSS + Ave TT/2)	**88**
% Species greater than 60% POC	**27%**
RDSIS of Site	**57%**

The RDSIS assessment of the property provided a moderate score of 57%, indicating moderate importance to RDL faunal species conservation within the region.

11 Wetland Assessment Results

11.1 Ecoregion and Ecostatus

The subject property is located in the Highland catchment and the study area forms part of the quaternary catchment A21C. According to the ecological importance classification for the quaternary catchment, the system can be classified as a moderately sensitive system which, in its present state, can be considered a Class D (Largely modified) stream.

Studies undertaken by the Institute for Water Quality Studies assessed all quaternary catchments as part of the *Resource Directed Measures for Protection of Water Resources*. In these assessments, the Ecological Importance and Sensitivity (EIS), Present Ecological Management Class (PEMC) and Desired Ecological Management Class (DEMC) were defined, and serve as a useful guideline in determining the importance and sensitivity of aquatic ecosystems prior to assessment, or as part of a desktop assessment. This database was searched for the quaternary catchment of concern (A21C) in order to define the EIS, PEMC and DEMC. The findings are based on a study undertaken by Kleynhans (1999) as part of “A procedure for the determination of the ecological reserve for the purpose of the national water balance model for South African rivers”.

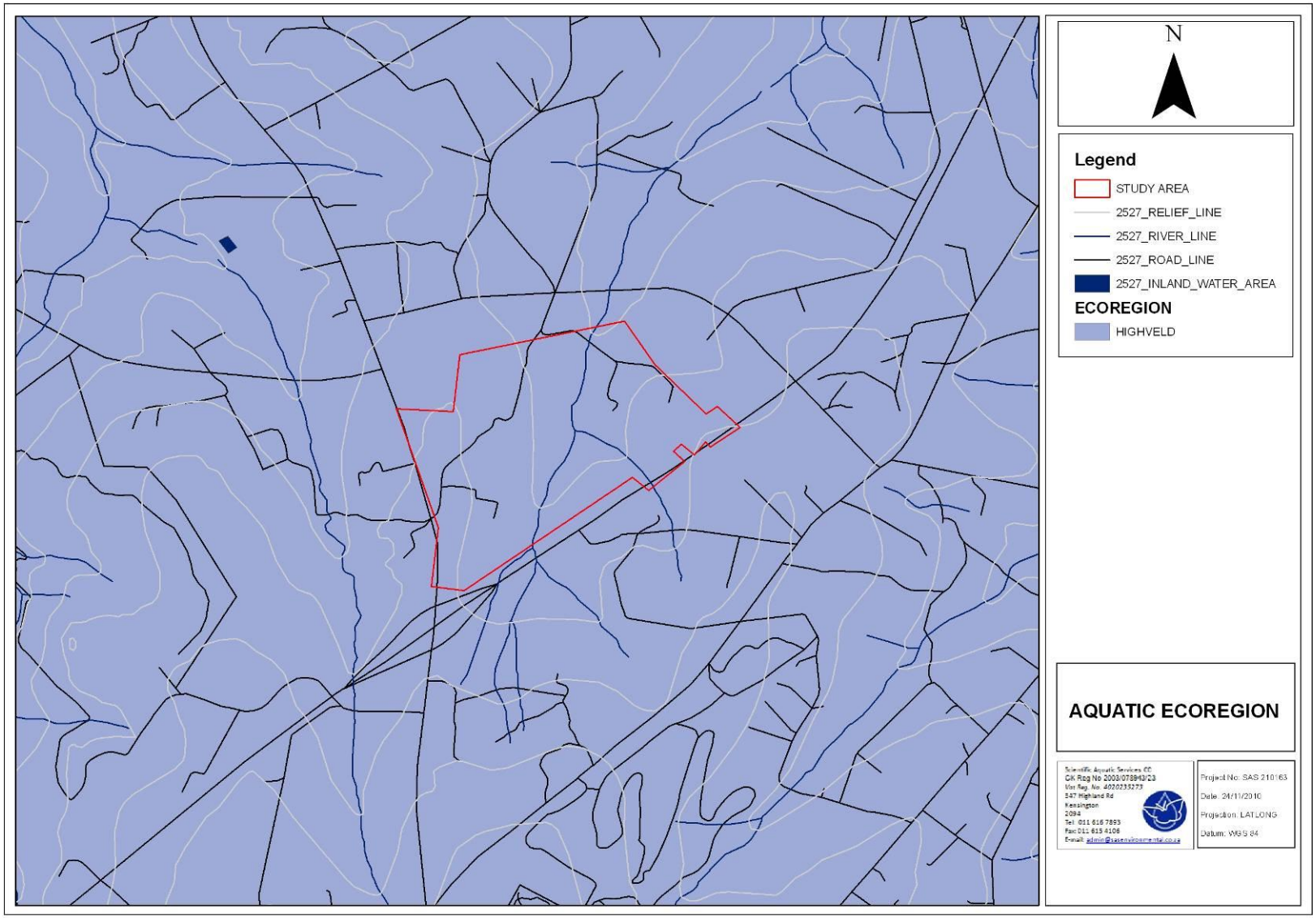


Figure 32: A map of the aquatic ecoregions of the subject property.

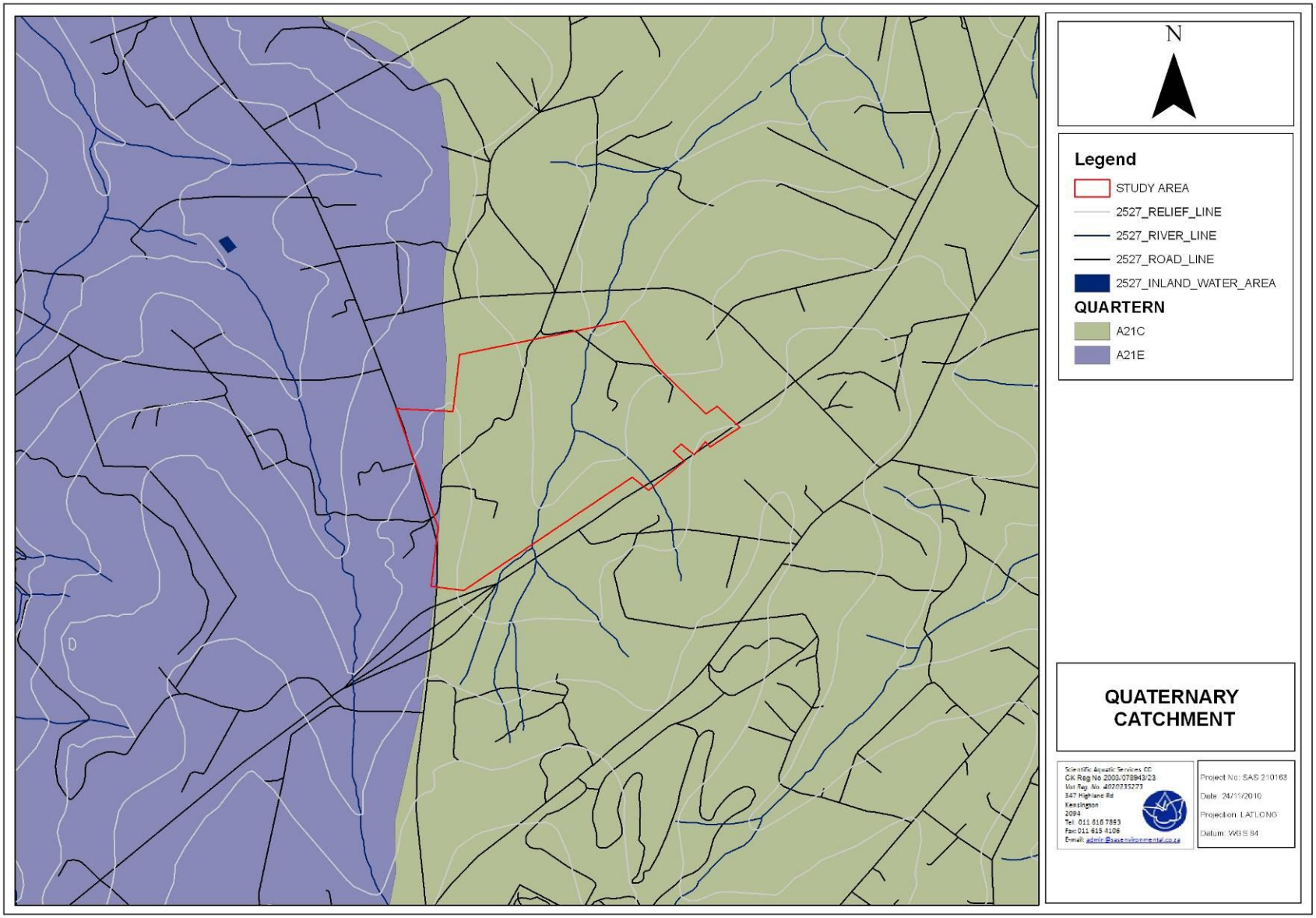


Figure 33: Quaternary Catchments pertaining to the subject property

The points below summarise the impacts on the aquatic resources in this quaternary catchment (Kleynhans 1999):

- Moderately high impact on bed structure has occurred within the quaternary catchment.
- Moderate flow modification has occurred within the system.
- There has been a high impact in the catchment as a result of introduction of instream biota.
- Very high impact from inundation is evident at the present time due to weirs in the drainage systems.

In terms of ecological functions, importance and sensitivity, the following points summarise the conditions in this catchment:

- The quaternary catchment provides a moderate diversity of habitat.
- The quaternary catchment has a low importance in terms of natural area conservation.
- The quaternary catchment is regarded as having high importance for rare and endangered species conservation.
- The quaternary catchment is considered of low importance in terms of provision of migration routes in the instream and riparian environments.
- The quaternary catchment has a moderate importance in terms of providing refugia for aquatic community members.
- The quaternary catchment can be considered to have moderate sensitivity to changes in water quality and flow.
- The quaternary catchment is of moderate importance in terms of species richness.

11.2 Wetland System Characterisation

One feature was identified within mid-portion of the subject property that forms part of the extreme upper reaches of the Jukskei River. The feature was categorised with the use of the *Wetland System Characterisation Methodology*. The results are illustrated in the figure below.

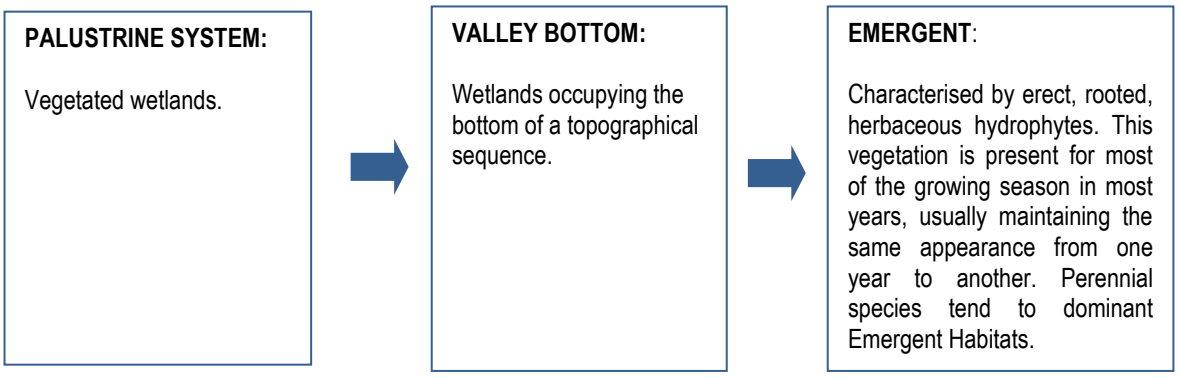


Figure 34: Wetland categorisation for the wetland feature.

It should be noted that some areas of the wetland feature can be also be considered non-vegetated, due to impoundments within the wetland system. Therefore, the wetland system classification accounts for the majority of the wetland feature encountered during the assessment.

14.3 Wetland Function Assessment

Wetland function and service provision were assessed within the study area. The average score for the wetland is presented in the following table as well as the radar plot in the figure that follows the table.

Table 29: Wetland functions and service provision.

Ecosystem service	
Flood attenuation	1.4
Streamflow regulation	2.5
Sediment trapping	2
Phosphate assimilation	2.5
Nitrate assimilation	2.5
Toxicant assimilation	2.4
Erosion control	2
Biodiversity maintenance	2.5
Carbon Storage	3
Water Supply	2.1
Harvestable resources	0.4
Cultivated foods	0.4
Tourism and recreation	0.6
Education and resource	1
SUM	**25.3**
Average score	**1.8**

From the results of the assessment, it is evident that the wetland feature overall has a moderate level of ecological function and service provision. The wetland feature is the most important in terms assimilation and streamflow regulation. These relatively high results obtained were mainly due to the fact that the wetland feature is located relatively close to major roads and areas with increased residential and informal developments. However the wetland feature has remained largely undisturbed and therefore can be considered important with regards to biodiversity maintenance.

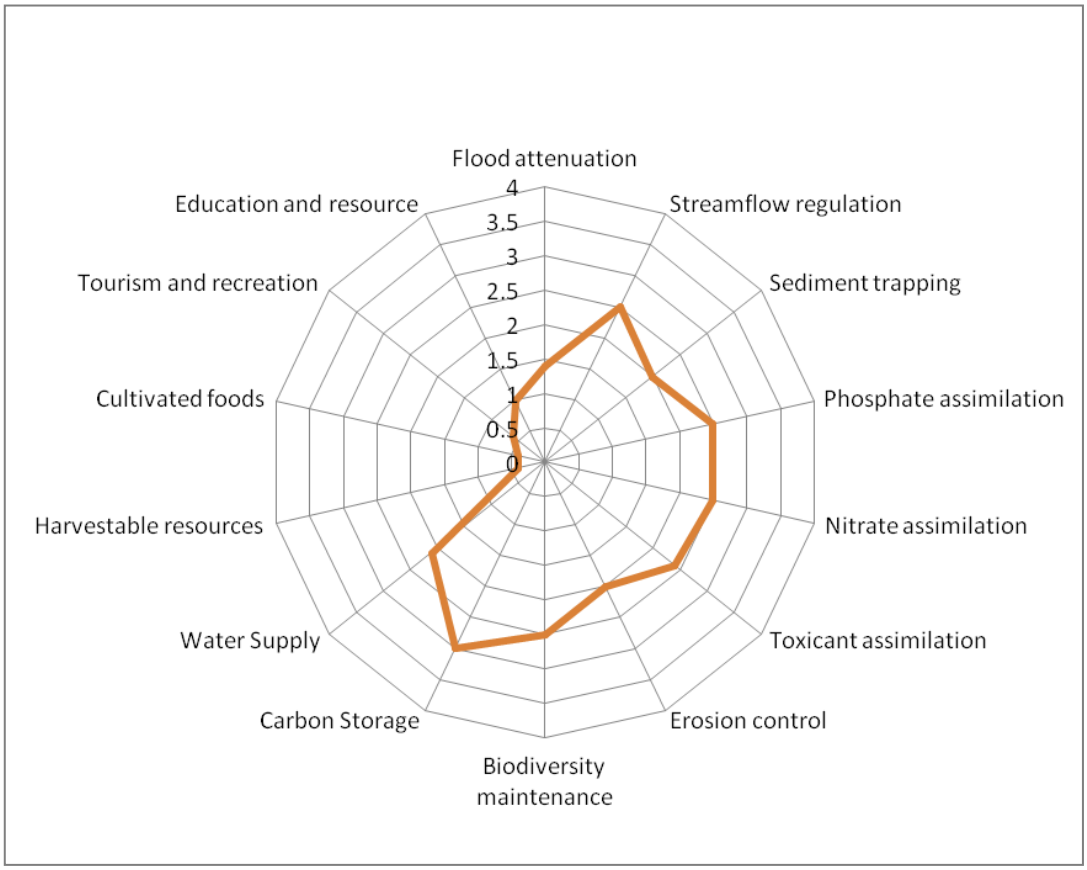


Figure 35: Radar plot of wetland services provided.

14.4 Present Ecological State

The result for the criteria and attributes used for the calculation of the PES is stipulated in the table below.

Table 30: Criteria and Attributes used with the calculation of the PES.

	Wetland feature	
Criteria and Attributes	**Score**	**Confidence**
Hydrologic		
Flow modification	1	3
Permanent Inundation	2	4
Water quality		
Water Quality Modification	3	3
Sediment load modification	3	3
Geomorphic		
Canalisation	3	3
Topographic Alteration	1	4
Biota		
Terrestrial Encroachment	3	3
Indigenous Vegetation Removal	4	3
Invasive plant encroachment	3	3
Alien fauna	4	4
Overutilisation of biota	4	4
Total	**31**	
Mean	**3**	

The mean score obtained calculated a moderate score of 3, indicating the PES falls within class C – moderately modified.

14.5 Ecological Management Class

All results obtained from the South African Wetland Assessment Classification System that was used in the determination of the appropriate EMC class, is indicated in the table below. The results obtained from the wetland feature assessment indicate relatively little transformation on all levels of ecology and functionality, with the exception of some areas suffering from vegetation transformation, with special mention of the northern portion. Therefore, it is deemed appropriate if the EMC class is set at a class – B (largely natural with few modifications). This is deemed achievable if the wetland zone with associated buffer is rehabilitated and left as open space during the proposed development.

14.6 Wetland delineation and sensitivity mapping

During the assessment, the following temporary zone indicators were used:

- Isolated areas within the assessment site showed signs of anthropogenic activity that resulted in encroachment of invader species and vegetation associated with disturbed areas primarily towards the north. However, most of the wetland vegetation was still useful with the identification of the temporary zone. *Imperata cylindrica, Verbena bonariensis, Phragmites australis*, *Typha capensis* and *Berkheya radula* were the most informative wetland species and used as primary wetland indicators. *Hyparrhenia hirta* was the dominant terrestrial species used to determine the outer boundary of the temporary zone.
- The wetland feature flows through a depression in the mid-portion of the subject property and can be characterized as a channelled valley bottom wetland. As a result, terrain units were useful in identifying the temporary zone boundary and used as secondary wetland indicator.
- The presence of surface water was also useful in identifying the boundary of the permanent zones with special mention of impoundments within the southern section.
- For the soil form indicator the presence of gleyed soils (most of the iron has been leached out of the soil leading to a greyish/greenish/bluish colour) and mottling (created by a fluctuating water table) were investigated to aid in the identification of areas with wetland characteristics where no indication of a temporary wetland zone could be identified from the vegetation or landscape characteristics.

Upon the assessment of the area, the various wetland vegetation components were assessed. Dominant species were characterised as either wetland or terrestrial species. The wetland species were then further categorised as temporary, seasonal and permanent zone species. This characterisation is presented in the table below, including the terrestrial species identified on the subject property.

Table 31: Floral species identified during wetlnad zone delineation

Terrestrial species	Temporary zone species	Seasonal zone species	Permanent zone species
Hyparrhenia hirta	*Berkheya radula*	*Imperata cylindrica*	*Phragmites australis*
Cynodon dactylon	*Helichrysum nudifolium*	*Cyperus sp.*	*Cyperus sp.*
Eucalyptus camaldulensis	*Salix babylonica*	*Verbena bonariensis*	*Typha capensis*
	Verbena bonariensis	*Berkheya radula*	*Imperata cylindrica*
	Pennisetum clandestinum	*Hyparrhenia tamba*	
		Pennisetum clandestinum	

Table 32: Summary of the wetland feature.

Item	Description
Site number	1
Quaternary catchment	A21C
Aquatic ecoregion	Highveld
Vegetation type	Egoli Granite Grassland
System Modifiers	Chemical
Wetland system characterisation	Palustrine, Valley bottom, Emergent
Wetland function and service provision	Moderate
Present Ecological State	Class C – moderately modified
Ecological Management Class	Class B - largely natural with few modifications
Wetland soil	Wetland soils present, mottling evident in photograph below.
Wetland vegetation	Wetland vegetation dominanated by *Imperata cylindrica*. 
	Northern portion of the wetland feature significantly transformed. 

Surface water

Limited surface water within the channelled valley bottom wetland, due impoundments, see below.

Terrain units

Channelled valey bottom wetland. Terrain units evident in photograph below.

Although a recommended buffer of 32 meters for wetland features within the urban edge is advocated by GDARD (2009) it is recommended that the wetland zone be buffered with 50 meter buffer, due to the potential of sensitive faunal and floral species that may inhabit the subject property. The extended buffer will aid in the conservation of habitat within the subject property and will also help to ultimately achieve the ecological management class of the wetland feature as determined by the *South African Wetland Assessment Classification System,* sections above.

Figure 36: Wetland and 50 meter buffer zone.

12 Sensitivity mapping

The figure below conceptually illustrates the sensitivity mapping associated the study area. The channelled valley bottom wetland with 50-meter buffer (orange) within the subject property does provide sustainable habitat for various wetland floral and faunal species and therefore is considered of high ecological sensitivity. Although a recommended buffer of 32 meters for wetland features within the urban edge is advocated by GDARD (2009) it is recommended that the wetland zone be buffered with a 50 meter buffer, due to individuals of the amphibian specie *Pyxicephalus adspersus* (RDL listed species) and floral species *Hypoxis hemerocallidea* and *Boophane disticha* (listed as declining) identified during the assessment within the subject property. Furthermore evidence was encountered of *Otomys angoniensis* considered a concern by GDARD as well as potential wetland habitat for the RDL listed butterfly *Metisella meninx* (Marsh sylph) and RDL listed *Tyto capensis*. The extended buffer zone will provide refuge, conserve habitat and provide migratory corridors for these as well as various other faunal species as well as provide a suitable relocation area for *Hypoxis hemerocallidea* and *Boophane disticha*. In addition an open space area is deemed necessary to protect and conserve part of the grassland floral habitat in which faunal species with specific reference to *Pyxicephalus adspersus* hunt and aestivate. The allocated high sensitive areas as well as associated buffer should remain private open space during all development activities. The allocated moderately low sensitive areas (green) may be developed provided that all recommendations stipulated within this report are adhered to. The remainder of the study area (yellow) is considered of insignificant ecological importance due to historical disturbance, the proposed development within these areas is deemed to have no impact on the present ecological state of the study area.

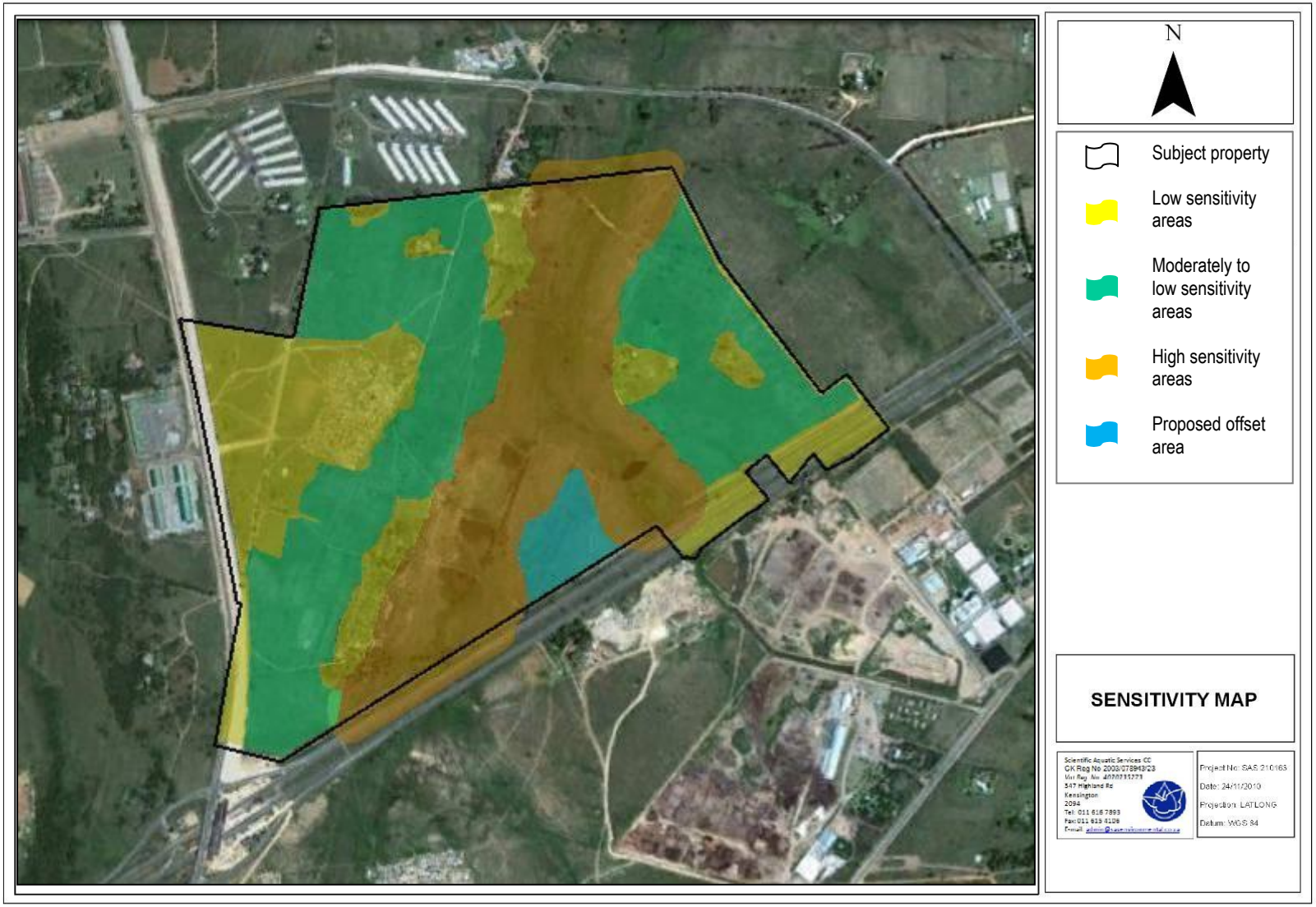


Figure 37: Sensitivity map for the subject property.

13 Conclusions and recommendations

Scientific Aquatic Services (SAS) was appointed to conduct an ecological assessment encompassing an assessment of the terrestrial fauna and flora as well as identification of all sensitive habitats, including wetlands/riparian features for the proposed Lanseria commercial development.

Historically the subject property was utilized as agriculture smallholdings with evidence of crop cultivation still evident throughout the majority of the study area. The land has since been left open space leading to some overall improvement of vegetation. However, an informal settlement erected in the last year or two has led to a significant decline in overall ecological condition. As a result only the wetland area can be considered of increased ecological importance. Wetland with associated buffer areas has the highest floral species diversity and also has the highest potential of supporting a variety faunal species when compared to the remainder of the subject property. Floral identification proved to be difficult in some areas due to species specific flowering times and recent veld fire and therefore the specie composition which has been determined is not a true representation of the total species composition; however the data collected is deemed adequate to formulate accurate conclusions regarding the overall ecology of the subject property. No RDL floral or faunal species where encountered during the assessment.

<u>The following general conclusions were drawn on completion of the survey:</u>

- Gauteng conservation plan has indicated no importance directly related to the subject property except for the river area that was assessed and delineated during the assessment.
- The subject property does not fall within one of the priority areas identified by the Grasslands program. This is mainly due significant impact from historical agricultural activities and residential infrastructure. Isolated areas within the grassland vegetation are starting to return to more natural grassland communities. However it is doubtful that the floral community will return to a pristine ecological state due to its isolation from similar habitat as well as increasing anthropogenic encroachment within surrounding areas.
- Presently ecological functioning and the condition of the subject property range from high in wetland areas to very low in areas where residences and farm infrastructure has been demolished. Isolated open veld areas can be considered to be in moderate ecological condition with moderate ecological functioning.

- In its present ecological state the subject property can be divided into three habitat units (wetland, transformed and open veld) based on ecological function as well as species composition noted during the assessment.
- Within the floral community results it is evident that the south-western portion of the open veld habitat unit has seen more disturbance than the remainder of the habitat unit. *Hyparrhenia hirta* dominated this area and species diversity decreases significantly towards this portion. The north-eastern portion has seen the least vegetation transformation with a significantly different floral community noted within the area. Only floral species with a high affinity for water was noted within the wetland habitat unit.
- The information gathered during the assessment of the subject property was used to determine the Vegetation Index Score (VIS). The subject property was divided into three dominant habitat types and VIS was applied to each habitat unit respectively. The VIS for habitat unit 1 (wetland habitat) was calculated at 11.75. The score falls within assessment class B according to the VIS final score definition – largely natural with few modifications. Habitat unit 2 (open veld) calculated a VIS score of 8.5. Less vegetation transformation resulted in a moderate VIS score class – Class C (largely natural with few modifications). The habitat unit 3 (transformed habitat) VIS score are remarkably lower than habitat unit 1 and 2 – assessment class E, the loss of natural habitat extensive. This is due significant vegetation transformation in areas were residential developments have been demolished as well as some areas totally left bare as a result of the informal settlement.
- No RDL floral species were identified during the assessment. However, two species namely *Hypoxis hemerocallidea* and *Boophane disticha* considered declining was identified during the site assessment. If any of these species will be disturbed during the proposed development activities they should be rescued and relocated to suitable open space areas.
- Only two floral species of concern calculated noteworthy POC scores, namely *Gunnera perpensa* (80%) and *Callilepis leptophylla* (73%). *Gunnera perpensa* will be located within the southern portion of the wetland feature were transformation is less severe and *Callilepis leptophylla* will be restricted to the north-eastern grassland habitat.
- The subject property dominant alien/weed communities can be divided into two, namely the areas associated with the transformed habitat unit mainly dominated by *Tagetes minuta* and *Eucalyptus camaldulensis* and the areas associated with the wetland habitat unit mainly dominated by *Protasparagus laricinus* and *Populus x canescens.*

- Medicinal plant species encountered are all regarded as common and widespread species, with the exception of *Hypoxis hemerocallidea* and *Boophane disticha* listed as "declining" in the PRECIS red data plant list.
- GDARD identified the following mammal species with an affinity for wetlands, *Aonyx capensis, Atilax paludinosus, Chrysopalax villosus, Dasymys incomtus, Lutra maculicollis, Itomys angoniensis (Otomys angoniensis)*, and *Otomys irroratus*, to be of concern. The habitat and food requirements of these species were evaluated to determine the possibility of these species inhabiting the study area. Only *Dasymys incomtus, Itomys angoniensis and Otomys irroratus* had a *high* possibility of occurring within the subject property.
- Historically the subject property could have provided habitat to various larger mammal species, but anthropogenic activities such as agriculture, residential development as well as more recent informal settlements left the majority of the study area transformed. Migratory corridors have also been significantly impeded as a result of construction of roads on all sides of the subject property except for the eastern boundary as well as palisade fencing surrounding the entire subject property. The subject property in its present state is not considered to support larger mammal species, however the wetland habitat is considered important for the survival of various smaller wetland mammal species.
- The moderately tall, dense grasslands on the subject property may provide suitable habitat for the African Grass Owl (Vulnerable), and although none were encountered during the study there is the potential for them to occur within wetland buffers. Thus, if the wetland with associated buffer remains open space these species will be protected from any impact the proposed development will have on their habitat.
- One reptile species of concern calculated a POC of 68% namely *Homoroselaps dorsalis* (striped harlequin snake). Striped harlequin snakes are rare and are listed by the IUCN as 'near threatened'. Although not encountered during the assessment, the eastern portion of the grassland habitat in its present state may provide habitat for this snake species. The extended buffer will cater for the conservation of this species if it does inhabit the subject property.
- Two individuals of the amphibian species *Pyxicephalus adspersus* were encountered during the assessment of the subject property within the road reserve of the N14 bordering the southern portion of the subject property. This amphibian species are considered near threatened and uses the wetland zone for breeding habitat as well as a migration corridor. The Giant Bullfrog (*Pyxicephalus adspersus*) is the largest Southern African frog, and considered near threatened. The extended wetland buffer to 50 meters

together with the proposed offset area is however deemed sufficient for the conservation of this species within the subject property. It is however deemed important that specific attention be paid to specific mitigation measures for the concervation of *Pyxicephalus adspersus* individuals and habitat as stipulated within the recommendations of this report.

- Evidence was encountered of the Mygalomorphae arachnids (Baboon spiders) in the western portion of the grassland habitat unit. After thorough searching only one burrow were identified, although it should be noted that these species are notoriously difficult to detect. All results obtained throughout the subject property assessment showed disturbance within the western portion of the grassland habitat unit, where the burrow was found. It is therefore the opinion of the specialists that an extended buffer of 50 meters on the eastern side of the wetland feature would be more valuable to the conservation of this species as well as various other faunal species that may inhabit the site.
- Suitable *Metisella meninx* (Marsh sylph) habitat was encountered within the subject property and the area falls within the distribution range noted for *this specie*. The marsh sylph (*M. meninx*) habitat comprises of wetland where marsh grass is dominant. One of these wetland grasses *Leersia hexandra* plays a vital role in the reproductive cycle of the specie (Roos and Henning, 2002). *L. hexandra* was found to inhabit wetland portions on the subject property and therefore the subject property is considered possible breeding habitat for this RDL specie.
- The RDSIS assessment of the property provided a medium score of 54%, indicating moderate importance to RDL faunal species conservation within the region.
- Presently ecological functioning and the condition of the subject property range from high in wetland areas to very low in areas where residences and farm infrastructure has been demolished. As a result the wetland with associated buffer area is considered high sensitive areas that should remain open space during all developmental activities. All areas included in the transformed habitat unit are considered as low sensitive areas. The open veld habitat unit can be considered to be moderate to low sensitive areas.

<u>After conclusion of this biodiversity assessment, it is the opinion of the ecologists that the proposed mining of the subject property be considered favourably provided that the recommendations below are adhered to:</u>

- Ecologically sensitive habitats were observed and a sensitivity map has been proposed. It is recommended that this sensitivity map be considered during the planning and

construction phases of the proposed development activities to aid in the conservation of ecology within the proposed development area.

- The plans for the proposed ecologically sensitive development should be strictly adhered to.

- Specific mitigation measures for the conservation of *Pyxicephalus adspersus* individuals and habitat include:

    - Wetland with associated 50 meter buffer as well a proposed offset area remains open space during all development activities.
    - Active removal and nearby release of Giant Bullfrogs unearthed during construction.
    - Efforts should be taken to reduce the potential for individuals to be killed by vehicles. This could be achieved by limiting the footprint of the construction phase, and excluding Giant Bullfrogs from the area by using low (400 mm high) concrete walls. It is recommended that the concrete walls be placed along the eastern and western border of the 50 meter buffer before construction begins, excluding the northern and southern boundary, by so doing the migrating bullfrogs will be protected from all roads during construction as well as after utilisation of the development begins.
    - Fencing used on the southern and northern boundary of the subject property should be permeable (palisade fencing) as an alternative to a solid wall, this will provide a migratory corridor for the bullfrogs.

- Areas allocated with high sensitivity (wetland with buffer zone) should remain open space during all development activities.
- The existing integrity of flora surrounding the proposed development should be upheld and no activities be carried out outside the footprint of the construction areas.
- Specimens of *Hypoxis hemerocallidea* and *Boophane disticha* should not be disturbed, or alternatively they should be rescued and relocated to a suitable protected area which has been designated as sensitive as part of this study. A rescue and relocation plan is included in Appendix C.
- All areas affected by construction should be rehabilitated upon completion of the construction phase of the development. Areas should be reseeded with indigenous grasses as required.

- Adequate stormwater management must be incorporated into the design of the proposed development in order to prevent erosion and the associated sedimentation of the wetland areas.
    - Sheet runoff from paved surfaces and access roads needs to be curtailed.
    - Runoff from paved surfaces should be slowed down by the strategic placement of berms.
    - The wetland buffer zones should be left undisturbed to allow the climax terrestrial grassland community to establish in these areas.
    - As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping.
- In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998 landowners are legally responsible for the control of invasive alien plants on their properties and it is therefore recommended that the declared weed and invader species be removed.
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. Use of all gravel roads currently located within wetland zones should be ceased.
- No fires whatsoever should be lit within the subject property.
- No animal trapping should be allowed during development activities.
- Although no RDL flora were observed on site, should any other RDL listed fauna or flora be identified, their position should be marked and a suitably qualified person should be consulted on the best options for conservation of the species which may include rescue and relocation or in situ conservation.
- No dirty water runoff must be permitted to reach the wetland resources.
- During the construction of the proposed development erosion berms should be installed to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms:
    - Where the track has slope of less than 2%, berms every 50m should be installed.
    - Where the track slopes between 2% and 10%, berms every 25m should be installed.
    - Where the track slopes between 10%-15%, berms every 20m should be installed.

- Where the track has slope greater than 15%, berms every 10m should be installed.

- As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping.
- All areas of disturbed and compacted soils need to be ripped and reprofiled.
- No dumping of waste should take place within the wetland zone. If any spills occur, they should be immediately cleaned up.

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APPENDIX A

Table 33: Indigenous floral species identified for the subject property during the field assessment.

Schrubs and forbs	Grass/Reeds/Sedges	Trees
Ledebouria ovatifolia	*Panicum ecklonii*	*Searcia lancea*
Becium obovatum	*Phragmites australis*	*Acacia karroo*
Helichrysum nudifolium	*Arundo donax*	
Vernonia oligocephala	*Melinis repens*	
Hermannia depressa	*Hyparrhenia hirta*	
Aloe greatheadii	*Eragrostis plana*	
Hypoxis hemerocallidea	*Imperata cylindrical*	
Ledebouria revoluta	*Themeda triandra*	
Stoebe vulgaris	*Elionurus muticus*	
Boophane disticha	*Brachiaria serrata*	
Cleome maculata	*Eragrostis chloromelas*	
Chironia palustris	*Eragrostis superba*	
	Hyparrhenia hirta	
	Harpochloa falx	
	Eragrostis racemosa	

Table 34: All the faunal species assessed for the subject property in the calculation of the Red Data Sensitivity Index Score

Common name	Species	Red List Status
Cape mole rat	*Georychus capensis yatesi*	EN
Sclater's golden mole	*Chlorotalpa sclateri montana*	CR
Highveld golden mole	*Amblysomus septentrionalis*	VU
Rough-haired golden mole	*Chrysospalax villosus rufopallidus*	CR
Rough-haired golden mole	*Chrysospalax villosus rufus*	EN
Juliana's golden mole	*Neamblysomus julianae*	EN
Robust golden mole	*Amblysomus robustus*	VU
Meester's golden mole	*Amblysomus hottentotus meesteri*	VU
Laminate vlei rat	*Otomys laminatus*	VU
Peak-saddle horseshoe bat	*Rhinolophus blasii empusa*	EN
Lesser long-fingered bat	*Miniopterus fraterculus*	VU
Welwitsch's hairy bat	*Myotis welwitschii*	EN
Short-eared trident bat	*Cloeotis percivali australis*	EN
Antbear	*Orycteropus afer*	NE
Oribi	*Ourebia ourebi*	VU
African striped weasel	*Poecilogale albinucha*	NE
Wild dog	*Lycaon pictus*	EN
Pangolin	*Manis temminckii*	VU
Aardwolf	*Proteles cristatus*	NE
African Leopard	*Panthera pardus*	NE
Natal red rock rabbit	*Pronolagus crassicaudatus ruddi*	NE
Whitewinged Flufftail	*Sarothrura ayresi*	CR
Rudd's Lark	*Heteromirafra ruddi*	CR
Yellowbreasted Pipit	*Hemimacronyx chloris*	VU
Bald Ibis	*Geronticus calvus*	VU
Botha's Lark	*Spizocorys fringillaris*	EN
Wattled Crane	*Bugeranus carunculatus*	CR
Blue Crane	*Anthropoides paradiseus*	VU
Grey Crowned Crane	*Balearica reguloru,*	VU
Blue Swallow	*Hirundo atrocaerulea*	CR
Pinkthroated Twinspot	*Hypargos margaritatus*	NT
Chestnutbanded Plover	*Charadrius pallidus*	NT
Striped Flufftail	*Sarothrura affinis*	VU
Southern Ground Hornbill	*Bucorvus leadbeateri*	VU
Blackrumped Buttonquail	*Turnix hottentotta nana*	EN
Blue Korhaan	*Eupodotis caerulescens*	VU
Stanley's Bustard	*Neotis denhami*	VU
African Marsh Harrier	*Circus ranivorus*	VU
Grass Owl	*Tyto capensis*	VU
Whitebellied Korhaan	*Eupodotis cafra*	VU
Saddlebilled Stork	*Ephippiorhynchus senegalensis*	CR
Lappetfaced Vulture	*Torgos tracheliotos*	EN
Whiteheaded Vulture	*Trigonoceps occipitalis*	EN
Bateleur	*Terathopius ecaudatus*	VU

Common name	Species	Red List Status
Cape Vulture	*Gyps coprotheres*	VU
Martial Eagle	*Polemaetus bellicosus*	VU
Peregrine Falcon	*Falco peregrinus minor*	VU
Taita Falcon	*Falco fasciinucha*	NT
Haacke's flat gecko	*Afroedura haackei*	EN
Abel Erasmus Pass flat gecko	*Afroedura sp.*	EN
Mariepskop flat gecko	*Afroedura sp.*	EN
Rondavels flat gecko	*Afroedura sp.*	EN
Forest/Natal purpleglossed snake	*Amblyodipsas concolor*	VU
Lowveld shieldnosed snake	*Aspidelaps scutatus intermedius*	VU
Dwarf chameleon	*Bradypodion transvaalense complex*	VU
Sungazer/ Giant girdled lizard	*Cordylus giganteus*	VU
Barberton girdled lizard	*Cordylus warreni barbertonensis*	VU
Lebombo girdled lizard	*Cordylus warreni warreni*	VU
Swazi rock snake	*Lamprophis swazicus*	VU
Transvaal flat lizard	*Platysaurus orientalis orientalis*	NT
Wilhelm's flat lizard	*Platysaurus wilhelmi*	VU
Montane burrowing skink	*Scelotes mirus*	LC
Breyer's longtailed seps	*Tetradactylus breyeri*	VU
Karoo Toad	*Bufo gariepensis nubicolus*	VU
Natal Ghost Frog	*Heleophryne natalensis*	VU
Spotted Shovel-Nosed Frog	*Hemisus guttatus*	VU
Yellow Striped Reed Frog	*Hyperolius semidiscus*	VU
Plain Stream Frog	*Strongylopus wageri*	VU
Giant Bullfrog	*Pyxicephalus adspersus*	VU
Greater Leaf-Folding Frog	*Afrixalus fornasinii*	VU
Whistling Rain Frog	*Breviceps sp.*	VU
Aloeides rossouwi	Rossouw's Copper	EN
Aloeides barbarae	Barbara's Copper	EN
Lepidochrysops swanepoeli	Swanepoel's Blue	EN
Lepidochrysops jefferyi	Jeffery's Blue	EN
Dingana fraterna	Stoffberg Widow	EN
Metisella meninx	Marsh Sylph*	VU
Aloeides nubilis	Cloud Copper	VU
Pseudagrion coeleste	Catshead Sprite - Coenagrionidae	CR
Pseudagrion inopinatum	Balinsky's Sprite - Coenagrionidae	VU
Pseudagrion newtoni	Newton's Sprite - Coenagrionidae	VU
Pseudagrion sjoestedti pseudojoestedti	Sjostedt's Sprite - Coenagrionidae	CR
Aeshna ellioti usambarica	Elliot's Hawker-Aeshnidae	VU
Phyllomacromia monoceros	Unicorn Cruiser - Corduliidae	CR

APPENDIX B

Table 35: Roberts Multimedia Birds of Southern Africa listing bird species expected to occur in the QDS 2527DD.

R=Resident ; **E**=Endemic ; **BM**=Breeding Migrant ; **NBM**=Non breeding Migrant; **V**=Vagrant ; **A**=Abundant ; **VC**=Very Common ; **C**=Common ; **U**=Uncommon ; **R**=Rare ; **#**=Rare bird Record

Map Status	English Name	Scientific
R-U	Little Banded Goshawk	*Accipiter badius*
R-U	Black Sparrowhawk	*Accipiter melanoleucus*
R-U	Little Sparrowhawk	*Accipiter minullus*
R-U	Ovambo Sparrowhawk	*Accipiter ovampensis*
R-VC	Indian Myna	*Acridotheres tristis*
NBM-U	Great Reed Warbler	*Acrocephalus arundinaceus*
BM-C	African Marsh Warbler	*Acrocephalus baeticatus*
R-C	Cape Reed Warbler	*Acrocephalus gracilirostris*
NBM-U	Eurasian Marsh Warbler	*Acrocephalus palustris*
NBM-U	Eurasian Sedge Warbler	*Acrocephalus schoenobaenus*
V #	Eurasian Reed Warbler	*Acrocephalus scirpaceus*
NBM-C	Common Sandpiper	*Actitis hypoleucos*
R-U	African Jacana	*Actophilornis africanus*
R-U	Malachite Kingfisher	*Alcedo cristata*
R-U	Halfcollared Kingfisher	*Alcedo semitorquata*
R-VC	Egyptian Goose	*Alopochen aegyptiacus*
E-U/VC	Redheaded Finch	*Amadina erythrocephala*
R-C	Cutthroat Finch	*Amadina fasciata*
R-C	Orangebreasted Waxbill	*Amandava subflava*
R-C	Black Crake	*Amaurornis flavirostris*
R-U	Thickbilled Weaver	*Amblyospiza albifrons*
R-U	Redheaded Weaver	*Anaplectes rubriceps*
R-U	Cape Teal	*Anas capensis*
R-C	Redbilled Teal	*Anas erythrorhyncha*
R-U/C	Hottentot Teal	*Anas hottentota*
E-VC	Cape Shoveller	*Anas smithii*
R-C	African Black Duck	*Anas sparsa*
R-VC	Yellowbilled Duck	*Anas undulata*
R-C	Darter	*Anhinga rufa*
BM-U	Cuckoofinch	*Anomalospiza imberbis*
E-U	Cape Penduline Tit	*Anthoscopus minutus*
E-U	Blue Crane	*Anthropoides paradisea*
R-VC	Grassveld Pipit	*Anthus cinnamomeus*
R-U	Plainbacked Pipit	*Anthus leucophrys*
R-U	Striped Pipit	*Anthus lineiventris*
R-U	Longbilled Pipit	*Anthus similis*
NBM-U	Tree Pipit	*Anthus trivialis*
R-U	Buffy Pipit	*Anthus vaalensis*
R-U	Barthroated Apalis	*Apalis thoracica*
R-VC	Little Swift	*Apus affinis*
NBM-U	Eurasian Swift	*Apus apus*
BM-U	Black Swift	*Apus barbatus*
BM-C	Whiterumped Swift	*Apus caffer*
BM-U	Horus Swift	*Apus horus*
NBM-U	Steppe Eagle	*Aquila nipalensis*
R-C	Black Eagle	*Aquila verreauxii*
BM-U	Wahlberg's Eagle	*Aquila wahlbergi*
R-C	Grey Heron	*Ardea cinerea*
R-C	Goliath Heron	*Ardea goliath*
R-VC	Blackheaded Heron	*Ardea melanocephala*
R-C	Purple Heron	*Ardea purpurea*
R-C	Squacco Heron	*Ardeola ralloides*
NBM-U	Ruddy Turnstone	*Arenaria interpres*

Map Status	English Name	Scientific
R-C	Marsh Owl	*Asio capensis*
R-U	Cuckoo Hawk	*Aviceda cuculoides*
R-U	Cape Batis	*Batis capensis*
R-C	Chinspot Batis	*Batis molitor*
R-A	Hadeda Ibis	*Bostrychia hagedash*
R-U	Bittern	*Botaurus stellaris*
E-C/VC	Marico Flycatcher	*Bradornis mariquensis*
R-C	Pallid Flycatcher	*Bradornis pallidus*
R-C	African Sedge Warbler	*Bradypterus baboecala*
R-C	Spotted Eagle Owl	*Bubo africanus*
R-U	Cape Eagle Owl	*Bubo capensis*
R-U	Giant Eagle Owl	*Bubo lacteus*
R-A	Cattle Egret	*Bubulcus ibis*
R-C	Spotted Dikkop	*Burhinus capensis*
E-U	Jackal Buzzard	*Buteo rufofuscus*
NBM-C	Steppe Buzzard	*Buteo vulpinus*
R-U	Greenbacked Heron	*Butorides striatus*
E-U	Desert Barred Warbler	*Calamonastes fasciolatus*
R-C	Redcapped Lark	*Calandrella cinerea*
R-U	Fawncoloured Lark	*Calendulauda africanoides*
E-U	Sabota Lark	*Calendulauda sabota*
NBM-U	Sanderling	*Calidris alba*
NBM-C	Curlew Sandpiper	*Calidris ferruginea*
NBM-C	Little Stint	*Calidris minuta*
R-VC	Greybacked BleatingWarbler	*Camaroptera brevicaudata*
R-C	Black Cuckooshrike	*Campephaga flava*
R-U	Goldentailed Woodpecker	*Campethera abingoni*
R-U	Bennett's Woodpecker	*Campethera bennettii*
NBM-U	Eurasian Nightjar	*Caprimulgus europaeus*
R-C	Fierynecked Nightjar	*Caprimulgus pectoralis*
BM-C	Rufouscheeked Nightjar	*Caprimulgus rufigena*
R-VC	Freckled Nightjar	*Caprimulgus tristigma*
R-VC	Burchell's Coucal	*Centropus burchellii*
R-C	Familiar Chat	*Cercomela familiaris*
R-U	Whitebrowed Robin	*Cercotrichas leucophrys*
E-VC	Kalahari Robin	*Cercotrichas paena*
E-U	Eastern Longbilled Lark	*Certhilauda semitorquata*
R-C	Pied Kingfisher	*Ceryle rudis*
R-VC	Black Sunbird	*Chalcomitra amethystina*
NBM-U	Caspian Plover	*Charadrius asiaticus*
NBM-U	Ringed Plover	*Charadrius hiaticula*
R-U	Chestnutbanded Plover	*Charadrius pallidus*
R-C	Kittlitz's Plover	*Charadrius pecuarius*
R-VC	Threebanded Plover	*Charadrius tricollaris*
E-VC	Spikeheeled Lark	*Chersomanes albofasciata*
BM-C	Whiskered Tern	*Chlidonias hybridus*
NBM-C	Whitewinged Tern	*Chlidonias leucopterus*
BM-C	Diederik Cuckoo	*Chrysococcyx caprius*
BM-U	Klaas's Cuckoo	*Chrysococcyx klaas*
NBM-U	Abdim's Stork	*Ciconia abdimii*
NBM-C	White Stork	*Ciconia ciconia*
R-U/C	Black Stork	*Ciconia nigra*
BM-U/VC	Plumcoloured Starling	*Cinnyricinclus leucogaster*
E-U	Greater Doublecollared Sunbird	*Cinnyris afra*
R-VC	Marico Sunbird	*Cinnyris mariquensis*
R-VC	Whitebellied Sunbird	*Cinnyris talatala*
R-C	Brown Snake Eagle	*Circaetus cinereus*
R-C	Blackbreasted Snake Eagle	*Circaetus pectoralis*
NBM-U	Eurasian Marsh Harrier	*Circus aeruginosus*

Map Status	English Name	Scientific
NBM-U	Pallid Harrier	*Circus macrourus*
NBM-U	Black Harrier	*Circus maurus*
NBM-U	Montagu's Harrier	*Circus pygargus*
R-U	African Marsh Harrier	*Circus ranivorus*
R-U	Lazy Cisticola	*Cisticola aberrans*
R-C	Desert Cisticola	*Cisticola aridulus*
R-U	Ayres' Cisticola	*Cisticola ayresii*
R-C	Rattling Cisticola	*Cisticola chinianus*
R-C	Neddicky	*Cisticola fulvicapillus*
R-C	Fantailed Cisticola	*Cisticola juncidis*
R-C	Wailing Cisticola	*Cisticola lais*
R-C	Cloud Cisticola	*Cisticola textrix*
R-VC	Levaillant's Cisticola	*Cisticola tinniens*
BM-U	Great Spotted Cuckoo	*Clamator glandarius*
BM-C	Jacobin Cuckoo	*Clamator jacobinus*
BM-U	Striped Cuckoo	*Clamator levaillantii*
E-C	Whitebacked Mousebird	*Colius colius*
R-VC	Speckled Mousebird	*Colius striatus*
R-U/C	Rameron Pigeon	*Columba arquatrix*
R-VC	Rock Pigeon	*Columba guinea*
R-C	Feral Pigeon	*Columba livia*
NBM-U	Eurasian Roller	*Coracias garrulus*
R-C	Purple Roller	*Coracias naevia*
R-U/VC	Longtailed Shrike	*Corvinella melanoleuca*
R-A	Pied Crow	*Corvus albus*
R-VC	Black Crow	*Corvus capensis*
R-A	Grey Lourie	*Corythaixoides concolor*
R-VC	Cape Robin	*Cossypha caffra*
E-C	Whitethroated Robin	*Cossypha humeralis*
R-U	Common Quail	*Coturnix coturnix*
BM-U	Harlequin Quail	*Coturnix delegorguei*
R-U/VC	Wattled Starling	*Creatophora cinerea*
BM-U	African Crake	*Crecopsis egregia*
NBM-U	Corncrake	*Crex crex*
NBM-U	Eurasian Cuckoo	*Cuculus canorus*
BM-U	Black Cuckoo	*Cuculus clamosus*
BM-C	Redchested Cuckoo	*Cuculus solitarius*
R-U	Temminck's Courser	*Cursorius temminckii*
R-C	Palm Swift	*Cypsiurus parvus*
NBM-U	House Martin	*Delichon urbica*
R-U	Fulvous Duck	*Dendrocygna bicolor*
R-VC	Whitefaced Duck	*Dendrocygna viduata*
R-U/C	Crested Francolin	*Dendroperdix sephaena*
R-U/C	Cardinal Woodpecker	*Dendropicos fuscescens*
R-U	Bearded Woodpecker	*Dendropicos namaquus*
R-VC/A	Forktailed Drongo	*Dicrurus adsimilis*
R-A	Puffback	*Dryoscopus cubla*
R-C	Great White Egret	*Egretta alba*
R-C	Black Egret	*Egretta ardesiaca*
R-C	Little Egret	*Egretta garzetta*
R-C	Yellowbilled Egret	*Egretta intermedia*
R-VC	Blackshouldered Kite	*Elanus caeruleus*
R-U	Cape Bunting	*Emberiza capensis*
R-U/VC	Goldenbreasted Bunting	*Emberiza flaviventris*
E-U	Larklike Bunting	*Emberiza impetuani*
R-VC	Rock Bunting	*Emberiza tahapisi*
R-C	Yellowbellied Eremomela	*Eremomela icteropygialis*
R-C	Burntnecked Eremomela	*Eremomela usticollis*
R-C	Chestnutbacked Finchlark	*Eremopterix leucotis*

Map Status	English Name	Scientific
R-VC	Common Waxbill	*Estrilda astrild*
R-U/C	Blackcheeked Waxbill	*Estrilda erythronotos*
E-U	Swee Waxbill	*Estrilda melanotis*
R-C	Golden Bishop	*Euplectes afer*
R-C	Whitewinged Widow	*Euplectes albonotatus*
R-VC	Redcollared Widow	*Euplectes ardens*
R-U	Yellowrumped Widow	*Euplectes capensis*
R-VC	Red Bishop	*Euplectes orix*
R-VC/A	Longtailed Widow	*Euplectes progne*
E-VC	Whitewinged Korhaan	*Eupodotis afraoides*
E-U/C	Whitebellied Korhaan	*Eupodotis barrowii*
E-VC	Redcrested Korhaan	*Eupodotis ruficrista*
NBM-U/C	Eastern Redfooted Kestrel	*Falco amurensis*
R-U	Lanner Falcon	*Falco biarmicus*
NBM-U	Lesser Kestrel	*Falco naumanni*
NBM-U	Peregrine Falcon	*Falco peregrinus*
R-U	Rock Kestrel	*Falco rupicolis*
R-U	Greater Kestrel	*Falco rupicoloides*
NBM-U	Northern Hobby Falcon	*Falco subbuteo*
NBM-U	Western Redfooted Kestrel	*Falco vespertinus*
R-VC	Redknobbed Coot	*Fulica cristata*
R-C	Ethiopian Snipe	*Gallinago nigripennis*
R-C	Common Moorhen	*Gallinula chloropus*
NBM-C	Blackwinged Pratincole	*Glareola nordmanni*
R-C	Pearlspotted Owl	*Glaucidium perlatum*
R-U	Whitebacked Night Heron	*Gorsachius leuconotus*
E-U	Violeteared Waxbill	*Granatina granatina*
R-U	Whitebacked Vulture	*Gyps africanus*
E-U/C	Cape Vulture	*Gyps coprotheres*
R-VC	Brownhooded Kingfisher	*Halcyon albiventris*
R-VC	Striped Kingfisher	*Halcyon chelicuti*
BM-U	Woodland Kingfisher	*Halcyon senegalensis*
R-U	African Fish Eagle	*Haliaeetus vocifer*
NBM-U	Ayres' Eagle	*Hieraaetus ayresii*
NBM-U	Booted Eagle	*Hieraaetus pennatus*
R-C	African Hawk Eagle	*Hieraaetus spilogaster*
R-C	Blackwinged Stilt	*Himantopus himantopus*
NBM-U	Icterine Warbler	*Hippolais icterina*
BM-VC	Lesser Striped Swallow	*Hirundo abyssinica*
BM-C	Whitethroated Swallow	*Hirundo albigularis*
BM-VC	Greater Striped Swallow	*Hirundo cucullata*
R-U	Pearlbreasted Swallow	*Hirundo dimidiata*
R-VC	Rock Martin	*Hirundo fuligula*
NBM-VC	Eurasian Swallow	*Hirundo rustica*
BM-C	Redbreasted Swallow	*Hirundo semirufa*
BM-C	South African Cliff Swallow	*Hirundo spilodera*
R-C	Greater Honeyguide	*Indicator indicator*
R-U	Lesser Honeyguide	*Indicator minor*
BM-C	Pygmy Kingfisher	*Ispidina picta*
R-U	Little Bittern	*Ixobrychus minutus*
R-U/C	Redthroated Wryneck	*Jynx ruficollis*
R-C	Lizard Buzzard	*Kaupifalco monogrammicus*
R-U/C	Jameson's Firefinch	*Lagonosticta rhodopareia*
R-U	Bluebilled Firefinch	*Lagonosticta rubricata*
R-U/C	Redbilled Firefinch	*Lagonosticta senegala*
E-VC	Burchell's Starling	*Lamprotornis australis*
E-VC	Glossy Starling	*Lamprotornis nitens*
E-VC	Crimsonbreasted Shrike	*Laniarius atrococcineus*
E-VC	Southern Boubou	*Laniarius ferrugineus*

Map Status	English Name	Scientific
R-A	Fiscal Shrike	*Lanius collaris*
NBM-VC	Redbacked Shrike	*Lanius collurio*
NBM-U/C	Lesser Grey Shrike	*Lanius minor*
R-C	Greyheaded Gull	*Larus cirrocephalus*
V #	Blackheaded Gull	*Larus ridibundus*
R-U	Marabou Stork	*Leptoptilos crumeniferus*
Rare	Blacktailed Godwit	*Limosa limosa*
R-U/VC	Bronze Mannikin	*Lonchura cucullata*
R-VC	Blackcollared Barbet	*Lybius torquatus*
E-VC	Orangethroated Longclaw	*Macronyx capensis*
R-VC	Greyheaded Bush Shrike	*Malaconotus blanchoti*
R-U	Giant Kingfisher	*Megaceryle maxima*
R-C	Black Flycatcher	*Melaenornis pammelaina*
E-U	Pale Chanting Goshawk	*Melierax canorus*
R-U	Gabar Goshawk	*Melierax gabar*
NBM-VC	Eurasian Bee-eater	*Merops apiaster*
R-C	Whitefronted Bee-eater	*Merops bullockoides*
R-U	Swallowtailed Bee-eater	*Merops hirundineus*
NBM-U	Bluecheeked Bee-eater	*Merops persicus*
R-VC	Little Bee-eater	*Merops pusillus*
BM-U	Yellowbilled Kite	*Milvus aegyptius*
NBM-U	Black Kite	*Milvus migrans*
R-VC	Rufousnaped Lark	*Mirafra africana*
E-U	Melodious Lark	*Mirafra cheniana*
E-U	Eastern Clapper Lark	*Mirafra fasciolata*
E-U	Monotonous Lark	*Mirafra passerina*
R-U	Flappet Lark	*Mirafra rufocinnamomea*
E-U/C	Shorttoed Rockthrush	*Monticola brevipes*
E-C	Cape Rockthrush	*Monticola rupestris*
R-U	African Pied Wagtail	*Motacilla aguimp*
R-VC	Cape Wagtail	*Motacilla capensis*
NBM-C	Yellow Wagtail	*Motacilla flava*
NBM-C	Spotted Flycatcher	*Muscicapa striata*
NBM-U	Yellowbilled Stork	*Mycteria ibis*
R-U	Fantailed Flycatcher	*Myioparus plumbeus*
E-U	Anteating Chat	*Myrmecocichla formicivora*
R-U	Malachite Sunbird	*Nectarinia famosa*
R-C	Southern Pochard	*Netta erythrophthalma*
R-U	Brubru	*Nilaus afer*
NBM-U	Whimbrel	*Numenius phaeopus*
R-VC	Helmeted Guineafowl	*Numida meleagris*
R-U	Blackcrowned Night Heron	*Nycticorax nycticorax*
R-VC	Namaqua Dove	*Oena capensis*
E-C/VC	Mountain Chat	*Oenanthe monticola*
R-U/C	Capped Wheatear	*Oenanthe pileata*
R-VC	Redwinged Starling	*Onychognathus morio*
R-VC	Blackheaded Oriole	*Oriolus larvatus*
NBM-U	Eurasian Golden Oriole	*Oriolus oriolus*
R-C	Quail Finch	*Ortygospiza atricollis*
R-C	African Scops Owl	*Otus senegalensis*
R-U	Maccoa Duck	*Oxyura maccoa*
NBM-U	Osprey	*Pandion haliaetus*
E-C	Titbabbler	*Parisoma subcaeruleum*
E-C	Ashy Tit	*Parus cinerascens*
E-VC	Southern Black Tit	*Parus niger*
E-VC	Southern Greyheaded Sparrow	*Passer diffusus*
R-VC	House Sparrow	*Passer domesticus*
E-A	Cape Sparrow	*Passer melanurus*
R-C	Great Sparrow	*Passer motitensis*

Map Status	English Name	Scientific
R-U	White Pelican	*Pelecanus onocrotalus*
R-U	Pinkbacked Pelican	*Pelecanus rufescens*
R-C	Coqui Francolin	*Peliperdix coqui*
NBM-U #	Honey Buzzard	*Pernis apivorus*
R-C	Yellowthroated Sparrow	*Petronia superciliaris*
R-VC	Reed Cormorant	*Phalacrocorax africanus*
R-VC	Whitebreasted Cormorant	*Phalacrocorax lucidus*
NBM-U/C	Ruff	*Philomachus pugnax*
R-C	Lesser Flamingo	*Phoenicopterus minor*
R-U	Greater Flamingo	*Phoenicopterus ruber*
R-VC	Redbilled Woodhoopoe	*Phoeniculus purpureus*
NBM-C	Willow Warbler	*Phylloscopus trochilus*
R-U/C	African Spoonbill	*Platalea alba*
R-VC	Spurwinged Goose	*Plectropterus gambensis*
R-C	Glossy Ibis	*Plegadis falcinellus*
R-U	Whitebrowed Sparrowweaver	*Plocepasser mahali*
E-VC	Cape Weaver	*Ploceus capensis*
R-U	Spottedbacked Weaver	*Ploceus cucullatus*
R-U	Lesser Masked Weaver	*Ploceus intermedius*
R-VC	Masked Weaver	*Ploceus velatus*
NBM-U	Grey Plover	*Pluvialis squatarola*
R-U	African Finfoot	*Podica senegalensis*
R-C	Great Crested Grebe	*Podiceps cristatus*
R-U	Blacknecked Grebe	*Podiceps nigricollis*
R-VC	Yellowfronted Tinker Barbet	*Pogoniulus chrysoconus*
R-U	Martial Eagle	*Polemaetus bellicosus*
R-C	Gymnogene	*Polyboroides typus*
R-C	Purple Gallinule	*Porphyrio madagascariensis*
Rare	Spotted Crake	*Porzana porzana*
R-U	Baillon's Crake	*Porzana pusilla*
E-VC	Blackchested Prinia	*Prinia flavicans*
R-VC	Tawnyflanked Prinia	*Prinia subflava*
R-VC	White Helmetshrike	*Prionops plumatus*
R-U	Sharpbilled Honeyguide	*Prodotiscus regulus*
R-U	Roseringed Parakeet	*Psittacula krameri*
R-VC	Groundscraper Thrush	*Psophocichla litsipsirupa*
E-U	Natal Francolin	*Pternistis natalensis*
E-VC	Swainson's Francolin	*Pternistis swainsonii*
R-U	Yellowthroated Sandgrouse	*Pterocles gutturalis*
R-U	Whitefaced Owl	*Ptilopsus granti*
E-VC	Redeyed Bulbul	*Pycnonotus nigricans*
R-A	Blackeyed Bulbul	*Pycnonotus tricolor*
R-U	Melba Finch	*Pytilia melba*
R-VC	Redbilled Quelea	*Quelea quelea*
R-C	African Rail	*Rallus caerulescens*
R-U/C	Pied Avocet	*Recurvirostra avosetta*
R-VC	Scimitarbilled Woodhoopoe	*Rhinopomastus cyanomelas*
BM-C	Banded Martin	*Riparia cincta*
R-C	Brownthroated Martin	*Riparia paludicola*
NBM-U	Sand Martin	*Riparia riparia*
R-C	Old World Painted Snipe	*Rostratula benghalensis*
R-U/C	Secretarybird	*Sagittarius serpentarius*
R-U	Knobbilled Duck	*Sarkidiornis melanotos*
R-U	Redchested Flufftail	*Sarothrura rufa*
R-VC	Stonechat	*Saxicola torquata*
R-U	Redwing Francolin	*Scleroptila levaillantii*
R-U	Orange River Francolin	*Scleroptila levaillantoides*
R-C	Shelley's Francolin	*Scleroptila shelleyi*
R-VC	Hamerkop	*Scopus umbretta*

Map Status	English Name	Scientific
R-VC	Blackthroated Canary	*Serinus atrogularis*
R-U	Cape Canary	*Serinus canicollis*
R-C	Streakyheaded Canary	*Serinus gularis*
R-U/VC	Yelloweyed Canary	*Serinus mozambicus*
E-VC	Fiscal Flycatcher	*Sigelus silens*
E-C	Grassbird	*Sphenoeacus afer*
E-C	Pinkbilled Lark	*Spizocorys conirostris*
E-VC	Scalyfeathered Finch	*Sporopipes squamifrons*
E-C	Pied Starling	*Spreo bicolor*
NBM-C	Fairy Flycatcher	*Stenostira scita*
R-U	Caspian Tern	*Sterna caspia*
R-A	Cape Turtle Dove	*Streptopelia capicola*
R-VC	Redeyed Dove	*Streptopelia semitorquata*
R-A	Laughing Dove	*Streptopelia senegalensis*
R-C	Ostrich	*Struthio camelus*
NBM-U	Garden Warbler	*Sylvia borin*
NBM-U	Whitethroat	*Sylvia communis*
R-VC	Longbilled Crombec	*Sylvietta rufescens*
R-VC	Dabchick	*Tachybaptus ruficollis*
BM-U	Alpine Swift	*Tachymarptis melba*
E-U	South African Shelduck	*Tadorna cana*
R-U	Threestreaked Tchagra	*Tchagra australis*
R-VC	Blackcrowned Tchagra	*Tchagra senegala*
R-U	Orangebreasted Bush Shrike	*Telophorus sulfureopectus*
E-VC	Bokmakierie	*Telophorus zeylonus*
BM-VC	Paradise Flycatcher	*Terpsiphone viridis*
R-U	Whitebacked Duck	*Thalassornis leuconotus*
R-C	Mocking Chat	*Thamnolaea cinnamomeiventris*
R-VC	Sacred Ibis	*Threskiornis aethiopicus*
R-VC	Redbilled Hornbill	*Tockus erythrorhynchus*
E-VC	Southern Yellowbilled Hornbill	*Tockus leucomelas*
R-C/VC	Grey Hornbill	*Tockus nasutus*
R-C	Lappetfaced Vulture	*Torgos tracheliotus*
R-VC	Crested Barbet	*Trachyphonus vaillantii*
R-U	African Green Pigeon	*Treron calva*
E-U	Pied Barbet	*Tricholaema leucomelas*
NBM-C	Wood Sandpiper	*Tringa glareola*
NBM-C	Greenshank	*Tringa nebularia*
NBM-U	Green Sandpiper	*Tringa ochropus*
NBM-C	Marsh Sandpiper	*Tringa stagnatilis*
V #	Redshank	*Tringa totanus*
E-VC	Pied Babbler	*Turdoides bicolor*
R-VC	Arrowmarked Babbler	*Turdoides jardineii*
R-U/VC	Kurrichane Thrush	*Turdus libonyanus*
E-VC	Karoo Thrush	*Turdus smithi*
R-U	Kurrichane Buttonquail	*Turnix sylvatica*
R-A	Greenspotted Dove	*Turtur chalcospilos*
R-C	Barn Owl	*Tyto alba*
R-U	Grass Owl	*Tyto capensis*
R-VC	African Hoopoe	*Upupa africana*
R-VC/A	Blue Waxbill	*Uraeginthus angolensis*
R-VC	Redfaced Mousebird	*Urocolius indicus*
R-VC	Blacksmith Plover	*Vanellus armatus*
R-VC	Crowned Plover	*Vanellus coronatus*
R-VC	Wattled Plover	*Vanellus senegallus*
R-U	Steelblue Widowfinch	*Vidua chalybeata*
R-U	Black Widowfinch	*Vidua funerea*
R-VC	Pintailed Whydah	*Vidua macroura*
R-VC	Paradise Whydah	*Vidua paradisaea*

Map Status	English Name	Scientific
R-U	Purple Widowfinch	*Vidua purpurascens*
E-U	Shafttailed Whydah	*Vidua regia*
E-VC	Cape White-eye	*Zosterops virens*

Table 36: Expected floral species list for the quarter degree grid 2527DD supplied by Sanbi Precis Database.

Family	Species	Threat status	Growth forms
ACANTHACEAE	*Barleria lancifolia T.Anderson subsp. lancifolia*	LC	Dwarf shrub, herb, shrub
ACANTHACEAE	*Barleria macrostegia Nees*	LC	Herb
ACANTHACEAE	*Barleria obtusa Nees*	LC	Dwarf shrub, herb, shrub
ACANTHACEAE	*Barleria pretoriensis C.B.Clarke*	LC	Dwarf shrub, herb
ACANTHACEAE	*Blepharis innocua C.B.Clarke*	LC	Herb
ACANTHACEAE	*Blepharis squarrosa (Nees) T.Anderson*	LC	Dwarf shrub, herb
ACANTHACEAE	*Chaetacanthus burchellii Nees*	LC	Dwarf shrub, herb
ACANTHACEAE	*Chaetacanthus costatus Nees*	LC	Dwarf shrub, herb
ACANTHACEAE	*Chaetacanthus setiger (Pers.) Lindl.*	LC	Dwarf shrub, herb, shrub
ACANTHACEAE	*Crabbea angustifolia Nees*	LC	Herb
ACANTHACEAE	*Dicliptera eenii S.Moore*	LC	Dwarf shrub, herb
ACANTHACEAE	*Isoglossa grantii C.B.Clarke*	LC	Dwarf shrub, herb, shrub
ACANTHACEAE	*Ruellia cordata Thunb.*	LC	Dwarf shrub, herb
ACANTHACEAE	*Ruellia patula Jacq.*	LC	Herb
ACANTHACEAE	*Thunbergia atriplicifolia E.Mey. ex Nees*	LC	Dwarf shrub, herb
ACHARIACEAE	*Kiggelaria africana L.*	LC	Shrub, tree
AMARANTHACEAE	*Achyranthes aspera L. var. sicula L.*		Herb
AMARANTHACEAE	*Alternanthera pungens Kunth*		Herb
AMARANTHACEAE	*Gomphrena celosioides Mart.*		Herb
AMARYLLIDACEAE	*Ammocharis coranica (Ker Gawl.) Herb.*	LC	Geophyte
AMARYLLIDACEAE	*Boophone disticha (L.f.) Herb.*	Declining	Geophyte, succulent
AMARYLLIDACEAE	*Brunsvigia natalensis Baker*	LC	Geophyte
AMARYLLIDACEAE	*Brunsvigia radulosa Herb.*	LC	Geophyte
AMARYLLIDACEAE	*Cyrtanthus tuckii Baker var. tuckii*	LC	Geophyte
AMARYLLIDACEAE	*Haemanthus humilis Jacq. subsp. humilis*	LC	Geophyte
AMARYLLIDACEAE	*Scadoxus puniceus (L.) Friis & Nordal*	LC	Geophyte, herb
ANACARDIACEAE	*Lannea discolor (Sond.) Engl.*	LC	Tree
ANACARDIACEAE	*Lannea edulis (Sond.) Engl. var. edulis*	LC	Dwarf shrub
ANACARDIACEAE	*Ozoroa insignis Delile subsp. reticulata (Baker f.) J.B.Gillett*		Shrub, tree
ANACARDIACEAE	*Ozoroa paniculosa (Sond.) R.& A.Fern. var. paniculosa*	LC	Shrub, tree
ANACARDIACEAE	*Ozoroa paniculosa (Sond.) R.& A.Fern. var. salicina (Sond.) R.& A.Fern.*	LC	Shrub, tree
ANACARDIACEAE	*Ozoroa sphaerocarpa R.Fern. & A.Fern.*	LC	Shrub, tree
ANACARDIACEAE	*Searsia dentata (Thunb.) F.A.Barkley*	LC	Shrub, tree
ANACARDIACEAE	*Searsia discolor (E.Mey. ex Sond.) Moffett*	LC	Dwarf shrub, shrub
ANACARDIACEAE	*Searsia lancea (L.f.) F.A.Barkley*	LC	Shrub, tree
ANACARDIACEAE	*Searsia leptodictya (Diels) T.S.Yi, A.J.Mill. & J.Wen forma leptodictya*		Shrub, tree
ANACARDIACEAE	*Searsia magalismontana (Sond.) Moffett subsp. magalismontana*	LC	Dwarf shrub
ANACARDIACEAE	*Searsia pallens (Eckl. & Zeyh.) Moffett*	LC	Shrub, tree
ANACARDIACEAE	*Searsia pyroides (Burch.) Moffett var. gracilis (Engl.) Moffett*	LC	Shrub, tree

Family	Species	Threat status	Growth forms
ANACARDIACEAE	*Searsia pyroides (Burch.) Moffett var. pyroides*	LC	[No lifeform defined]
ANACARDIACEAE	*Searsia rigida (Mill.) F.A.Barkley var. dentata (Engl.) Moffett*	LC	Shrub, tree
ANACARDIACEAE	*Searsia rigida (Mill.) F.A.Barkley var. margaretae (Burtt Davy ex Moffett) Moffett*	LC	Shrub
ANACARDIACEAE	*Searsia rigida (Mill.) F.A.Barkley var. rigida*	LC	Shrub
ANACARDIACEAE	*Searsia undulata (Jacq.) T.S.Yi, A.J.Mill. & J.Wen*	LC	Shrub
ANACARDIACEAE	*Searsia zeyheri (Sond.) Moffett*	LC	Shrub
ANEMIACEAE	*Mohria vestita Baker*	LC	Geophyte, herb, lithophyte
ANTHERICACEAE	*Chlorophytum bowkeri Baker*	LC	Herb
ANTHERICACEAE	*Chlorophytum cooperi (Baker) Nordal*	LC	Herb
ANTHERICACEAE	*Chlorophytum fasciculatum (Baker) Kativu*	LC	Herb
ANTHERICACEAE	*Chlorophytum trichophlebium (Baker) Nordal*	LC	Herb
APIACEAE	*Afrosciadium magalismontanum (Sond.) P.J.D.Winter*		Herb
APIACEAE	*Alepidea setifera N.E.Br.*	LC	Herb
APIACEAE	*Annesorhiza flagellifolia Burtt Davy*	LC	Herb
APIACEAE	*Berula thunbergii (DC.) H.Wolff*		Herb, hydrophyte
APIACEAE	*Centella asiatica (L.) Urb.*	LC	Climber, herb
APIACEAE	*Cyclospermum leptophyllum (Pers.) Sprague ex Britton & P.Wilson*		Herb
APIACEAE	*Heteromorpha arborescens (Spreng.) Cham. & Schltdl. var. abyssinica (Hochst. ex A.Rich.) H.Wolff*	LC	Shrub, tree
APIACEAE	*Pastinaca sativa L.*		Herb
APOCYNACEAE	*Acokanthera oppositifolia (Lam.) Codd*	LC	Shrub, tree
APOCYNACEAE	*Ancylobotrys capensis (Oliv.) Pichon*	LC	Climber, shrub
APOCYNACEAE	*Asclepias albens (E.Mey.) Schltr.*	LC	Herb
APOCYNACEAE	*Asclepias brevipes (Schltr.) Schltr.*	LC	Herb
APOCYNACEAE	*Asclepias eminens (Harv.) Schltr.*	LC	Herb
APOCYNACEAE	*Aspidoglossum biflorum E.Mey.*	LC	Herb, succulent
APOCYNACEAE	*Brachystelma oianthum Schltr.*	LC	Geophyte, succulent
APOCYNACEAE	*Carissa bispinosa (L.) Desf. ex Brenan*	LC	Shrub
APOCYNACEAE	*Ceropegia multiflora Baker subsp. multiflora*	LC	Climber, succulent
APOCYNACEAE	*Cryptolepis cryptolepidioides (Schltr.) Bullock*	LC	Climber, shrub
APOCYNACEAE	*Cryptolepis oblongifolia (Meisn.) Schltr.*	LC	Scrambler, shrub
APOCYNACEAE	*Cynanchum ellipticum (Harv.) R.A.Dyer*	LC	Climber
APOCYNACEAE	*Gomphocarpus fruticosus (L.) Aiton f. subsp. fruticosus*		Herb, shrub
APOCYNACEAE	*Gomphocarpus glaucophyllus Schltr.*	LC	Herb
APOCYNACEAE	*Orbea lutea (N.E.Br.) Bruyns subsp. lutea*	LC	Succulent
APOCYNACEAE	*Pachycarpus schinzianus (Schltr.) N.E.Br.*	LC	Herb, succulent
APOCYNACEAE	*Pentarrhinum insipidum E.Mey.*	LC	Climber
APOCYNACEAE	*Raphionacme galpinii Schltr.*	LC	Geophyte, herb, succulent
APOCYNACEAE	*Raphionacme hirsuta (E.Mey.) R.A.Dyer*	LC	Geophyte, herb, succulent
APOCYNACEAE	*Rauvolfia caffra Sond.*	LC	Tree
APOCYNACEAE	*Riocreuxia burchellii K.Schum.*	LC	Climber
APOCYNACEAE	*Sarcostemma viminale (L.) R.Br. subsp. viminale*	LC	Climber, succulent
APOCYNACEAE	*Secamone alpini Schult.*	LC	Climber
APOCYNACEAE	*Stapelia gigantea N.E.Br.*	LC	Succulent

Family	Species	Threat status	Growth forms
AQUIFOLIACEAE	*Ilex mitis (L.) Radlk. var. mitis*	Declining	Shrub, tree
ARALIACEAE	*Cussonia paniculata Eckl. & Zeyh. subsp. sinuata (Reyneke & Kok) De Winter*	LC	Succulent, tree
ASPARAGACEAE	*Asparagus angusticladus (Jessop) J.-P.Lebrun & Stork*	LC	Climber
ASPARAGACEAE	*Asparagus asparagoides (L.) Druce*	LC	Climber, succulent
ASPARAGACEAE	*Asparagus cooperi Baker*	LC	Dwarf shrub, shrub
ASPARAGACEAE	*Asparagus flavicaulis (Oberm.) Fellingham & N.L.Mey. subsp. flavicaulis*	LC	Shrub
ASPARAGACEAE	*Asparagus setaceus (Kunth) Jessop*	LC	Shrub
ASPARAGACEAE	*Asparagus suaveolens Burch.*	LC	Shrub
ASPARAGACEAE	*Asparagus transvaalensis (Oberm.) Fellingham & N.L.Mey.*	LC	Shrub
ASPARAGACEAE	*Asparagus virgatus Baker*	LC	Shrub
ASPHODELACEAE	*Aloe greatheadii Schönland var. davyana (Schönland) Glen & D.S.Hardy*	LC	Herb, succulent
ASPHODELACEAE	*Aloe marlothii A.Berger subsp. marlothii*	LC	Succulent, tree
ASPHODELACEAE	*Bulbine capitata Poelln.*	LC	Geophyte, herb, succulent
ASPHODELACEAE	*Trachyandra saltii (Baker) Oberm. var. saltii*	LC	Geophyte, succulent
ASPLENIACEAE	*Asplenium aethiopicum (Burm.f.) Bech.*	LC	Epiphyte, geophyte, herb, lithophyte
ASPLENIACEAE	*Asplenium capense (Kunze) Bir, Fraser-Jenk. & Lovis*		[No lifeform defined]
ASPLENIACEAE	*Asplenium varians Wall. ex Hook. & Grev. subsp. fimbriatum (Kunze) Schelpe*	LC	Geophyte, herb, lithophyte
ASTERACEAE	*Acanthospermum glabratum (DC.) Wild*		Herb
ASTERACEAE	*Acanthospermum hispidum DC.*		Herb
ASTERACEAE	*Adenostemma caffrum DC. var. caffrum*	LC	Herb, hydrophyte
ASTERACEAE	*Ageratina adenophora (Spreng.) R.M.King & H.Rob.*		Herb, shrub
ASTERACEAE	*Ambrosia artemisiifolia L.*		Herb
ASTERACEAE	*Artemisia afra Jacq. ex Willd. var. afra*	LC	Herb, shrub
ASTERACEAE	*Aster harveyanus Kuntze*	LC	Herb
ASTERACEAE	*Athrixia elata Sond.*	LC	Dwarf shrub
ASTERACEAE	*Berkheya carlinopsis Welw. ex O.Hoffm. subsp. magalismontana (Bolus) Roessler*	LC	Shrub
ASTERACEAE	*Berkheya zeyheri Oliv. & Hiern subsp. zeyheri*	LC	Herb
ASTERACEAE	*Bidens bipinnata L.*		Herb
ASTERACEAE	*Bidens pilosa L.*		Herb
ASTERACEAE	*Brachylaena rotundata S.Moore*	LC	Shrub, tree
ASTERACEAE	*Callilepis leptophylla Harv.*	Declining	Herb
ASTERACEAE	*Callilepis salicifolia Oliv.*	LC	Herb
ASTERACEAE	*Cineraria aspera Thunb.*	LC	Herb, suffrutex
ASTERACEAE	*Conyza podocephala DC.*	LC	Herb
ASTERACEAE	*Conyza scabrida DC.*	LC	Shrub
ASTERACEAE	*Conyza sumatrensis (Retz.) E.Walker var. sumatrensis*		Herb
ASTERACEAE	*Cotula anthemoides L.*	LC	Herb
ASTERACEAE	*Cotula nigellifolia (DC.) K.Bremer & Humphries var. nigellifolia*	LC	Herb, hydrophyte
ASTERACEAE	*Denekia capensis Thunb.*	LC	Herb
ASTERACEAE	*Dicoma anomala Sond. subsp. gerrardii (Harv. ex F.C.Wilson) S.Ortíz & Rodr.Oubiña*	LC	Herb
ASTERACEAE	*Dimorphotheca spectabilis Schltr.*	LC	Herb

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ASTERACEAE	*Felicia fascicularis DC.*	LC	Shrub
ASTERACEAE	*Felicia muricata (Thunb.) Nees subsp. muricata*	LC	Shrub
ASTERACEAE	*Flaveria bidentis (L.) Kuntze*		Herb
ASTERACEAE	*Galinsoga parviflora Cav.*		Herb
ASTERACEAE	*Gazania krebsiana Less. subsp. serrulata (DC.) Roessler*	LC	Herb
ASTERACEAE	*Geigeria burkei Harv. subsp. burkei var. burkei*	LC	Herb
ASTERACEAE	*Geigeria burkei Harv. subsp. burkei var. zeyheri (Harv.) Merxm.*	LC	Herb
ASTERACEAE	*Gerbera ambigua (Cass.) Sch.Bip.*	LC	Herb
ASTERACEAE	*Gerbera piloselloides (L.) Cass.*	LC	Herb
ASTERACEAE	*Helichrysum caespititium (DC.) Harv.*	LC	Herb
ASTERACEAE	*Helichrysum callicomum Harv.*	LC	Herb
ASTERACEAE	*Helichrysum cerastioides DC. var. cerastioides*	LC	Herb
ASTERACEAE	*Helichrysum chionosphaerum DC.*	LC	Herb
ASTERACEAE	*Helichrysum harveyanum Wild*	LC	Herb
ASTERACEAE	*Helichrysum nudifolium (L.) Less. var. nudifolium*	LC	Herb
ASTERACEAE	*Helichrysum nudifolium (L.) Less. var. oxyphyllum (DC.) Beentje*	LC	Herb
ASTERACEAE	*Helichrysum rugulosum Less.*	LC	Herb
ASTERACEAE	*Helichrysum setosum Harv.*	LC	Herb, shrub
ASTERACEAE	*Helichrysum stenopterum DC.*	LC	Herb
ASTERACEAE	*Hilliardiella aristata (DC.) H.Rob.*		Herb
ASTERACEAE	*Lactuca inermis Forssk.*	LC	Herb
ASTERACEAE	*Laggera decurrens (Vahl) Hepper & J.R.I.Wood*	LC	Herb
ASTERACEAE	*Macledium zeyheri (Sond.) S.Ortíz subsp. zeyheri*	LC	Herb
ASTERACEAE	*Nidorella hottentotica DC.*	LC	Herb
ASTERACEAE	*Nolletia rarifolia (Turcz.) Steetz*	LC	Suffrutex
ASTERACEAE	*Osteospermum muricatum E.Mey. ex DC. subsp. muricatum*	LC	Herb
ASTERACEAE	*Pentzia monocephala S.Moore*	LC	Dwarf shrub
ASTERACEAE	*Phymaspermum bolusii (Hutch.) Källersjö*	LC	Shrub
ASTERACEAE	*Pseudognaphalium oligandrum (DC.) Hilliard & B.L.Burtt*	LC	Herb
ASTERACEAE	*Psiadia punctulata (DC.) Vatke*	LC	Shrub
ASTERACEAE	*Schistostephium crataegifolium (DC.) Fenzl ex Harv.*	LC	Herb, suffrutex
ASTERACEAE	*Schkuhria pinnata (Lam.) Kuntze ex Thell.*		Herb
ASTERACEAE	*Senecio affinis DC.*	LC	Herb
ASTERACEAE	*Senecio albanensis DC. var. doroniciflorus (DC.) Harv.*	LC	Herb
ASTERACEAE	*Senecio barbertonicus Klatt*	LC	Shrub, succulent
ASTERACEAE	*Senecio coronatus (Thunb.) Harv.*	LC	Herb
ASTERACEAE	*Senecio erubescens Aiton var. erubescens*	LC	Herb
ASTERACEAE	*Senecio hieracioides DC.*	LC	Herb
ASTERACEAE	*Senecio lydenburgensis Hutch. & Burtt Davy*	LC	Herb
ASTERACEAE	*Senecio oxyriifolius DC. subsp. oxyriifolius*	LC	Herb, succulent
ASTERACEAE	*Senecio pentactinus Klatt*	LC	Herb, shrub
ASTERACEAE	*Senecio striatifolius DC.*	LC	Herb

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ASTERACEAE	*Senecio venosus Harv.*	LC	Herb
ASTERACEAE	*Seriphium plumosum L.*	LC	Shrub
ASTERACEAE	*Sonchus dregeanus DC.*	LC	Herb
ASTERACEAE	*Tagetes minuta L.*		Herb
ASTERACEAE	*Tarchonanthus camphoratus L.*	LC	Shrub, tree
ASTERACEAE	*Tarchonanthus parvicapitulatus P.P.J.Herman*	LC	Shrub, tree
ASTERACEAE	*Tolpis capensis (L.) Sch.Bip.*	LC	Herb
ASTERACEAE	*Tripteris aghillana DC. var. aghillana*	LC	Herb, succulent
ASTERACEAE	*Vernonia galpinii Klatt*	LC	Herb
ASTERACEAE	*Vernonia staehelinoides Harv.*	LC	Shrub, suffrutex
ASTERACEAE	*Vernonia sutherlandii Harv.*	LC	Herb
ASTERACEAE	*Zinnia peruviana (L.) L.*		Herb
AYTONIACEAE	*Mannia capensis (Steph.) S.W.Arnell*		Bryophyte
AYTONIACEAE	*Plagiochasma appendiculatum Lehm. & Lindenb.*		Bryophyte
AYTONIACEAE	*Plagiochasma microcephalum (Steph.) Steph. var. microcephalum*		Bryophyte
AYTONIACEAE	*Plagiochasma rupestre (J.R.& G.Forst.) Steph. var. rupestre*		Bryophyte
AYTONIACEAE	*Plagiochasma rupestre (J.R.& G.Forst.) Steph. var. volkii Bischl.*		Bryophyte
BARTRAMIACEAE	*Philonotis dregeana (Müll.Hal.) A.Jaeger*		Bryophyte
BARTRAMIACEAE	*Philonotis falcata (Hook.) Mitt.*		Bryophyte
BARTRAMIACEAE	*Philonotis hastata (Duby) Wijk & Margad.*		Bryophyte
BORAGINACEAE	*Ehretia rigida (Thunb.) Druce subsp. rigida*	LC	Shrub, tree
BORAGINACEAE	*Heliotropium ciliatum Kaplan*	LC	Herb
BRACHYTHECIACEAE	*Brachythecium implicatum (Hornsch. ex Müll.Hal.) A.Jaeger*		Bryophyte, epiphyte
BRASSICACEAE	*Diplotaxis muralis (L.) DC.*		Herb
BRASSICACEAE	*Lepidium africanum (Burm.f.) DC. subsp. africanum*	LC	Herb
BRASSICACEAE	*Lepidium bonariense L.*		Herb
BRASSICACEAE	*Lepidium transvaalense Marais*	LC	Herb
BRASSICACEAE	*Nasturtium officinale R.Br.*		Herb
BRASSICACEAE	*Sisymbrium officinale (L.) Scop.*		Herb
BRYACEAE	*Bryum argenteum Hedw.*		Bryophyte
BRYACEAE	*Bryum pycnophyllum (Dixon) Mohamed*		Bryophyte, epiphyte
BUDDLEJACEAE	*Buddleja saligna Willd.*	LC	Shrub, tree
BUDDLEJACEAE	*Buddleja salviifolia (L.) Lam.*	LC	Shrub, tree
BUDDLEJACEAE	*Gomphostigma virgatum (L.f.) Baill.*	LC	Dwarf shrub, herb, shrub
BUDDLEJACEAE	*Nuxia congesta R.Br. ex Fresen.*	LC	Shrub, tree
BUDDLEJACEAE	*Nuxia glomerulata (C.A.Sm.) I.Verd.*	LC	Shrub, tree
CAMPANULACEAE	*Wahlenbergia banksiana A.DC.*	LC	Herb
CAMPANULACEAE	*Wahlenbergia magaliesbergensis Lammers*	LC	Dwarf shrub
CAMPANULACEAE	*Wahlenbergia undulata (L.f.) A.DC.*	LC	Herb
CANNABACEAE	*Cannabis sativa L. var. sativa*		Herb
CAPPARACEAE	*Boscia albitrunca (Burch.) Gilg & Gilg-Ben.*	LC	Shrub, tree
CAPPARACEAE	*Cleome conrathii Burtt Davy*	NT	Herb
CAPPARACEAE	*Cleome gynandra L.*	LC	Herb
CAPPARACEAE	*Cleome maculata (Sond.) Szyszyl.*	LC	Herb

Family	Species	Threat status	Growth forms
CAPPARACEAE	*Cleome monophylla L.*	LC	Herb
CAPPARACEAE	*Maerua cafra (DC.) Pax*	LC	Shrub, tree
CAPPARACEAE	*Maerua juncea Pax subsp. crustata (Wild) Wild*	LC	Climber, shrub
CARYOPHYLLACEAE	*Dianthus mooiensis F.N.Williams subsp. mooiensis var. mooiensis*		Herb
CELASTRACEAE	*Gymnosporia buxifolia (L.) Szyszyl.*	LC	Shrub, tree
CELASTRACEAE	*Gymnosporia tenuispina (Sond.) Szyszyl.*	LC	Shrub
CELASTRACEAE	*Maytenus undata (Thunb.) Blakelock*	LC	Shrub, tree
CELASTRACEAE	*Pterocelastrus echinatus N.E.Br.*	LC	Shrub, tree
CELASTRACEAE	*Salacia rehmannii Schinz*	LC	Dwarf shrub
CELTIDACEAE	*Celtis africana Burm.f.*	LC	Shrub, tree
CHENOPODIACEAE	*Chenopodium carinatum R.Br.*		Herb
CHRYSOBALANACEAE	*Parinari capensis Harv. subsp. capensis*	LC	Dwarf shrub
COLCHICACEAE	*Gloriosa modesta (Hook.) J.C.Manning & Vinn.*	LC	Climber, geophyte
COLCHICACEAE	*Ornithoglossum vulgare B.Nord.*	LC	Geophyte
COMBRETACEAE	*Combretum apiculatum Sond. subsp. apiculatum*	LC	Shrub, tree
COMBRETACEAE	*Combretum erythrophyllum (Burch.) Sond.*	LC	Shrub, tree
COMBRETACEAE	*Combretum molle R.Br. ex G.Don*	LC	Tree
COMBRETACEAE	*Combretum zeyheri Sond.*	LC	Shrub, tree
COMBRETACEAE	*Terminalia sericea Burch. ex DC.*	LC	Tree
COMMELINACEAE	*Commelina africana L. var. krebsiana (Kunth) C.B.Clarke*	LC	Herb
COMMELINACEAE	*Commelina africana L. var. lancispatha C.B.Clarke*	LC	Herb
COMMELINACEAE	*Commelina modesta Oberm.*	LC	Herb
COMMELINACEAE	*Cyanotis speciosa (L.f.) Hassk.*	LC	Herb, succulent
CONVOLVULACEAE	*Convolvulus ocellatus Hook.f. var. ocellatus*	LC	Herb
CONVOLVULACEAE	*Convolvulus sagittatus Thunb.*	LC	Herb
CONVOLVULACEAE	*Convolvulus thunbergii Roem. & Schult.*	LC	Herb
CONVOLVULACEAE	*Cuscuta campestris Yunck.*		Herb, parasite
CONVOLVULACEAE	*Dichondra micrantha Urb.*		Herb
CONVOLVULACEAE	*Evolvulus alsinoides (L.) L.*	LC	Herb
CONVOLVULACEAE	*Ipomoea bathycolpos Hallier f.*	LC	Herb
CONVOLVULACEAE	*Ipomoea bolusiana Schinz*	LC	Dwarf shrub, herb, succulent
CONVOLVULACEAE	*Ipomoea crassipes Hook. var. crassipes*	LC	Herb, succulent
CONVOLVULACEAE	*Ipomoea gracilisepala Rendle*	LC	Herb
CONVOLVULACEAE	*Ipomoea oblongata E.Mey. ex Choisy*	LC	Herb, succulent
CONVOLVULACEAE	*Ipomoea obscura (L.) Ker Gawl. var. obscura*	LC	Herb
CONVOLVULACEAE	*Ipomoea ommanneyi Rendle*	LC	Herb, succulent
CONVOLVULACEAE	*Ipomoea transvaalensis A.Meeuse*	LC	Herb, succulent
CONVOLVULACEAE	*Merremia verecunda Rendle*	LC	Herb
CONVOLVULACEAE	*Xenostegia tridentata (L.) D.F.Austin & Staples subsp. angustifolia (Jacq.) Lejoly & Lisowski*	LC	Herb
CRASSULACEAE	*Crassula lanceolata (Eckl. & Zeyh.) Endl. ex Walp. subsp. transvaalensis (Kuntze) Toelken*	LC	Herb, succulent
CRASSULACEAE	*Crassula setulosa Harv. var. jenkinsii Schönland*	LC	Herb, lithophyte, succulent
CRASSULACEAE	*Crassula setulosa Harv. var. setulosa forma setulosa*		Herb, succulent
CRASSULACEAE	*Kalanchoe paniculata Harv.*	LC	Shrub, succulent

Family	Species	Threat status	Growth forms
CRASSULACEAE	*Kalanchoe rotundifolia (Haw.) Haw.*	LC	Dwarf shrub, succulent
CRASSULACEAE	*Kalanchoe thyrsiflora Harv.*	LC	Lithophyte, shrub, succulent
CUCURBITACEAE	*Cucumis africanus L.f.*	LC	Herb
CUCURBITACEAE	*Cucumis anguria L. var. longaculeatus J.H.Kirkbr.*	LC	Climber, herb
CUCURBITACEAE	*Cucumis myriocarpus Naudin subsp. myriocarpus*	LC	Herb
CUCURBITACEAE	*Cucumis zeyheri Sond.*	LC	Herb
CUCURBITACEAE	*Zehneria marlothii (Cogn.) R.& A.Fern.*	LC	Climber
CYPERACEAE	*Abildgaardia ovata (Burm.f.) Kral*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Bulbostylis burchellii (Ficalho & Hiern) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Bulbostylis humilis (Kunth) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Bulbostylis oritrephes (Ridl.) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Carex acutiformis Ehrh.*		Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Carex austro-africana (Kük.) Raymond*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Carex cognata Kunth*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cladium mariscus (L.) Pohl subsp. jamaicense (Crantz) Kük.*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Cyperus albostriatus Schrad.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus congestus Vahl*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus esculentus L. var. esculentus*	LC	Cyperoid, geophyte, herb, mesophyte
CYPERACEAE	*Cyperus fastigiatus Rottb.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus leptocladus Kunth*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus margaritaceus Vahl var. margaritaceus*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus obtusiflorus Vahl var. obtusiflorus*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus rupestris Kunth var. rupestris*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus sexangularis Nees*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Fimbristylis dichotoma (L.) Vahl subsp. dichotoma*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Fuirena stricta Steud. var. stricta*	LC	Cyperoid, helophyte, herb, sudd hydrophyte
CYPERACEAE	*Isolepis cernua (Vahl) Roem. & Schult. var. cernua*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Kyllinga alba Nees*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Kyllinga melanosperma Nees*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Mariscus dregeanus Kunth*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Mariscus uitenhagensis Steud.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Pycreus unioloides (R.Br.) Urb.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Schoenoplectus brachyceras (Hochst. ex A.Rich.) Lye*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Schoenoxiphium lehmannii (Nees) Steud.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Schoenoxiphium sparteum (Wahlenb.) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Scleria bulbifera Hochst. ex A.Rich.*	LC	Cyperoid, geophyte, herb, mesophyte
CYPERACEAE	*Scleria dregeana Kunth*	LC	Cyperoid, helophyte, herb
DIPSACACEAE	*Cephalaria zeyheriana Szabó*	LC	Herb
DIPSACACEAE	*Scabiosa columbaria L.*	LC	Herb
DRYOPTERIDACEAE	*Dryopteris athamantica (Kunze) Kuntze*	LC	Geophyte, herb, lithophyte
DRYOPTERIDACEAE	*Dryopteris inaequalis (Schltdl.) Kuntze*	LC	Geophyte, herb

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EBENACEAE	*Diospyros lycioides Desf. subsp. guerkei (Kuntze) De Winter*	LC	Shrub, tree
EBENACEAE	*Diospyros lycioides Desf. subsp. lycioides*	LC	Shrub
EBENACEAE	*Diospyros whyteana (Hiern) F.White*	LC	Shrub, tree
EBENACEAE	*Euclea crispa (Thunb.) Gürke subsp. crispa*	LC	Shrub, tree
EBENACEAE	*Euclea natalensis A.DC. subsp. angustifolia F.White*	LC	Shrub, tree
ENTODONTACEAE	*Entodon cymbifolius Wager & Dixon*		Bryophyte, epiphyte
ENTODONTACEAE	*Entodon macropodus (Hedw.) Müll.Hal.*		Bryophyte, epiphyte
EQUISETACEAE	*Equisetum ramosissimum Desf. subsp. ramosissimum*	LC	Herb, hydrophyte
ERICACEAE	*Erica woodii Bolus var. woodii*	LC	Dwarf shrub
ERIOSPERMACEAE	*Eriospermum cooperi Baker var. cooperi*	LC	Geophyte
ERIOSPERMACEAE	*Eriospermum flagelliforme (Baker) J.C.Manning*	LC	Geophyte
ERPODIACEAE	*Aulacopilum trichophyllum Ångstr.*		Bryophyte, epiphyte
ERPODIACEAE	*Erpodium coronatum (Hook.f. & Wilson) Mitt. subsp. transvaaliense (Broth. & Wager) Magill*		Bryophyte, epiphyte
EUPHORBIACEAE	*Acalypha angustata Sond.*	LC	Dwarf shrub, herb
EUPHORBIACEAE	*Acalypha glabrata Thunb. var. glabrata*	LC	Shrub, tree
EUPHORBIACEAE	*Acalypha glabrata Thunb. var. pilosa Pax*	LC	Shrub, tree
EUPHORBIACEAE	*Acalypha villicaulis Hochst.*	LC	Dwarf shrub, herb, shrub
EUPHORBIACEAE	*Clutia pulchella L. var. pulchella*	LC	Dwarf shrub, herb, shrub
EUPHORBIACEAE	*Croton gratissimus Burch. var. subgratissimus (Prain) Burtt Davy*	LC	Shrub, tree
EUPHORBIACEAE	*Euphorbia cooperi N.E.Br. ex A.Berger var. cooperi*	LC	Succulent, tree
EUPHORBIACEAE	*Euphorbia epicyparissias E.Mey. ex Boiss.*	LC	Dwarf shrub, herb
EUPHORBIACEAE	*Euphorbia inaequilatera Sond. var. inaequilatera*	LC	Dwarf shrub, herb
EUPHORBIACEAE	*Euphorbia indica Lam.*		Herb
EUPHORBIACEAE	*Euphorbia pseudotuberosa Pax*	LC	Dwarf shrub, succulent
EUPHORBIACEAE	*Euphorbia pubescens Vahl*	LC	Herb
EUPHORBIACEAE	*Euphorbia rhombifolia Boiss.*	LC	Shrub, succulent
EUPHORBIACEAE	*Euphorbia schinzii Pax*	LC	Dwarf shrub, shrub, succulent
EUPHORBIACEAE	*Ricinus communis L. var. communis*		Shrub, tree
EUPHORBIACEAE	*Tragia rupestris Sond.*	LC	Climber, dwarf shrub, herb, shrub
FABACEAE	*Acacia ataxacantha DC.*	LC	Climber, shrub, tree
FABACEAE	*Acacia caffra (Thunb.) Willd.*	LC	Shrub, tree
FABACEAE	*Acacia dealbata Link*		Shrub, tree
FABACEAE	*Acacia hebeclada DC. subsp. hebeclada*	LC	Shrub, tree
FABACEAE	*Acacia karroo Hayne*	LC	Shrub, tree
FABACEAE	*Acacia nilotica (L.) Willd. ex Delile subsp. kraussiana (Benth.) Brenan*	LC	Tree
FABACEAE	*Acacia tortilis (Forssk.) Hayne subsp. heteracantha (Burch.) Brenan*	LC	Shrub, tree
FABACEAE	*Alysicarpus zeyheri Harv.*	LC	Herb
FABACEAE	*Burkea africana Hook.*	LC	Tree
FABACEAE	*Chamaecrista biensis (Steyaert) Lock*	LC	Herb
FABACEAE	*Chamaecrista mimosoides (L.) Greene*	LC	Herb
FABACEAE	*Chamaecrista stricta E.Mey.*	LC	Herb
FABACEAE	*Crotalaria barkae Schweinf. subsp. barkae*	LC	Herb
FABACEAE	*Crotalaria brachycarpa (Benth.) Burtt Davy ex I.Verd.*	LC	Herb

Family	Species	Threat status	Growth forms
FABACEAE	*Crotalaria lotoides Benth.*	LC	Herb
FABACEAE	*Crotalaria sphaerocarpa Perr. ex DC. subsp. sphaerocarpa*	LC	Herb
FABACEAE	*Dolichos angustifolius Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Elephantorrhiza elephantina (Burch.) Skeels*	LC	Dwarf shrub, shrub, suffrutex
FABACEAE	*Eriosema burkei Benth. ex Harv. var. burkei*	LC	Herb
FABACEAE	*Eriosema cordatum E.Mey.*	LC	Herb
FABACEAE	*Erythrina lysistemon Hutch.*	LC	Tree
FABACEAE	*Indigastrum burkeanum (Benth. ex Harv.) Schrire*	LC	Herb
FABACEAE	*Indigastrum costatum (Guill. & Perr.) Schrire subsp. macrum (E.Mey.) Schrire*	LC	Herb
FABACEAE	*Indigofera comosa N.E.Br.*	LC	Shrub
FABACEAE	*Indigofera confusa Prain & Baker f.*	LC	Herb
FABACEAE	*Indigofera frondosa N.E.Br.*	LC	Shrub
FABACEAE	*Indigofera hedyantha Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Indigofera heterotricha DC.*	LC	Dwarf shrub, herb
FABACEAE	*Indigofera hilaris Eckl. & Zeyh. var. hilaris*	LC	Herb
FABACEAE	*Indigofera melanadenia Benth. ex Harv.*	LC	Herb, shrub
FABACEAE	*Indigofera oxalidea Welw. ex Baker*	LC	Herb
FABACEAE	*Lablab purpureus (L.) Sweet subsp. uncinatus Verdc.*	LC	Climber, herb
FABACEAE	*Lotononis calycina (E.Mey.) Benth.*	LC	Herb
FABACEAE	*Lotononis eriantha Benth.*	LC	Herb
FABACEAE	*Lotononis listii Polhill*	LC	Creeper, herb
FABACEAE	*Lotononis pulchra Dummer*	LC	Herb
FABACEAE	*Lotononis tenella (E.Mey.) Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Melolobium subspicatum Conrath*	VU	Dwarf shrub
FABACEAE	*Mundulea sericea (Willd.) A.Chev. subsp. sericea*	LC	Shrub, tree
FABACEAE	*Neonotonia wightii (Wight. ex Arn.) J.A.Lackey*	LC	Climber
FABACEAE	*Neorautanenia ficifolia (Benth. ex Harv.) C.A.Sm.*	LC	Climber, herb, succulent
FABACEAE	*Ophrestia oblongifolia (E.Mey.) H.M.L.Forbes var. oblongifolia*	LC	Herb
FABACEAE	*Pearsonia bracteata (Benth.) Polhill*	LC	Herb
FABACEAE	*Pearsonia cajanifolia (Harv.) Polhill subsp. cajanifolia*	LC	Herb, shrub
FABACEAE	*Pearsonia sessilifolia (Harv.) Dummer subsp. sessilifolia*	LC	Dwarf shrub, herb
FABACEAE	*Pearsonia uniflora (Kensit) Polhill*	LC	Herb
FABACEAE	*Rhynchosia caribaea (Jacq.) DC.*	LC	Climber, herb
FABACEAE	*Rhynchosia minima (L.) DC. var. prostrata (Harv.) Meikle*	LC	Climber, herb
FABACEAE	*Rhynchosia nervosa Benth. ex Harv. var. nervosa*	LC	Herb
FABACEAE	*Rhynchosia nitens Benth. ex Harv.*	LC	Shrub
FABACEAE	*Rhynchosia totta (Thunb.) DC. var. totta*	LC	Climber, herb
FABACEAE	*Rhynchosia venulosa (Hiern) K.Schum.*	LC	Climber, herb
FABACEAE	*Senna italica Mill. subsp. arachoides (Burch.) Lock*	LC	Herb
FABACEAE	*Sphenostylis angustifolia Sond.*	LC	Dwarf shrub, herb
FABACEAE	*Stylosanthes fruticosa (Retz.) Alston*	LC	Dwarf shrub, herb
FABACEAE	*Sutherlandia microphylla Burch. ex DC.*	LC	Shrub
FABACEAE	*Tephrosia elongata E.Mey. var. elongata*	LC	Dwarf shrub, herb, shrub

Family	Species	Threat status	Growth forms
FABACEAE	*Tephrosia longipes Meisn. subsp. longipes var. longipes*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Tephrosia multijuga R.G.N.Young*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Tephrosia rhodesica Baker f. var. evansii (Hutch. & Burtt Davy) Brummitt*	LC	Dwarf shrub, shrub
FABACEAE	*Tephrosia rhodesica Baker f. var. rhodesica*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Tephrosia semiglabra Sond.*	LC	Herb
FABACEAE	*Teramnus labialis (L.f.) Spreng. subsp. labialis*	LC	Climber, herb
FABACEAE	*Vigna unguiculata (L.) Walp. subsp. stenophylla (Harv.) Maréchal, Mascherpa & Stainier*	LC	Climber, herb
FABACEAE	*Vigna vexillata (L.) A.Rich. var. vexillata*	LC	Climber, herb
FABACEAE	*Zornia linearis E.Mey.*	LC	Herb
FABACEAE	*Zornia milneana Mohlenbr.*	LC	Herb
FABRONIACEAE	*Fabronia pilifera Hornsch.*		Bryophyte, epiphyte
FISSIDENTACEAE	*Fissidens bogosicus Müll.Hal.*		Bryophyte
FISSIDENTACEAE	*Fissidens palmifolius (P.Beauv.) Broth.*		Bryophyte, hydrophyte
FISSIDENTACEAE	*Fissidens rufescens Hornsch.*		Bryophyte
FISSIDENTACEAE	*Fissidens submarginatus Bruch*		Bryophyte
FOSSOMBRONIACEAE	*Fossombronia gemmifera Perold*		Bryophyte
FUNARIACEAE	*Funaria hygrometrica Hedw.*		Bryophyte
GENTIANACEAE	*Chironia palustris Burch. subsp. palustris*	LC	Herb
GENTIANACEAE	*Chironia palustris Burch. subsp. transvaalensis (Gilg) I.Verd.*	LC	Herb
GENTIANACEAE	*Sebaea grandis (E.Mey.) Steud.*	LC	Herb
GERANIACEAE	*Monsonia angustifolia E.Mey. ex A.Rich.*	LC	Herb
GERANIACEAE	*Monsonia burkeana Planch. ex Harv.*	LC	Herb
GERANIACEAE	*Monsonia grandifolia R.Knuth*	LC	Herb
GERANIACEAE	*Pelargonium luridum (Andrews) Sweet*	LC	Geophyte, succulent
GISEKIACEAE	*Gisekia pharnacioides L. var. pharnacioides*	LC	Herb
GUNNERACEAE	*Gunnera perpensa L.*	Declining	Herb, hydrophyte
HYACINTHACEAE	*Albuca setosa Jacq.*	LC	Geophyte
HYACINTHACEAE	*Bowiea volubilis Harv. ex Hook.f. subsp. volubilis*	VU	Climber, geophyte, succulent
HYACINTHACEAE	*Dipcadi marlothii Engl.*	LC	Geophyte
HYACINTHACEAE	*Dipcadi viride (L.) Moench*	LC	Geophyte
HYACINTHACEAE	*Drimia calcarata (Baker) Stedje*	LC	Geophyte
HYACINTHACEAE	*Drimia elata Jacq.*	DDT	Geophyte
HYACINTHACEAE	*Drimia sanguinea (Schinz) Jessop*	NT	Geophyte
HYACINTHACEAE	*Eucomis autumnalis (Mill.) Chitt. subsp. autumnalis*		Geophyte
HYACINTHACEAE	*Ledebouria cooperi (Hook.f.) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ledebouria inquinata (C.A.Sm.) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ledebouria luteola Jessop*	LC	Geophyte
HYACINTHACEAE	*Ledebouria marginata (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ledebouria ovatifolia (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ornithogalum tenuifolium F.Delaroche subsp. tenuifolium*	LC	Geophyte
HYACINTHACEAE	*Schizocarphus nervosus (Burch.) Van der Merwe*	LC	Geophyte
HYPERICACEAE	*Hypericum aethiopicum Thunb. subsp. sonderi (Bredell) N.Robson*	LC	Herb

Family	Species	Threat status	Growth forms
HYPOXIDACEAE	*Hypoxis argentea Harv. ex Baker var. argentea*	LC	Geophyte
HYPOXIDACEAE	*Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.*	Declining	Geophyte
HYPOXIDACEAE	*Hypoxis iridifolia Baker*	LC	Geophyte
HYPOXIDACEAE	*Hypoxis rigidula Baker var. pilosissima Baker*	LC	Geophyte
HYPOXIDACEAE	*Hypoxis rigidula Baker var. rigidula*	LC	Geophyte, herb
ICACINACEAE	*Apodytes dimidiata E.Mey. ex Arn. subsp. dimidiata*	LC	Shrub, tree
ICACINACEAE	*Cassinopsis ilicifolia (Hochst.) Kuntze*	LC	Shrub, tree
IRIDACEAE	*Freesia grandiflora (Baker) Klatt*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus permeabilis D.Delaroche subsp. edulis (Burch. ex Ker Gawl.) Oberm.*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus pretoriensis Kuntze*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus sericeovillosus Hook.f. subsp. calvatus (Baker) Goldblatt*	LC	Geophyte, herb
IRIDACEAE	*Hesperantha longicollis Baker*	LC	Geophyte, herb
IRIDACEAE	*Moraea stricta Baker*	LC	Geophyte, herb
IRIDACEAE	*Tritonia nelsonii Baker*	LC	Geophyte, herb
JUBULACEAE	*Frullania ericoides (Nees) Mont.*		Bryophyte, epiphyte
JUNCACEAE	*Juncus effusus L.*	LC	Helophyte, herb
JUNCACEAE	*Juncus exsertus Buchenau*	LC	Helophyte, herb
JUNCACEAE	*Juncus punctorius L.f.*	LC	Helophyte, herb
LAMIACEAE	*Acrotome hispida Benth.*	LC	Herb
LAMIACEAE	*Clerodendrum glabrum E.Mey.*	LC	Shrub, tree
LAMIACEAE	*Leucas martinicensis (Jacq.) R.Br.*	LC	Herb
LAMIACEAE	*Ocimum angustifolium Benth.*	LC	Herb, shrub
LAMIACEAE	*Ocimum obovatum E.Mey. ex Benth. subsp. obovatum var. obovatum*	LC	Herb
LAMIACEAE	*Plectranthus cylindraceus Hochst. ex Benth.*	LC	Herb, succulent
LAMIACEAE	*Plectranthus grallatus Briq.*	LC	Herb
LAMIACEAE	*Plectranthus hereroensis Engl.*	LC	Herb
LAMIACEAE	*Rotheca hirsuta (Hochst.) R.Fern.*	LC	Herb
LAMIACEAE	*Rotheca louwalbertsii (P.P.J.Herman) P.P.J.Herman & Retief*	LC	Herb
LAMIACEAE	*Salvia reflexa Hornem.*		Herb
LAMIACEAE	*Salvia repens Burch. ex Benth. var. repens*	LC	Herb
LAMIACEAE	*Salvia runcinata L.f.*	LC	Herb
LAMIACEAE	*Satureja biflora (Buch.-Ham. ex D.Don) Briq.*	LC	Herb
LAMIACEAE	*Scutellaria racemosa Pers.*		Herb
LAMIACEAE	*Stachys natalensis Hochst. var. galpinii (Briq.) Codd*	LC	Herb
LAMIACEAE	*Stachys natalensis Hochst. var. natalensis*	LC	Herb
LAMIACEAE	*Tetradenia brevispicata (N.E.Br.) Codd*	LC	Shrub, succulent, tree
LAMIACEAE	*Teucrium trifidum Retz.*	LC	Herb
LAMIACEAE	*Vitex zeyheri Sond.*	LC	Tree
LEMNACEAE	*Lemna gibba L.*	LC	Herb, hydrophyte, pleustophyte
LEMNACEAE	*Spirodela punctata (G.Mey.) C.H.Thomps.*	LC	Herb, hydrophyte, pleustophyte
LESKEACEAE	*Pseudoleskea leskeoides (Paris) Müll.Hal.*		Bryophyte, epiphyte
LINACEAE	*Linum thunbergii Eckl. & Zeyh.*	LC	Herb
LOBELIACEAE	*Cyphia assimilis Sond.*	LC	Climber, herb

Family	Species	Threat status	Growth forms
LOBELIACEAE	*Cyphia stenopetala Diels*	LC	Climber, herb
LOBELIACEAE	*Lobelia erinus L.*	LC	Herb
LOBELIACEAE	*Lobelia thermalis Thunb.*	LC	Herb
LORANTHACEAE	*Agelanthus natalitius (Meisn.) Polhill & Wiens subsp. zeyheri (Harv.) Polhill & Wiens*	LC	Parasite, shrub, succulent
LORANTHACEAE	*Tapinanthus quequensis (Weim.) Polhill & Wiens*	LC	Parasite, shrub
LORANTHACEAE	*Tapinanthus rubromarginatus (Engl.) Danser*	LC	Parasite, shrub, succulent
MALPIGHIACEAE	*Sphedamnocarpus pruriens (A.Juss.) Szyszyl. subsp. galphimiifolius (A.Juss.) P.D.de Villiers & D.J.Botha*	LC	Climber, shrub
MALPIGHIACEAE	*Sphedamnocarpus pruriens (A.Juss.) Szyszyl. subsp. pruriens*	LC	Climber, shrub
MALVACEAE	*Abutilon piloso-cinereum A.Meeuse*	LC	Herb, shrub
MALVACEAE	*Abutilon pycnodon Hochr.*	LC	Herb, shrub
MALVACEAE	*Abutilon sonneratianum (Cav.) Sweet*	LC	Shrub
MALVACEAE	*Corchorus asplenifolius Burch.*	LC	Herb
MALVACEAE	*Corchorus confusus Wild*	LC	Herb
MALVACEAE	*Corchorus trilocularis L.*		Herb
MALVACEAE	*Dombeya rotundifolia (Hochst.) Planch. var. rotundifolia*	LC	Shrub, tree
MALVACEAE	*Grewia flava DC.*	LC	Shrub
MALVACEAE	*Grewia monticola Sond.*	LC	Shrub, tree
MALVACEAE	*Grewia occidentalis L. var. occidentalis*	LC	Shrub, tree
MALVACEAE	*Hermannia boraginiflora Hook.*	LC	Dwarf shrub
MALVACEAE	*Hermannia burkei Burtt Davy*	LC	Climber, herb
MALVACEAE	*Hermannia cordata (E.Mey. ex E.Phillips) De Winter*	LC	Herb
MALVACEAE	*Hermannia depressa N.E.Br.*	LC	Herb
MALVACEAE	*Hermannia floribunda Harv.*	LC	Dwarf shrub, shrub
MALVACEAE	*Hermannia grandifolia N.E.Br.*	LC	Herb
MALVACEAE	*Hermannia lancifolia Szyszyl.*	LC	Herb
MALVACEAE	*Hibiscus aethiopicus L. var. ovatus Harv.*	LC	Herb
MALVACEAE	*Hibiscus calyphyllus Cav.*	LC	Dwarf shrub, herb
MALVACEAE	*Hibiscus engleri K.Schum.*	LC	Herb
MALVACEAE	*Hibiscus lunarifolius Willd.*	LC	Herb
MALVACEAE	*Hibiscus microcarpus Garcke*	LC	Herb
MALVACEAE	*Hibiscus subreniformis Burtt Davy*	LC	Dwarf shrub, herb
MALVACEAE	*Hibiscus trionum L.*		Herb
MALVACEAE	*Melhania transvaalensis Szyszyl.*	LC	Dwarf shrub
MALVACEAE	*Pavonia burchellii (DC.) R.A.Dyer*	LC	Dwarf shrub
MALVACEAE	*Sida chrysantha Ulbr.*	LC	Dwarf shrub
MALVACEAE	*Sida dregei Burtt Davy*	LC	Dwarf shrub, herb
MALVACEAE	*Sida rhombifolia L. subsp. rhombifolia*	LC	Dwarf shrub, herb, shrub
MALVACEAE	*Sida spinosa L. var. spinosa*	LC	Dwarf shrub, herb
MALVACEAE	*Sida ternata L.f.*	LC	Herb
MALVACEAE	*Triumfetta sonderi Ficalho & Hiern*	LC	Dwarf shrub
MARCHANTIACEAE	*Marchantia debilis K.I.Goebel*		Bryophyte
MELIACEAE	*Turraea obtusifolia Hochst.*	LC	Climber, shrub, tree
MENISPERMACEAE	*Antizoma angustifolia (Burch.) Miers ex Harv.*	LC	Climber

Family	Species	Threat status	Growth forms
MESEMBRYANTHEMACEAE	*Aptenia cordifolia (L.f.) Schwantes*	LC	Succulent
MOLLUGINACEAE	*Psammotropha mucronata (Thunb.) Fenzl var. mucronata*	LC	Herb
MOLLUGINACEAE	*Psammotropha myriantha Sond.*	LC	Herb
MORACEAE	*Ficus abutilifolia (Miq.) Miq.*	LC	Shrub, tree
MORACEAE	*Ficus ingens (Miq.) Miq.*	LC	Tree
MORACEAE	*Ficus salicifolia Vahl*	LC	Tree
MYRICACEAE	*Morella serrata (Lam.) Killick*	LC	Shrub, tree
MYROTHAMNACEAE	*Myrothamnus flabellifolius Welw.*	DDT	Dwarf shrub, shrub
MYRSINACEAE	*Myrsine africana L.*	LC	Shrub
OCHNACEAE	*Ochna pulchra Hook.f.*	LC	Shrub, tree
OLACACEAE	*Ximenia caffra Sond. var. caffra*	LC	Shrub, tree
OLEACEAE	*Jasminum quinatum Schinz*	LC	Climber, dwarf shrub
OLEACEAE	*Menodora africana Hook.*	LC	Dwarf shrub, herb
OLEACEAE	*Olea europaea L. subsp. africana (Mill.) P.S.Green*	LC	Shrub, tree
OLEANDRACEAE	*Oleandra distenta Kunze*	LC	Herb, lithophyte
OLINIACEAE	*Olinia emarginata Burtt Davy*	LC	Tree
ONAGRACEAE	*Epilobium hirsutum L.*	LC	Herb
ONAGRACEAE	*Oenothera affinis Cambess.*		Herb
ONAGRACEAE	*Oenothera rosea L'Hér. ex Aiton*		Herb
ONAGRACEAE	*Oenothera tetraptera Cav.*		Herb
OPHIOGLOSSACEAE	*Ophioglossum polyphyllum A.Braun*	LC	Geophyte, herb
ORCHIDACEAE	*Bonatea antennifera Rolfe*		[No lifeform defined]
ORCHIDACEAE	*Bonatea polypodantha (Rchb.f.) L.Bolus*	LC	Geophyte, herb
ORCHIDACEAE	*Disa aconitoides Sond. subsp. aconitoides*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia ovalis Lindl. var. bainesii (Rolfe) P.J.Cribb & la Croix*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia streptopetala Lindl.*	LC	Geophyte, herb, succulent
ORCHIDACEAE	*Habenaria mossii (G.Will.) J.C.Manning*	EN	Geophyte, herb
ORCHIDACEAE	*Habenaria tridens Lindl.*	LC	Geophyte, herb
OROBANCHACEAE	*Alectra orobanchoides Benth.*	LC	[No lifeform defined]
OROBANCHACEAE	*Cycnium adonense E.Mey. ex Benth.*	LC	Herb, parasite
OROBANCHACEAE	*Cycnium tubulosum (L.f.) Engl. subsp. tubulosum*	LC	Herb
OROBANCHACEAE	*Graderia subintegra Mast.*	LC	Herb, parasite, suffrutex
OROBANCHACEAE	*Harveya pumila Schltr.*	LC	Herb, parasite
OROBANCHACEAE	*Striga asiatica (L.) Kuntze*	LC	Herb, parasite
OROBANCHACEAE	*Striga elegans Benth.*	LC	Herb, parasite
OROBANCHACEAE	*Striga gesnerioides (Willd.) Vatke*	LC	Herb, parasite
OXALIDACEAE	*Oxalis corniculata L.*		Herb
OXALIDACEAE	*Oxalis depressa Eckl. & Zeyh.*	LC	Geophyte, succulent
OXALIDACEAE	*Oxalis latifolia Kunth*		Geophyte
OXALIDACEAE	*Oxalis obliquifolia Steud. ex A.Rich.*	LC	Geophyte
PAPAVERACEAE	*Papaver aculeatum Thunb.*	LC	Herb
PEDALIACEAE	*Harpagophytum zeyheri Decne. subsp. zeyheri*	LC	Herb
PEDALIACEAE	*Sesamum triphyllum Welw. ex Asch. var. triphyllum*	LC	Herb
PHYLLANTHACEAE	*Bridelia mollis Hutch.*	LC	Shrub, tree

Family	Species	Threat status	Growth forms
PHYLLANTHACEAE	*Phyllanthus incurvus Thunb.*	LC	Dwarf shrub, herb
PHYLLANTHACEAE	*Phyllanthus parvulus Sond. var. garipensis (E.Mey. ex Drège) Radcl.-Sm.*	LC	Dwarf shrub, herb
PHYLLANTHACEAE	*Phyllanthus parvulus Sond. var. parvulus*	LC	Dwarf shrub, herb
PHYTOLACCACEAE	*Phytolacca heptandra Retz.*	LC	Herb
PITTOSPORACEAE	*Pittosporum viridiflorum Sims*	LC	Shrub, tree
PLANTAGINACEAE	*Plantago longissima Decne.*	LC	Herb
PLANTAGINACEAE	*Plantago major L.*		Herb
PLUMBAGINACEAE	*Plumbago zeylanica L.*		Shrub
POACEAE	*Agrostis lachnantha Nees var. lachnantha*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. eckloniana (Nees) Gibbs Russ.*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. semialata*	LC	Graminoid
POACEAE	*Andropogon schirensis Hochst. ex A.Rich.*	LC	Graminoid
POACEAE	*Anthephora pubescens Nees*	LC	Graminoid
POACEAE	*Aristida aequiglumis Hack.*	LC	Graminoid
POACEAE	*Aristida bipartita (Nees) Trin. & Rupr.*	LC	Graminoid
POACEAE	*Aristida canescens Henrard subsp. canescens*	LC	Graminoid
POACEAE	*Aristida congesta Roem. & Schult. subsp. barbicollis (Trin. & Rupr.) De Winter*	LC	Graminoid
POACEAE	*Aristida congesta Roem. & Schult. subsp. congesta*	LC	Graminoid
POACEAE	*Aristida diffusa Trin. subsp. burkei (Stapf) Melderis*	LC	Graminoid
POACEAE	*Aristida junciformis Trin. & Rupr. subsp. junciformis*	LC	Graminoid
POACEAE	*Aristida scabrivalvis Hack. subsp. scabrivalvis*	LC	Graminoid
POACEAE	*Aristida spectabilis Hack.*	LC	Graminoid
POACEAE	*Aristida stipitata Hack. subsp. graciliflora (Pilg.) Melderis*	LC	Graminoid
POACEAE	*Aristida transvaalensis Henrard*	LC	Graminoid
POACEAE	*Bewsia biflora (Hack.) Gooss.*	LC	Graminoid
POACEAE	*Bothriochloa bladhii (Retz.) S.T.Blake*	LC	Graminoid
POACEAE	*Bothriochloa insculpta (Hochst. ex A.Rich.) A.Camus*	LC	Graminoid
POACEAE	*Brachiaria brizantha (A.Rich.) Stapf*	LC	Graminoid
POACEAE	*Brachiaria nigropedata (Ficalho & Hiern) Stapf*	LC	Graminoid
POACEAE	*Brachiaria serrata (Thunb.) Stapf*	LC	Graminoid
POACEAE	*Briza minor L.*		Graminoid
POACEAE	*Chrysopogon serrulatus Trin.*	LC	Graminoid
POACEAE	*Cymbopogon nardus (L.) Rendle*	LC	Graminoid
POACEAE	*Cynodon dactylon (L.) Pers.*	LC	Graminoid
POACEAE	*Digitaria brazzae (Franch.) Stapf*	LC	Graminoid
POACEAE	*Digitaria diagonalis (Nees) Stapf var. diagonalis*	LC	Graminoid
POACEAE	*Digitaria eriantha Steud.*	LC	Graminoid
POACEAE	*Digitaria longiflora (Retz.) Pers.*	LC	Graminoid
POACEAE	*Digitaria monodactyla (Nees) Stapf*	LC	Graminoid
POACEAE	*Digitaria ternata (A.Rich.) Stapf*	LC	Graminoid
POACEAE	*Digitaria tricholaenoides Stapf*	LC	Graminoid
POACEAE	*Diheteropogon amplectens (Nees) Clayton var. amplectens*	LC	Graminoid
POACEAE	*Echinochloa colona (L.) Link*	LC	Graminoid

Family	Species	Threat status	Growth forms
POACEAE	*Echinochloa jubata Stapf*	LC	Graminoid
POACEAE	*Ehrharta erecta Lam. var. erecta*	LC	Graminoid
POACEAE	*Elionurus muticus (Spreng.) Kunth*	LC	Graminoid
POACEAE	*Enneapogon pretoriensis Stent*	LC	Graminoid
POACEAE	*Enneapogon scoparius Stapf*	LC	Graminoid
POACEAE	*Eragrostis barbinodis Hack.*	LC	Graminoid
POACEAE	*Eragrostis capensis (Thunb.) Trin.*	LC	Graminoid
POACEAE	*Eragrostis chloromelas Steud.*	LC	Graminoid
POACEAE	*Eragrostis curvula (Schrad.) Nees*	LC	Graminoid
POACEAE	*Eragrostis gummiflua Nees*	LC	Graminoid
POACEAE	*Eragrostis heteromera Stapf*	LC	Graminoid
POACEAE	*Eragrostis lehmanniana Nees var. lehmanniana*	LC	Graminoid
POACEAE	*Eragrostis nindensis Ficalho & Hiern*	LC	Graminoid
POACEAE	*Eragrostis patentipilosa Hack.*	LC	Graminoid
POACEAE	*Eragrostis racemosa (Thunb.) Steud.*	LC	Graminoid
POACEAE	*Eragrostis rigidior Pilg.*	LC	Graminoid
POACEAE	*Eragrostis sclerantha Nees subsp. sclerantha*	LC	Graminoid
POACEAE	*Eragrostis superba Peyr.*	LC	Graminoid
POACEAE	*Eriochloa fatmensis (Hochst. & Steud.) Clayton*	LC	Graminoid
POACEAE	*Eustachys paspaloides (Vahl) Lanza & Mattei*	LC	Graminoid
POACEAE	*Fingerhuthia africana Lehm.*	LC	Graminoid
POACEAE	*Hemarthria altissima (Poir.) Stapf & C.E.Hubb.*	LC	Graminoid
POACEAE	*Heteropogon contortus (L.) Roem. & Schult.*	LC	Graminoid
POACEAE	*Hyparrhenia hirta (L.) Stapf*	LC	Graminoid
POACEAE	*Hyparrhenia tamba (Steud.) Stapf*	LC	Graminoid
POACEAE	*Imperata cylindrica (L.) Raeusch.*	LC	Graminoid
POACEAE	*Koeleria capensis (Steud.) Nees*	LC	Graminoid
POACEAE	*Leersia hexandra Sw.*	LC	Graminoid
POACEAE	*Loudetia flavida (Stapf) C.E.Hubb.*	LC	Graminoid
POACEAE	*Loudetia simplex (Nees) C.E.Hubb.*	LC	Graminoid
POACEAE	*Melica racemosa Thunb.*	LC	Graminoid
POACEAE	*Melinis nerviglumis (Franch.) Zizka*	LC	Graminoid
POACEAE	*Melinis repens (Willd.) Zizka subsp. repens*	LC	Graminoid
POACEAE	*Microchloa caffra Nees*	LC	Graminoid
POACEAE	*Panicum coloratum L. var. coloratum*	LC	Graminoid
POACEAE	*Panicum maximum Jacq.*	LC	Graminoid
POACEAE	*Panicum natalense Hochst.*	LC	Graminoid
POACEAE	*Paspalum distichum L.*	LC	Graminoid
POACEAE	*Paspalum scrobiculatum L.*	LC	Graminoid
POACEAE	*Paspalum urvillei Steud.*		Graminoid
POACEAE	*Phragmites australis (Cav.) Steud.*	LC	Graminoid
POACEAE	*Pogonarthria squarrosa (Roem. & Schult.) Pilg.*	LC	Graminoid
POACEAE	*Schizachyrium sanguineum (Retz.) Alston*	LC	Graminoid
POACEAE	*Setaria lindenbergiana (Nees) Stapf*	LC	Graminoid

Family	Species	Threat status	Growth forms
POACEAE	*Setaria megaphylla (Steud.) T.Durand & Schinz*	LC	Graminoid
POACEAE	*Setaria plicatilis (Hochst.) Hack. ex Engl.*	LC	Graminoid
POACEAE	*Setaria pumila (Poir.) Roem. & Schult.*	LC	Graminoid
POACEAE	*Setaria sphacelata (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. torta (Stapf) Clayton*	LC	Graminoid
POACEAE	*Sorghum versicolor Andersson*	LC	Graminoid
POACEAE	*Sporobolus discosporus Nees*	LC	Graminoid
POACEAE	*Sporobolus fimbriatus (Trin.) Nees*	LC	Graminoid
POACEAE	*Sporobolus nitens Stent*	LC	Graminoid
POACEAE	*Sporobolus stapfianus Gand.*	LC	Graminoid
POACEAE	*Stipa dregeana Steud. var. elongata (Nees) Stapf*	LC	Graminoid
POACEAE	*Stipagrostis uniplumis (Licht.) De Winter var. neesii (Trin. & Rupr.) De Winter*	LC	Graminoid
POACEAE	*Stipagrostis zeyheri (Nees) De Winter subsp. sericans (Hack.) De Winter*	LC	Graminoid
POACEAE	*Themeda triandra Forssk.*	LC	Graminoid
POACEAE	*Trachypogon spicatus (L.f.) Kuntze*	LC	Graminoid
POACEAE	*Tragus berteronianus Schult.*	LC	Graminoid
POACEAE	*Trichoneura grandiglumis (Nees) Ekman*	LC	Graminoid
POACEAE	*Tripogon minimus (A.Rich.) Steud.*	LC	Graminoid
POACEAE	*Triraphis andropogonoides (Steud.) E.Phillips*	LC	Graminoid
POACEAE	*Tristachya rehmannii Hack.*	LC	Graminoid
POACEAE	*Urelytrum agropyroides (Hack.) Hack.*	LC	Graminoid
POACEAE	*Urochloa panicoides P.Beauv.*		Graminoid
POLYGALACEAE	*Polygala albida Schinz subsp. albida*	LC	Herb
POLYGALACEAE	*Polygala hottentotta C.Presl*	LC	Dwarf shrub, herb
POLYGALACEAE	*Polygala krumanina Burch. ex Ficalho & Hiern*	LC	Shrub
POLYGALACEAE	*Polygala producta N.E.Br.*	LC	Dwarf shrub, herb
POLYGALACEAE	*Polygala transvaalensis Chodat subsp. transvaalensis*	LC	Herb
POLYGONACEAE	*Oxygonum dregeanum Meisn. subsp. canescens (Sond.) Germish. var. canescens*	LC	Herb
PORTULACACEAE	*Anacampseros subnuda Poelln. subsp. subnuda*	LC	Herb, succulent
PORTULACACEAE	*Portulaca quadrifida L.*	LC	Herb, succulent
POTAMOGETONACEAE	*Potamogeton pusillus L.*	LC	Herb, hydrophyte
POTAMOGETONACEAE	*Potamogeton schweinfurthii A.Benn.*	LC	Herb, hydrophyte
POTTIACEAE	*Barbula bolleana (Müll.Hal.) Broth.*		Bryophyte
POTTIACEAE	*Didymodon tophaceus (Brid.) Lisa*		Bryophyte
POTTIACEAE	*Timmiella pelindaba Magill*		Bryophyte
POTTIACEAE	*Tortella humilis (Hedw.) Jenn.*		Bryophyte, epiphyte
POTTIACEAE	*Tortella xanthocarpa (Schimp. ex Müll.Hal.) Broth.*		Bryophyte, epiphyte
POTTIACEAE	*Trichostomum brachydontium Bruch*		Bryophyte
PROTEACEAE	*Faurea saligna Harv.*	LC	Tree
PROTEACEAE	*Protea caffra Meisn. subsp. caffra*	LC	Shrub, tree
PROTEACEAE	*Protea gaguedi J.F.Gmel.*	LC	Shrub, tree
PROTEACEAE	*Protea roupelliae Meisn. subsp. roupelliae*	LC	Tree
PROTEACEAE	*Protea welwitschii Engl.*	LC	Dwarf shrub, shrub
PTERIDACEAE	*Adiantum capillus-veneris L.*	LC	Geophyte, herb, lithophyte

Family	Species	Threat status	Growth forms
PTERIDACEAE	*Pteris cretica L.*	LC	Geophyte, herb, lithophyte
PTERIDACEAE	*Pteris vittata L.*	LC	Geophyte, herb, lithophyte
RACOPILACEAE	*Racopilum capense Müll.Hal. ex Broth.*		Bryophyte, epiphyte
RANUNCULACEAE	*Clematis brachiata Thunb.*	LC	Climber
RANUNCULACEAE	*Ranunculus multifidus Forssk.*		Herb
RHAMNACEAE	*Berchemia zeyheri (Sond.) Grubov*	LC	Tree
RHAMNACEAE	*Helinus integrifolius (Lam.) Kuntze*	LC	Climber, shrub
RHAMNACEAE	*Rhamnus prinoides L'Hér.*	LC	Shrub, tree
RHAMNACEAE	*Ziziphus mucronata Willd. subsp. mucronata*	LC	Shrub, tree
RHAMNACEAE	*Ziziphus zeyheriana Sond.*	LC	Dwarf shrub
RICCIACEAE	*Riccia albolimbata S.W.Arnell*		Bryophyte
RICCIACEAE	*Riccia atropurpurea Sim*		Bryophyte
RICCIACEAE	*Riccia congoana Steph.*		Bryophyte
RICCIACEAE	*Riccia okahandjana S.W.Arnell*		Bryophyte
RICCIACEAE	*Riccia simii Perold*		Bryophyte
ROSACEAE	*Agrimonia procera Wallr.*	LC	Herb
ROSACEAE	*Duchesnea indica (Andrews) Focke*		Herb
ROSACEAE	*Rubus rigidus Sm.*	LC	Shrub
RUBIACEAE	*Afrocanthium gilfillanii (N.E.Br.) Lantz*	LC	[No lifeform defined]
RUBIACEAE	*Anthospermum hispidulum E.Mey. ex Sond.*	LC	Dwarf shrub
RUBIACEAE	*Anthospermum rigidum Eckl. & Zeyh. subsp. pumilum (Sond.) Puff*	LC	Dwarf shrub
RUBIACEAE	*Anthospermum rigidum Eckl. & Zeyh. subsp. rigidum*	LC	Dwarf shrub
RUBIACEAE	*Kohautia amatymbica Eckl. & Zeyh.*	LC	Herb
RUBIACEAE	*Kohautia caespitosa Schnizl. subsp. brachyloba (Sond.) D.Mantell*	LC	Herb
RUBIACEAE	*Kohautia cynanchica DC.*	LC	Herb
RUBIACEAE	*Kohautia virgata (Willd.) Bremek.*	LC	Herb
RUBIACEAE	*Oldenlandia herbacea (L.) Roxb. var. herbacea*	LC	Herb
RUBIACEAE	*Otiophora calycophylla (Sond.) Schltr. & K.Schum. subsp. calycophylla*	LC	Herb
RUBIACEAE	*Pavetta gardeniifolia A.Rich. var. gardeniifolia*	LC	Shrub, tree
RUBIACEAE	*Pavetta gardeniifolia A.Rich. var. subtomentosa K.Schum.*	LC	Shrub, tree
RUBIACEAE	*Pavetta zeyheri Sond. subsp. zeyheri*	LC	Shrub, tree
RUBIACEAE	*Pentanisia angustifolia (Hochst.) Hochst.*	LC	Herb
RUBIACEAE	*Pygmaeothamnus zeyheri (Sond.) Robyns var. zeyheri*	LC	Dwarf shrub
RUBIACEAE	*Richardia brasiliensis Gomes*		Herb
RUBIACEAE	*Rubia horrida (Thunb.) Puff*	LC	Herb
RUBIACEAE	*Rubia petiolaris DC.*	LC	Scrambler
RUBIACEAE	*Spermacoce senensis (Klotzsch) Hiern*	LC	Herb
RUBIACEAE	*Tricalysia lanceolata (Sond.) Burtt Davy*	LC	Shrub, tree
RUBIACEAE	*Vangueria infausta Burch. subsp. infausta*	LC	Tree
RUBIACEAE	*Vangueria parvifolia Sond.*		Tree
RUTACEAE	*Calodendrum capense (L.f.) Thunb.*	LC	Tree
RUTACEAE	*Zanthoxylum capense (Thunb.) Harv.*	LC	Shrub, tree
SALICACEAE	*Dovyalis zeyheri (Sond.) Warb.*	LC	Shrub, tree

Family	Species	Threat status	Growth forms
SALICACEAE	*Salix babylonica L. var. babylonica*		Tree
SALICACEAE	*Salix mucronata Thunb. subsp. woodii (Seemen) Immelman*	LC	Tree
SALICACEAE	*Scolopia zeyheri (Nees) Harv.*	LC	Shrub, tree
SANTALACEAE	*Osyris lanceolata Hochst. & Steud.*	LC	Shrub
SANTALACEAE	*Thesium costatum A.W.Hill var. costatum*	LC	Herb, parasite
SANTALACEAE	*Thesium transvaalense Schltr.*	LC	Dwarf shrub, herb, parasite
SAPINDACEAE	*Pappea capensis Eckl. & Zeyh.*	LC	Shrub, tree
SAPOTACEAE	*Englerophytum magalismontanum (Sond.) T.D.Penn.*	LC	Shrub, tree
SAPOTACEAE	*Mimusops zeyheri Sond.*	LC	Shrub, tree
SCROPHULARIACEAE	*Chaenostoma floribundum Benth.*	LC	Herb
SCROPHULARIACEAE	*Chaenostoma leve (Hiern) Kornhall*	LC	Herb
SCROPHULARIACEAE	*Diclis petiolaris Benth.*	LC	Herb
SCROPHULARIACEAE	*Halleria lucida L.*	LC	Shrub, tree
SCROPHULARIACEAE	*Jamesbrittenia atropurpurea (Benth.) Hilliard subsp. atropurpurea*	LC	Dwarf shrub, shrub
SCROPHULARIACEAE	*Nemesia fruticans (Thunb.) Benth.*	LC	Dwarf shrub, suffrutex
SCROPHULARIACEAE	*Nemesia rupicola Hilliard*	LC	Herb
SCROPHULARIACEAE	*Selago densiflora Rolfe*	LC	Herb
SCROPHULARIACEAE	*Veronica anagallis-aquatica L.*	LC	Herb, hydrophyte
SCROPHULARIACEAE	*Zaluzianskya elongata Hilliard & B.L.Burtt*	LC	Herb
SELAGINELLACEAE	*Selaginella caffrorum (Milde) Hieron. var. caffrorum*	LC	Geophyte, herb, lithophyte
SELAGINELLACEAE	*Selaginella mittenii Baker*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes dolomiticola (Schelpe) Schelpe & N.C.Anthony*	LC	Herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes eckloniana (Kunze) Mett.*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes hirta Sw. var. hirta*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes inaequalis (Kunze) Mett. var. inaequalis*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes involuta (Sw.) Schelpe & N.C.Anthony var. obscura (N.C.Anthony) N.C.Anthony*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes marlothii (Hieron.) Domin*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes pentagona Schelpe & N.C.Anthony*	LC	Herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes viridis (Forssk.) Sw. var. glauca (Sim) Schelpe & N.C.Anthony*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes viridis (Forssk.) Sw. var. viridis*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Pellaea calomelanos (Sw.) Link var. calomelanos*	LC	Geophyte, herb, lithophyte
SOLANACEAE	*Lycium cinereum Thunb.*	LC	Dwarf shrub, shrub
SOLANACEAE	*Nicotiana glauca Graham*		Shrub, tree
SOLANACEAE	*Solanum lichtensteinii Willd.*	LC	Dwarf shrub, shrub
SOLANACEAE	*Solanum panduriforme E.Mey.*	LC	Dwarf shrub, herb, shrub
SOLANACEAE	*Solanum retroflexum Dunal*	LC	Herb
SOLANACEAE	*Solanum rigescens Jacq.*	LC	[No lifeform defined]
SOLANACEAE	*Solanum sisymbriifolium Lam.*		Herb, shrub
SOLANACEAE	*Withania somnifera (L.) Dunal*	LC	Dwarf shrub, herb, shrub
STRYCHNACEAE	*Strychnos usambarensis Gilg*	LC	Climber, shrub, tree
TARGIONIACEAE	*Targionia hypophylla L.*		Bryophyte
TECOPHILAEACEAE	*Walleria nutans J.Kirk*	LC	Geophyte
THELYPTERIDACEAE	*Christella dentata (Forssk.) Brownsey & Jermy*	LC	Geophyte, herb

Family	Species	Threat status	Growth forms
THELYPTERIDACEAE	*Thelypteris confluens (Thunb.) C.V.Morton*	LC	Geophyte, herb, hydrophyte
THYMELAEACEAE	*Gnidia capitata L.f.*	LC	Dwarf shrub, shrub
THYMELAEACEAE	*Gnidia microcephala Meisn.*	LC	Dwarf shrub, shrub
THYMELAEACEAE	*Gnidia sericocephala (Meisn.) Gilg ex Engl.*	LC	Dwarf shrub, shrub
TYPHACEAE	*Typha capensis (Rohrb.) N.E.Br.*	LC	Herb, hydrophyte, hyperhydate
URTICACEAE	*Obetia tenax (N.E.Br.) Friis*	LC	Shrub, succulent, tree
URTICACEAE	*Pouzolzia mixta Solms var. mixta*	LC	Shrub, succulent, tree
VALERIANACEAE	*Valeriana capensis Thunb. var. capensis*	LC	Herb
VELLOZIACEAE	*Xerophyta humilis (Baker) T.Durand & Schinz*	LC	Herb
VELLOZIACEAE	*Xerophyta retinervis Baker*	LC	Herb
VELLOZIACEAE	*Xerophyta viscosa Baker*	LC	Herb
VERBENACEAE	*Chascanum hederaceum (Sond.) Moldenke var. hederaceum*	LC	Herb
VERBENACEAE	*Chascanum pinnatifidum (L.f.) E.Mey. var. pinnatifidum*	LC	Herb
VERBENACEAE	*Duranta erecta L.*		Shrub
VERBENACEAE	*Lantana rugosa Thunb.*	LC	Shrub
VERBENACEAE	*Lippia javanica (Burm.f.) Spreng.*	LC	Shrub
VERBENACEAE	*Priva meyeri Jaub. & Spach var. meyeri*	LC	Herb
VERBENACEAE	*Verbena aristigera S.Moore*		Herb
VERBENACEAE	*Verbena officinalis L.*		Herb
VERRUCARIACEAE	*Catapyrenium lachneum (Ach.) R.Sant. var. lachneum*		Lichen
VISCACEAE	*Viscum combreticola Engl.*	LC	Parasite, shrub, succulent
VISCACEAE	*Viscum rotundifolium L.f.*	LC	Parasite, shrub, succulent
VISCACEAE	*Viscum verrucosum Harv.*	LC	Parasite, shrub, succulent
VITACEAE	*Cyphostemma lanigerum (Harv.) Desc. ex Wild & R.B.Drumm.*	LC	Climber, succulent
VITACEAE	*Cyphostemma sulcatum (C.A.Sm.) J.J.M.van der Merwe*	LC	Scrambler, succulent
VITACEAE	*Cyphostemma woodii (Gilg & M.Brandt) Desc.*	LC	Herb, succulent
VITACEAE	*Rhoicissus tridentata (L.f.) Wild & R.B.Drumm. subsp. cuneifolia (Eckl. & Zeyh.) Urton*		Climber
VITACEAE	*Rhoicissus tridentata (L.f.) Wild & R.B.Drumm. subsp. tridentata*		Shrub
ZYGOPHYLLACEAE	*Tribulus terrestris L.*	LC	Herb

Table 37: Wild Mammals of Gauteng considered to be threatened according to the IUCN Species Survival Commission (2000) and species that are endemic to South Africa (GDACE, 2004)

Species	English Name	Endemic to SA	IUCN Status
	ORDER: INSECTIVORA		
Family: Soricidae			
Myosorex varius	Forest Shrew	Y	
Family: Chrysochloridae			
Chrysospalax villosus	Rough-haired golden mole	Y	VU B1+2c
Amblysomus hottentotus	Hottentot golden mole	Y	
Amblysomus julianae	Juliana's golden mole	Y	CR B1+2c
	ORDER: CHIROPTERA		
Family: Vespertilionidae			
Miniopterus schreibersii	Schreiber's long-fingered bat	N	LR/nt
Rhinolophus blasii	Peak-saddle horseshoe bat	N	LR/nt
Family: Hipposideridae			
Cloeotis percivalli	Short-eared trident bat	N	LR/nt
	ORDER: RODENTIA		
Family Pedetidae			
Pedetes capensis	Springhare	N	VU A1cd
Family: Muridae			
Dasymys incomtus	Water rat	N	DD
Rhabdomys pumilio	Striped mouse	N	DD
Mystromys albicaudatus	White-tailed rat	Y	EN A3c
	ORDER: CARNIVORA		
Family: Hyaenidae			
Hyaena brunnea	Brown hyaena	N	LR/nt
Family: Felidae			
Acinonyx jubatus	Cheetah	N	VUC2a(i)
Panthera pardus	Leopard	N	
Panthera leo	Lion	N	VUC2a(i)
Felis nigripes	Small spotted cat	N	VUC2a(i)
Family: Canidae			
Lycaon pictus	Wild dog	N	EN C1
Family: Mustelidae			
Lutra maculicollis	Spotted-necked otter	N	VuA1c
	ORDER: PERISSODACTYLA		
Family: Rhinocerotidae			
Ceratotherium simum	White rhinoceros	N	NT
Family: Equidae			
Equus zebra hartmannae	Hartmann's zebra	Exotic	EN A1b
	ORDER ARTIODACTYLA		
Family: Giraffidae			
Giraffa camelopardalis	Giraffe	N	LR/cd
Family: Bovidae			
Tragelaphus angasii	Nyala	N	LR/cd
Tragelaphus strepsiceros	Kudu	N	LR/cd
Taurotragus oryx	Eland	N	LR/cd
Redunca arundinum	Reedbuck	N	LR/cd
Kobus ellipsiprymnus	Waterbuck	N	LR/cd
Hippotragus niger	Sable antelope	N	LR/cd
Hippotragus equinus	Roan antelope	N	LR/cd
Oryx gazella	Gemsbok	N	LR/cd
Syncerus caffer	African buffalo	N	LR/cd
Connochaetes gnou	Black wildebeest	Y	
Connochaetes taurinus	Blue wildebeest	N	LR/cd
Alcelaphus buselaphus	Red hartebeest	N	LR/cd
Damaliscus dorcas phillipsi	Blesbok	Y	LR/cd
Damaliscus lunatus	Tsessebe	N	LR/cd
Aepyceros melampus melampus	Impala	N	LR/cd

Species	English Name	Endemic to SA	IUCN Status
Antidorcas marsupialis	Springbok	N	LR/cd
Oreotragus oreotragus	Klipspringer	N	LR/cd
Ourebia ourebi	Oribi	N	LR/cd
Pelea capreolus	Grey rhebok	Y	

Table 38: Threatened bird species that are priorities in Gauteng (GDACE, 2004)

English name	Species	Threatened Status
Cape Vulture	*Gyps coprotheres*	VU
Blue Crane	*Anthropoides paradiseus*	VU
Lesser Kestrel	*Falco naumanni*	VU
Grass Owl	*Tyto capensis*	VU
African Marsh Harrier	*Circus ranivorus*	VU
White-backed Night Heron	*Gorsachius leuconotus*	VU
White-bellied Korhaan	*Eupodotis cafra*	VU
Martial Eagle	*Polemaetus bellicosus*	VU
African Finfoot	*Podica senegalensis*	VU
Blue Korhaan	*Eupodotis caerulescens*	NT
Melodious Lark	*Mirafra cheniana*	NT
Lesser Flamingo	*Phoenicopterus minor*	NT
Secretarybird	*Sagittarius serpentarius*	NT
Black Stork	*Ciconia nigra*	NT
Lanner Falcon	*Falco biarmicus*	NT
Half-collared Kingfisher	*Alcedo semitorquata*	NT
Greater Flamingo	*Phoenicopterus ruber*	NT
Yellow-billed Stork	*Mycteria ibis*	NT
Red-billed Oxpecker	*Buphagus erythrorhynchus*	NT

Table 39: Gauteng Province Threatened, Rare and of conservation concern Invertebrates (GDACE, 2004)

Species	Taxon	IUCN Red List Status	SA Red Data Book Status*	Preliminary Regional Assessment	Gauteng endemic
			Butterflies		
Aloeides dentatis dentatis	Butterfly	VUD2	Endangered/CD		Yes
Chrysoritis aureus	Butterfly	LR/nt	Endangered/CD		Near (Gauteng, OFS)
Metisella meninx	Butterfly	NE	Vulnerable		No
Gegenes hottentota	Butterfly	NE	Data deficient		No
			Spiders		
Harpactirella flavipilosa	Baboon spider	NE	NE	Data Deficient	No
Harpactira hamiltoni	Baboon spider	NE	NE: In Nature Conservation Ordinance 1983	Rare	Near (Gauteng, OFS, KZN)
Pycnacantha tribulus	Spider	NE	NE	Very Rare	No
Brachionopus pretoriae	Trapdoor spider	NE	NE	Data Deficient	Yes
Idiops fryi	Trapdoor spider	NE	NE	Rare	Near (Gauteng, OFS)
Idiops pretoriae	Trapdoor spider	NE	NE	Rare	Yes
Idiops gunningi	Trapdoor spider	NE	NE	Rare	Yes
Homostola pardalina	Trapdoor spider	NE	NE	Rare	Near (Gauteng, Mpumalanga)
Homostola zebrina	Trapdoor spider	NE	NE	Data Deficient	No
Galeosoma hirsutum	Trapdoor spider	NE	NE	Rare	Yes
Galeosoma pilosum	Trapdoor spider	NE	NE	Rare	Yes
Galeosoma robertsi	Trapdoor spider	NE	NE	Rare	Yes
Galeosoma planiscutatum	Trapdoor spider	NE	NE	Rare	Yes
Galeosoma pallidum	Trapdoor spider	NE	NE	Rare	Yes
Galeosoma scutatum	Trapdoor spider	NE	NE	Rare	Yes
Segregara monticola	Trapdoor spider	NE	NE	Rare	Yes
Segregara transvaalensis	Trapdoor spider	NE	NE	Rare	No
Moggridgea paucispina	Trapdoor spider	NE	NE	Rare	No
Ancylotrypa nuda	Trapdoor spider	NE	NE	Data deficient	Near (Gauteng, NW province)
Ancylotrypa rufescens	Trapdoor spider	NE	NE	Rare	Yes
Ancylotrypa brevipalpis	Trapdoor spider	NE	NE	Rare	Near (Gauteng, NW province)
Ancylotrypa pretoriae	Trapdoor spider	NE	NE	Data deficient	Near (Gauteng, NW province)
Gorgyrella schreineri minor	Trapdoor spider	NE	NE	Data deficient	Yes
Stasimopus robertsi	Trapdoor spider	NE	NE	Rare	No
Stasimopus suffucus	Trapdoor spider	NE	NE	Rare	Yes
Stasimopus oculatus	Trapdoor spider	NE	NE	Rare	No
Calommata simoni	Trapdoor spider	NE	NE	Very Rare	Yes
			Scorpions		
Hadogenes gunningi	Scorpion	NE	NE	Threatened	Near (Gauteng, NW province)
Hadogenes gracilis	Scorpion	NE	NE	Threatened	Marginal in Gauteng (NW province species)
Hadogenes longimanus	Scorpion	NE		Threatened	Marginal in Gauteng (Mpumalanga species)
Opistophthalmus pugnax	Scorpion	NE	NE	Endangered	Near (Gauteng, NW province)

Species	Taxon	IUCN Red List Status	SA Red Data Book Status*	Preliminary Regional Assessment	Gauteng endemic
			Beetles		

Species	Taxon	IUCN Red List Status	SA Red Data Book Status*	Preliminary Regional Assessment	Gauteng endemic
Ichnestoma stobbiai	Fruit Chafer beetle		NE	Preliminary Evaluation using IUCN software: Critically Endangered	Yes
Trichocephala brincki	Fruit Chafer beetle		NE	Preliminary Evaluation using IUCN software: Vulnerable	Near (Gauteng, NW province)

APPENDIX C: Vegetation Index Score

Vegetation Index Score-Habitat unit 1 Wetland Habitat

EVC=[[(EVC1+EVC2)/2]

EVC 1 - Percentage natural vegetation cover:

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Site score						X
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score	0	Very Low	Low	Moderately	High	Very High
Site score			X			
EVC 2 score	0	1	2	3	4	5

SI=(SI1+SI2+SI3+SI4)/4)

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous							X	X
Clumped								
Scattered				X		X		
Sparse	X	X	X		X			

Present State (P/S) = Currently applicable for each habitat unit

Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

PVC=[(EVC)-((exotic x 0.7) + (bare ground x 0.3))

Percentage vegetation cover (exotic):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %			X			
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %	X					
PVC Score	0	1	2	3	4	5

RIS

Extent of indigenous species recruitment	**0**	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
				X		
RIS	**0**	**1**	**2**	**3**	**4**	**5**

VIS = [(EVC)+((SIxPVC)+(RIS))] = 11.75

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
12.5 to 15	**A**	Unmodified, natural
10 to 12.5	**B**	Largely natural with few modifications.
7.5 to 10	**C**	Moderately modified
5 to 7.5	**D**	Largely modified
2.5 to 5	**E**	The loss of natural habitat extensive
<2.5	**F**	Modified completely

Vegetation Index Score-Habitat unit 2 Open veld

EVC=[[(EVC1+EVC2)/2]

EVC 1 - Percentage natural vegetation cover:

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Site score				X		
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score	0	Very Low	Low	Moderately	High	Very High
Site score				X		
EVC 2 score	0	1	2	3	4	5

SI=(SI1+SI2+SI3+SI4)/4)

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous								X
Clumped				X		X	X	
Scattered			X		X			
Sparse	X	X						

Present State (P/S) = Currently applicable for each habitat unit

Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

PVC=[(EVC)-((exotic x 0.7) + (bare ground x 0.3))

Percentage vegetation cover (exotic):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %			X			
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %				X		
PVC Score	0	1	2	3	4	5

RIS

Extent of indigenous species recruitment	**0**	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
					X	
RIS	**0**	**1**	**2**	**3**	**4**	**5**

VIS = [(EVC)+((SIxPVC)+(RIS))] = 8.5

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
12.5 to 15	**A**	Unmodified, natural
10 to 12.5	**B**	Largely natural with few modifications.
7.5 to 10	**C**	Moderately modified
5 to 7.5	**D**	Largely modified
2.5 to 5	**E**	The loss of natural habitat extensive
<2.5	**F**	Modified completely

Vegetation Index Score-Habitat unit 3 Transformed

1. *EVC=[[(EVC1+EVC2)/2]*

EVC 1 - Percentage natural vegetation cover:

Vegetation cover %	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Site score		X				
EVC 1 score	0	1	2	3	4	5

EVC2 - Total site disturbance score:

Disturbance score	0	Very Low	Low	Moderately	High	Very High
Site score						X
EVC 2 score	0	1	2	3	4	5

2. *SI=(SI1+SI2+SI3+SI4)/4)*

	Trees (SI1)		Shrubs (SI2)		Forbs (SI3)		Grasses (SI4)	
Score:	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State	Present State	Perceived Reference State
Continuous								X
Clumped								
Scattered			X	X		X		
Sparse	X	X			X		X	

Present State (P/S) = Currently applicable for each habitat unit

Perceived Reference State (PRS) = If in pristine condition

Each SI score is determined with reference to the following scoring table of vegetation distribution for present state versus perceived reference state.

	Present state (P/S)			
Perceived Reference state (PRS)	Continuous	Clumped	Scattered	Sparse
Continuous	3	2	1	0
Clumped	2	3	2	1
Scattered	1	2	3	2
Sparse	0	1	2	3

Percentage vegetation cover (exotic):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %		X				
PVC Score	0	1	2	3	4	5

Percentage vegetation cover (bare ground):

	0%	1-5%	6-25%	26-50%	51-75%	76-100%
Vegetation cover %						X
PVC Score	0	1	2	3	4	5

PVC=[(EVC)-((exotic x 0.7) + (bare ground x 0.3))

RIS

Extent of indigenous species recruitment	**0**	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
	X					
RIS	**0**	**1**	**2**	**3**	**4**	**5**

VIS = [(EVC)+((SIxPVC)+(RIS))] = 4.6

The final VIS scores for each habitat unit are then categorised as follows:

Vegetation Index Score	Assessment Class	Description
12.5 to 15	**A**	Unmodified, natural
10 to 12.5	**B**	Largely natural with few modifications.
7.5 to 10	**C**	Moderately modified
5 to 7.5	**D**	Largely modified
2.5 to 5	**E**	The loss of natural habitat extensive
<2.5	**F**	Modified completely

APPENDIX D

Additional information on Hypoxis hemerocallidea and Boophane disticha found on the proposed development site

&

Proposed medicinal plant rescue plan for the Hypoxis hemerocallidea and Boophane disticha, found on the proposed development site

***Hypoxis hemerocallidae* (= *H. rooperi*) – Star flower (Eng.), Gifbol (Afr.) (Hypoxidaceae)**

Figure 38: *Hypoxis hemerocallidea*

Hypoxis hemerocallidae is a perennial herb widely found in grasslands and woodlands. It reaches a length of up to 400mm. It has a large tuber, measuring 25-70 mm in diameter that is covered with bristly hairs. The leaves are arranged in 3 ranks, measuring 600-950 x 10-50 mm. They are carried erect and are soft sickle-shaped, keeled, with prominent ribs, and tapering tips. Dense white hairs are on the surface, margins and keel of the leaves. There are 6-16 bright yellow, star-shaped flowers per stem, each ± 50mm in diameter, which open at first light and close at midday. They appear on many slender, erect stems, almost as long as the leaves from August to April. The leaves are used to make lasting rope, and the bulb is used to blacken floors. Used in traditional medicine to treat headaches, dizziness, mental disorders and, in western medicine, to treat cancers, inflammation and HIV. It is incorrectly known as African Potato. It makes an attractive, hardy garden plant.

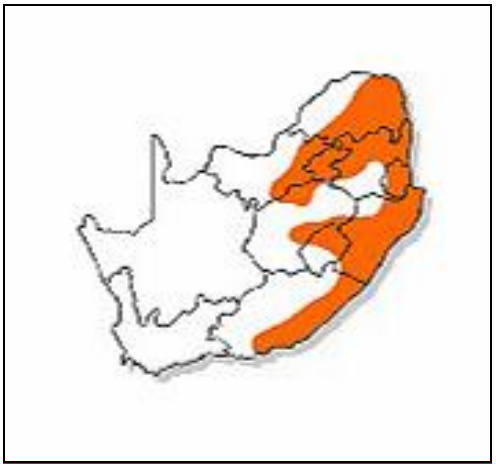

Figure 39: Distribution of *Hypoxis hemerocallidea* within South Africa (Van Wyk, et al., 1997, Briza Botanical Library, The Modern Publishers, Roosevelt Park)

Proposed medicinal plant rescue plan for the *Orange Data Listed* plant species, *Hypoxis hemerocallidea,* found on the proposed development site

Introduction

As this plant species is "Orange Listed", the requirement for in situ conservation does not have to be enforced[6]; however, it is recommended that individuals should be removed and rescued as part of a medicinal plant rescue operation prior to commencement of developmental activities.

Hypoxis hemerocallidea is a relatively hardy bulbous plant with a relatively shallow root structure; it is easily dug up and takes readily to relocation within areas of similar habitat and soil types. A rescue and relocation plan is perceived to be a viable mitigation measure to ensure the ongoing survival of this species within the area.

Methods & Materials

An appropriate service provider should be allocated to manage the operation that will entail the identification and marking of all of the individuals that fall outside of the appointed open areas designated with high sensitivity (wetland areas). The dimensions of the hole to be dug to safely remove each individual plant will be established, and the plants will be dug up and placed in propagating bags of appropriate sizes. Soil from the site will be used to fill the bags. These individuals should then be relocated to open space areas. The remaining individual plants will be allocated to recognised organisations that would require medicinal plant propagation and usage.

[6] Michele Pfab, GDACE, Conservation, Nov 2007.

***Boophone disticha* = entury plant, poison bulb, sore-eye flower (Eng.); perdeskop, seerooglelie (Afr.); Kxutsana-yanaha, Motlatsisa (Se Sotho); Incumbe, Siphahluka (Swazi); Incotho, Incwadi (Xhosa, Zulu); Ibhade (Zulu)**

Figure 40: *Boophone disticha*

The greyish green leaves are erect, arranged in a conspicuous fan and are usually produced after flowering. This spring-flowering species will flower even if it does not receive any water in winter**.** The bulb is very poisonous**.**

This plant thrives in full sun in well-drained, sandy soil and also in rocky areas. The species should be planted in a protected area, although it can stand drought, it does not like frost. The bulb should be planted in such a way that the neck and part of the bulb show above the ground. The plants seem to grow equally well in well-drained, sandy soil and in hard ground, but they take a long time to flower after being moved (www.plantzafrica.co.za).

Transplanting guidelines include[7]:

- The soil a few centimetres should be loosened to ensure no damage to the bulb.
- Removed bulbs should be dried for a period of two weeks.
- After drying the bulbs should be potted with a potting mixture consisting of 2/3 potting soil and 1/3 course sand. The plants should be planted at the same depth as they were when they were removed.
- Once the potted plants are established they should be placed at the site for a week.
- Soil preparartion should entail the removal of a plug of soil the size of the pot. The bulb should then be inserted with the potting soil.
- Watering of the bulbs should continue until establishment of the plants is noted.

[7] Final environmental impact report. Eskom transmission proposed Gamma Sub-station EIA: 12/12/20/873.