

# VEGETATION AND FLORA ASSESSMENT: Various Portions of the Farm Rooikoppies 297-IQ, Rustenburg, North West Province



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# Declaration of Independence & Summary of Expertise

## Appointment of specialist

David Hoare of David Hoare Consulting (Pty) Ltd was commissioned by Seaton Thomson Associates to provide specialist consulting services for the Environmental Impact Assessment for the proposed development of the Doornpoort Extension 50 sewer network on the Farm Doornpoort 295-JR, Tshwane, Gauteng Province. The consulting services comprise a description of the flora and vegetation in the study area.

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## Summary of expertise

Dr David Hoare:

- Dr Hoare has majors in Botany and Zoology from Rhodes University, Grahamstown, an Honours Degree in Botany from Rhodes University, an MSc from the Department of Plant Science, University of Pretoria, and a PhD in Botany from the Nelson Mandela Metropolitan University, Port Elizabeth.
- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science, Botanical Science), registration number 400221/05.
- Founded David Hoare Consulting (Pty) Ltd, an independent consultancy, in 2001.
- Ecological consultant since 1995, with working experience in Gauteng, Mpumalanga, Limpopo, North West, Eastern Cape, Western Cape, Northern Cape and Free State Provinces, Tanzania, Kenya, Mozambique, Zimbabwe, Zambia, Botswana and Swaziland.
- Conducted over 500 specialist ecological surveys as an ecological consultant. Areas of specialization include general ecology, biodiversity assessments, vegetation description and mapping, plant species surveys, and alien invasive surveys and management. Has undertaken work in grassland, thicket, forest, savannah, fynbos, coastal vegetation, wetlands and Nama-Karoo vegetation.
- Published six technical scientific reports, 15 scientific conference presentations, seven book chapters and eight refereed scientific papers.
- Attended 15 national and international congresses & 5 expert workshops, lectured vegetation science / ecology at 2 universities and referee for 2 international journals.

## Independence

David Hoare Consulting (Pty) Ltd and its Directors have no connection with the proponent. David Hoare Consulting (Pty) Ltd is not a subsidiary, legally or financially, of the proponent. Remuneration for services by the proponent in relation to this project is not linked to approval by decision-making authorities responsible for authorising this proposed project and the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project. David Hoare Consulting (Pty) Ltd is an independent consultant to Seaton Thomson & Associates and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work.

## Indemnity and conditions relating to this report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. David Hoare Consulting cc and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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## Introduction

This document presents the results of the flora and vegetation assessment of the study site, based on a desktop and field assessment, as well as mapping from aerial imagery.

On 22 July 2019 David Hoare Consulting (Pty) Ltd was appointed by Seaton Thomson & Associates to undertake a description and assessment of the flora and vegetation of the site.

The requirement of the study was to assess the sensitivity of the vegetation of the site and to assess the possibility of any threatened plant species occurring there.

### Terms of reference and approach

The intention of the study was to provide an assessment of potentially sensitive vegetation or plant species features on site that may be negatively impacted by development of the site. The study was to include a site visit to assess the habitat on site with the view of making judgements on:

1. the condition of the vegetation on site;
2. the sensitivity and conservation value of vegetation on site;
3. the suitability of habitat for threatened plant species.

The study was to cover the remaining areas of natural vegetation on the site. The following information was to be provided in the report:

- To provide a description of the broad vegetation types and/or habitats for the area, including any areas of potential conservation value. This will be based on published sources, including the vegetation map of South Africa (Mucina et al. 2006), the National Spatial Biodiversity Assessment and any Biodiversity Conservation Plans that exist for Gauteng Province.
- To provide the national conservation status of major vegetation types in which the study sites are located, as listed in The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).
- To provide an assessment of the Red and Orange List (threatened, near threatened and declining) flora species within North West Province and more specifically those that could occur in the project study area, including information on habitats in which they are most likely to be encountered.
- To investigate the potential presence of trees protected according to the National Forests Act and flora protected under the National Environmental Management: Biodiversity Act.



- To provide a list of the declared weeds or alien invader species on site, as listed according to the National Environmental Management: Biodiversity Act (NEM:BA; Act 10 of 2004). In terms of this Act alien invasive species are listed in one of the following categories:

<b>Definitions of NEM:BA Categories</b>	
Category 1a Listed Invasive Species	<p><b>Species requiring compulsory control:</b></p> <p>Species listed by notice in terms of section 70(1)(a) of the act, as a species that must be combatted or eradicated. These species are contained in Notice 3 of the AIS list, which is referred to as the National List of Invasive Species. Landowners are obliged to take immediate steps to control Category 1a species.</p>
Category 1b Listed Invasive Species	<p><b>Species controlled by an invasive species management programme:</b></p> <p>Species listed by notice in terms of section 70(1)(a) of the act, as species that must be controlled or 'contained'. These species are contained in Notice 3 of the AIS list, which is referred to as the National List of Invasive Species. However, where an Invasive Species Management Programme has been developed for a Category 1b species, then landowners are obliged to "control" the species in accordance with the requirements of that programme.</p>
Category 2 Listed Invasive Species	<p><b>Species controlled by area:</b></p> <p>Species which require a permit to carry out a restricted activity e.g. cultivation within an area specified in the Notice or an area specified in the permit, as the case may be. Category 2 includes plant species that have economic, recreational, aesthetic or other valued properties, notwithstanding their invasiveness. It is important to note that a Category 2 species that falls outside the demarcated area specified in the permit, becomes a Category 1b invasive species. Permit-holders must take all the necessary steps to prevent the escape and spread of the species.</p>
Category 3 Listed Invasive Species	<p><b>Species controlled by activity:</b></p> <p>A species listed by notice in terms of section 70(1)(a) of the act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the act, as specified in the notice. Category 3 species are less-transforming invasive species which are regulated by activity. The principal focus with these species is to ensure that they are not introduced, sold or transported. However, Category 3 plant species are automatically Category 1b species within riparian and wetland areas.</p>
Exempted Alien Species	<p><b>Exempted species:</b></p> <p>An alien species that is not regulated in terms of this statutory framework - as defined in Notice 2 of the AIS List.</p>
Prohibited Alien Species	<p><b>Prohibited species:</b></p> <p>An alien species listed by notice by the Minister, in respect of which a permit may not be issued as contemplated in section 67(1) of the act. These species are contained in Notice 4 of the AIS List, which is referred to as the List of Prohibited Alien Species.</p>



- To compile an assessment and preliminary map of the general status of vegetation on site in order to provide a description of which areas contain natural habitat versus those that are transformed and/or degraded.





## Desktop description of study area

This section provides a description of the location of the study area as well as an outline of the background biodiversity information known for the study area.

### Study area

#### Location

The site of the proposed development is located just to the south of Marikana, which is approximately halfway between Rustenburg in the west and Brits in the east (see map below, which shows concentric circles at 5 km intervals from the site). It is north of the Magaliesberg mountain range and the N4 National road that runs parallel to the mountains. This area is on the flats on the northern side of the Magaliesberg. The Marikana-Buffelspoort road runs through the western end of the study area. A mine access road runs along the eastern boundary of the site. The boundaries of the site are property boundaries. The site straddles the quarter degree grids 2527CB (Rustenburg) and 2527DA (Wolhuterskop).

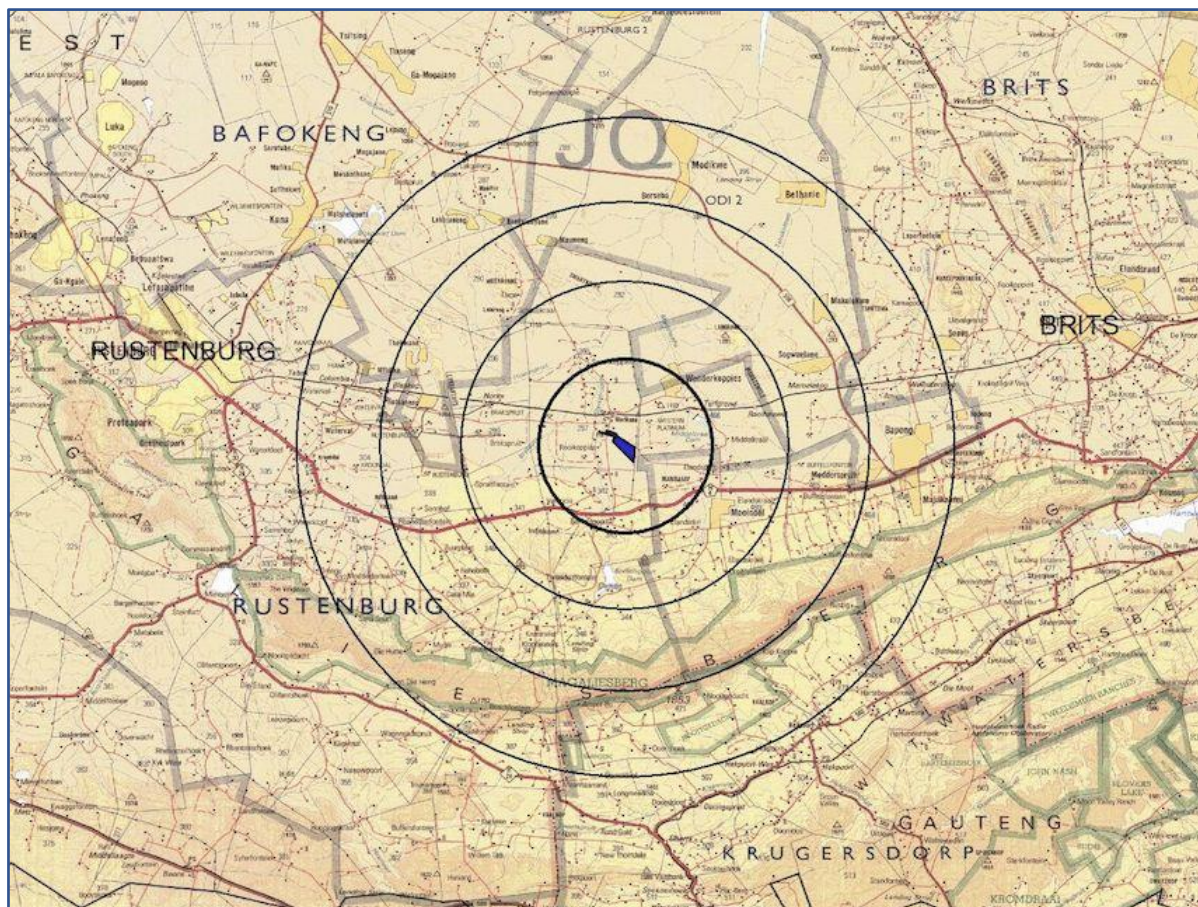


Figure 1: Location of the site.

The site is largely disturbed, consisting of cultivated lands as well as previously cultivated areas, along with some homestead / garden combinations, roads / tracks and some natural areas. There is no mining infrastructure on site, but surrounding areas are dominated by mines, human settlements and cultivation. The natural areas on site consist mostly of remnant patches of woodland and savanna-type vegetation.

### *Topography*

The study area is situated on a gently sloping landscape. There is a stream bed passing along the western boundary and a drainage valley running a third of the way from the eastern boundary, which are two low parts of the landscape. The landscape rises slightly out of these drainage areas. The eastern drainage drops from 1170 m on the southern boundary to 1161 m on the northern boundary and the western drainage is at around 1168 m. The highest point on site is on the south-eastern boundary, which is at 1182 m. The entire site slopes gently towards the north.



**Figure 2: Aerial image of the site (Google Earth).**

## Regional vegetation patterns in relation to the site

According to the most recent vegetation map of the country (Mucina et al., 2005) the study area falls within one regional vegetation type, namely Marikana Thornveld. There are three other vegetation type mapped as being within 10 km proximity to the site, namely Norite Koppies Bushveld, Gold Reef Mountain Bushveld and Moot Plains Bushveld, but these are restricted to a specific landscape position and does not extend onto the site. Any remaining vegetation on site therefore falls within Marikana Thornveld.

### *Marikana Thornveld*

#### **Distribution**

Found mainly in North-West and Gauteng Provinces. Occurs on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. Occurs at altitude of about 1 050–1 450 m.

#### **Vegetation & Landscape Features**

Marikana Thornveld is described as an open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains. Shrubs are denser along drainage lines, on termitaria and rocky outcrops (Rutherford et al., 2006). The vegetation is characterized by the presence of the woody species *Acacia caffra*, *Acacia gerrardii*, *Acacia karroo*, *Combretum molle*, *Rhus lancea*, *Ziziphus mucronata*, *Acacia nilotica*, *Acacia tortilis*, *Euclea crispa*, *Olea europea* subsp. *africana*, *Rhus pyroides* and *Asparagus cooperi*, the grass species, *Elionurus muticus*, *Eragrostis lehmanniana*, *Setaria sphacelata* and *Themeda triandra*, the herbs, *Hermannia depressa*, *Ipomoea obscura*, *Barleria macrostegia*, *Dianthus mooiensis*, *Ipomoea oblongata*, *Vernonia oligocephala*, *Ledebouria revoluta* and *Ornithogalum tenuifolium*.

#### **Geology & Soils**

Most of the area is underlain by the mafic intrusive rocks of the Rustenburg Layered Suite of the Bushveld Igneous Complex. Rocks include gabbro, norite, pyroxenite and anorthosite. The shales and quartzites of the Pretoria Group (Transvaal Supergroup) also contribute. Mainly vertic melanic clays with some dystrophic or mesotrophic plinthic catenas and some freely drained, deep soils. Land types mainly Ea, Ba.

#### **Climate**

Summer rainfall with very dry winters. MAP between about 600- and 700-mm. Frost fairly frequent in winter. Mean monthly maximum and minimum temperatures for Brits-Agr 35.3°C and –3.3°C for January and June, respectively. Corresponding values are 35.3°C and –1.4°C for Rustenberg (November and July) and 32.8°C and –1.0°C for Pretoria University Experimental Farm (January and July). This unit has a relatively more temperate climate than the SVcb 1 Dwaalboom Thornveld.

#### **Important Taxa**

Tall Tree: *Acacia burkei*.

Small Trees: *Acacia caffra* (d), *A. gerrardii* (d), *A. karroo* (d), *Combretum molle* (d), *Rhus lancea* (d), *Ziziphus mucronata* (d), *Acacia nilotica*, *A. tortilis* subsp. *heteracantha*, *Celtis africana*, *Dombeya rotundifolia*, *Pappea capensis*, *Peltophorum africanum*, *Terminalia sericea*.

Tall Shrubs: *Euclea crispa* subsp. *crispa* (d), *Olea europaea* subsp. *africana* (d), *Rhus pyroides* var. *pyroides* (d), *Diospyros lycioides* subsp. *guerkei*, *Ehretia rigida* subsp. *rigida*, *Euclea undulata*, *Grewia flava*, *Pavetta gardeniifolia*.

Low Shrubs: *Asparagus cooperi* (d), *Rhynchosia nitens* (d), *Indigofera zeyheri*, *Justicia flava*.

Woody Climbers: *Clematis brachiata* (d), *Helinus integrifolius*.

Herbaceous Climbers: *Pentarrhinum insipidum* (d), *Cyphostemma cirrhosum*.

Graminoids: *Elionurus muticus* (d), *Eragrostis lehmanniana* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Aristida scabrivalvis* subsp. *scabrivalvis*, *Fingerhuthia africana*, *Heteropogon contortus*, *Hyperthelia dissoluta*, *Melinis nerviglumis*, *Pogonarthria squarrosa*.

Herbs: *Hermannia depressa* (d), *Ipomoea obscura* (d), *Barleria macrostegia*, *Dianthus mooiensis* subsp. *mooiensis*, *Ipomoea oblongata*, *Vernonia oligocephala*.

Geophytic Herbs: *Ledebouria revoluta*, *Ornithogalum tenuifolium*, *Sansevieria aethiopica*.

## Remarks

Less than 1% statutorily conserved in, for example, Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land transformation. Erosion is very low to moderate. Alien invasive plants occur localised in high densities, especially along the drainage lines.

## Vegetation conservation status

### *National status*

The conservation status of Marikana Thornveld is Endangered with 2% conserved of a target of 19% and more than 48% transformed, mostly by urbanisation, cultivation, mining, or by building of roads. Urbanisation is increasing and further expansion will bring further pressure on the remaining vegetation (Mucina et al., 2006).

Marikana Thornveld is listed as Vulnerable in The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).

**Table 1: Conservation status of vegetation types occurring in the study area, according to Driver et al. 2005 / Mucina et al. 2005 and the National Ecosystem List of the National Environmental Management: Biodiversity Act.**

Vegetation Type	Conservation status (Mucina et al. 2005)	Status (NEMBA)
Marikana Thornveld	Endangered	Vulnerable

*Provincial C-Plan status*

The North West Biodiversity Sector Plan (NW BSP) classifies the province according to conservation value in decreasing value, as follows:

1. Protected Areas



**Figure 2: Critical Biodiversity Areas in relation to the site boundaries.**



2. Terrestrial Critical Biodiversity Area Level 1
3. Terrestrial Critical Biodiversity Area Level 2
4. Terrestrial Ecological Support Areas Level 1 and Level 2
5. Other Natural Areas

According to the NWBSP, there are patches on site that fall within CBA 2 (shown in orange in map on previous page). The CBA 2 areas are remnants of Marikana Thornveld.

Based on the C-Plan, it can be interpreted that most of the remaining vegetation on site is not considered to be important for the conservation of biodiversity in the province, with the exception of any patches of natural habitat within Marikana Thornveld.



# Methodology

## Vegetation survey

Fieldwork for this study was conducted on 13 August 2019. A checklist of species occurring on site was collected and the site was investigated in detail in order to ensure that all parts were covered during the survey. The site was traversed by foot and species listed as they were encountered. Plant names follow Germishuizen et al. (2005) and any taxonomic updates, as found on the SANBI website. The season of the survey was unfavourable, being in the middle of winter, and it is unlikely that many of species present on site were identifiable at the time of the survey.

## Red List plant species

A list of Red List flora species which could potentially occur within the study area was compiled from existing data (refer to Appendix 1). Lists of historical occurrences of Threatened and Orange List plant species were obtained from databases and literature sources. Information about the species on this list were updated from literature sources and from information online. The list was evaluated to determine which species were likely to occur in the available habitats in the study area. For all listed plant species that occur in the general geographical area of the site, a rating of the likelihood of it occurring on site is given as follows:

LOW: no suitable habitats occur on site / habitats on site do not match habitat description for species;

MEDIUM: habitats on site match general habitat description for species (e.g. grassland), but detailed microhabitat requirements (e.g. rocky grassland on shallow soils overlying dolomite) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;

HIGH: habitats found on site match very strongly the general and microhabitat description for the species (e.g. rocky grassland on shallow soils overlying dolomite);

DEFINITE: species found on site.

## Protected trees

Regulations published for the National Forests Act (Act 84 of 1998) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distributions of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (<http://sibis.sanbi.org/>) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 100 km), or where it is considered possible that they could occur there,



were listed and were considered as being at risk of occurring there. The site was searched for these species during the field survey and any individuals or concentrations noted.

### **Sensitivity assessment**

The purpose of producing a habitat sensitivity map is to provide information on the location of potentially sensitive features in the study area. This was compiled by taking the following into consideration:

1. The general status of the vegetation of the study area was derived by compiling a landcover data layer for the study area (sensu Fairbanks et al. 2000) using available satellite imagery and aerial photography. From this it can be seen which areas are transformed versus those that are still in a natural status.
2. Various provincial, regional or national level conservation planning studies have been undertaken in the area, e.g. North West Biodiversity Sector Plan 2015. The mapped results from these were taken into consideration in compiling the habitat sensitivity map.
3. Habitats in which various species occur that may be protected or are considered to have high conservation status are considered to be sensitive.





## Results of field survey of site

This section provides a description of vegetation and flora patterns found on site, as determined from the field survey in combination with mapping from aerial imagery. Historical aerial imagery was used to attempt to understand the extensive patterns of disturbance seen on site during the field survey.

### Historical disturbance on site

There are historical aerial images on Google Earth going back to July 2004. From these it can be seen that cultivation has had the biggest impact on the natural vegetation of the area. There is no imagery between July 2004 and September 2009, but during this period, the vegetation was completely cleared in a swathe through the central part of the site. This has resulted in the central part of the riparian woodland being cleared. The purpose of this clearing is not evident from the aerial imagery, but is probably related to mining activities – there is a large excavation just to the west of the central part of the site in 2004, as well as a linear arrangement of boreholes that run through the site, but this is gone by 2009. A more detailed discussion of this is included below in the description of Riparian Woodland.

A summary of historical disturbance on site is as follows:

1. Cultivation.
2. Major earthworks, probably associated with mining.
3. Harvesting of wood from woody vegetation.
4. Grazing by domestic livestock.
5. Invasion by alien invasive trees on site.

### Vegetation patterns on site

Vegetation and habitat types on site are significantly determined by the land-use history of the site, with disturbance playing a role in determining species composition. The vegetation and habitat types identified on the site are shown in the Figure below.

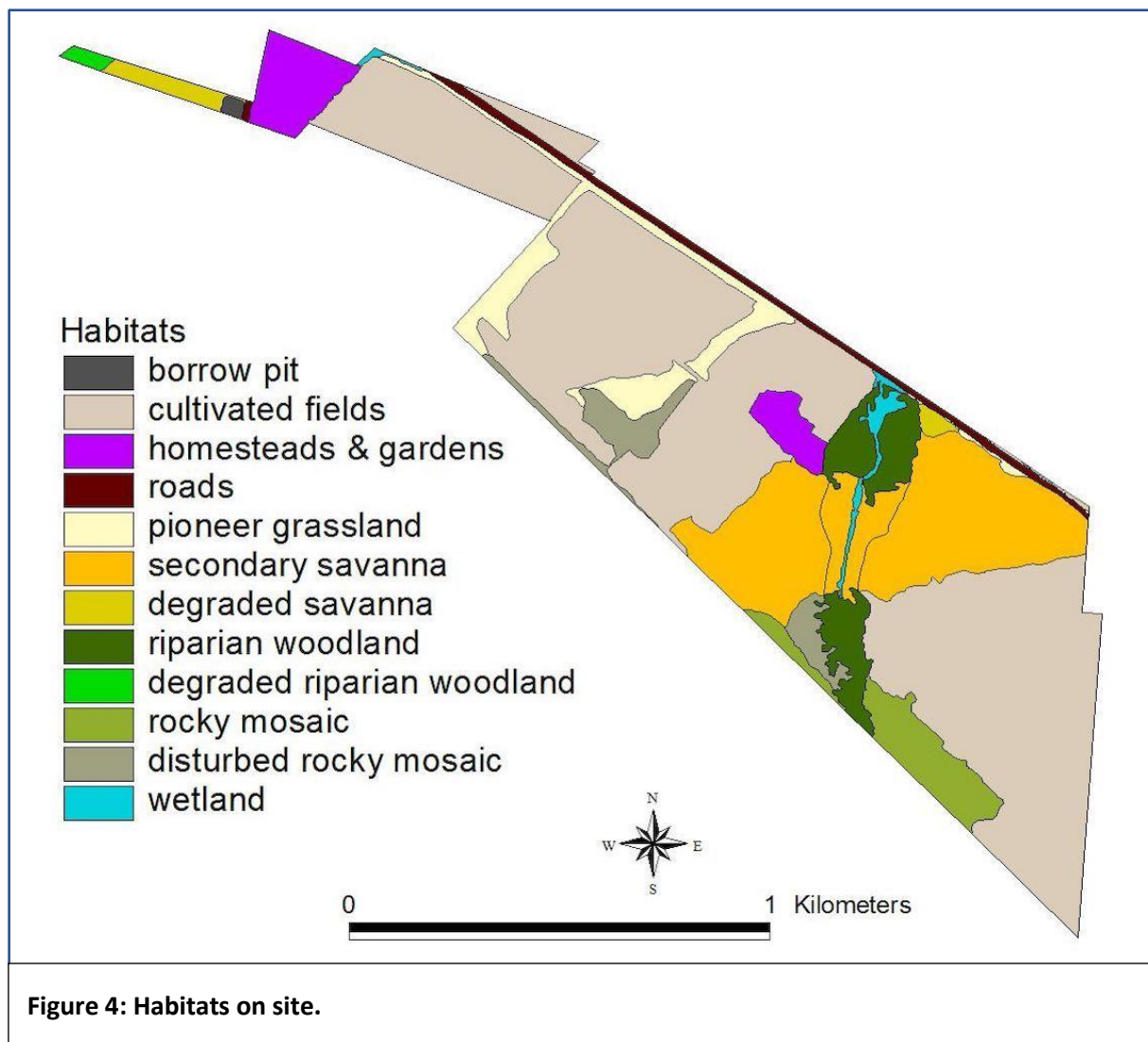
The boundaries of map units were delineated from Google imagery, but were verified in the field using a Garmin hand-held GPS. This delineation was used to draw a map of habitats on site using GIS software. This map is provided below to show the location of differently mapped areas. The areas distinguished on site were divided into the following categories:

1. Riparian Woodland;
2. Rocky Mosaic;
3. Wetland;
4. Secondary Savanna;
5. Degraded Savanna;
6. Pioneer Grassland;



7. Transformed areas, including roads, homesteads and gardens, cultivated fields, and a borrow pit.

The GIS map was projected (Transverse Mercator projection, WGS84, LO29 central meridian) after which a GIS function was used to calculate areas of different classes. The areas are provided in the Table 2 below.



**Table 2: Area in hectares of each habitat class found on site.**

Habitat class	Area (hectares)
Riparian Woodland (intact & degraded)	5.499 0.336
Rocky Mosaic (intact & degraded)	4.573 3.693
Wetland	1.087
Degraded Savanna	1.474
Secondary Savanna	21.291
Pioneer Grassland	6.380
Transformed Areas (borrow pit, cultivation, homesteads & gardens, roads)	0.191 66.548 5.192 2.595
<b>TOTAL</b>	<b>118.859</b>

The results of the mapping process indicate that there is 16.662 hectares of intact natural vegetation on site. Rocky Mosaic vegetation and Riparian Woodland in a natural state cover the largest proportion of the natural vegetation on site and cultivation is the largest land cover of the site.

In general, the natural vegetation that would have occurred naturally in this area is Marikana Thornveld, which is a mixed thornveld occurring on the clay flats, which are largely ploughed on site, with the exception of rocky areas.

### *Riparian woodland*

The central drainage line through the study area is a small tributary of the Maretlwana, which passes through Marikana to eventually join the Sterkstroom and then the Crocodile River. The drainage has been impacted by mining and agricultural activities. The origins of this drainage are lost in the mining activities to the south of the study area, but historical aerial imagery (July 2004) shows that it originated just over 2 km further south, of which 1.3 km of the system is now lost to mining. There is some uncertainty in assigning riparian status to the woodland, since the species composition of the woodland and the location of the drainage channel within the woodland do not provide a clear indication that the woodland is specifically associated with the riparian zone. Also, agricultural activities have resulted in vegetation clearance to the edge of the woodland and it is unknown what the original vegetation patterns on site would have been in the absence of such clearing, i.e. whether the woodland would have extended further outwards or been replaced by some other vegetation composition and structure. Evidence to support the position that it is most likely riparian vegetation is obtained from historical imagery, from topographical information and from patterns in other parts of the landscape:



**Figure 5: Historical aerial images of the south-eastern part of the site.**

1. Within the site, historical aerial imagery (see Figure 5) shows that the woodland was continuous through the site in 2004, but was cleared in the central portion by 2009, and further thinned out in the southern portion by 2019. In the absence of mechanical clearing, the drainage valley would be occupied throughout its extent by the woodland found on site.
2. Imagery from July 2009, February 2011 and July 2011 show that the woodland is not diminished by fire, even if the fire burns into the woodland. The most prevalent natural disturbance therefore does not eliminate woodland in the drainage valleys. The distribution of woodland must therefore be determined by some other ecological factor/s, in this case

probably topography, hydrology and/or soils, which would be different in the riparian zone to adjacent areas.

3. Observations on site and from course elevation data suggest that the woodland occurs within a relatively flat-bottomed, shallow drainage valley, which rises gradually with distance from the edge of the woodland. This indicates that the woodland occupies a particular topographical position in the landscape that is associated with drainage.
4. Throughout the Marikana Thornveld regional vegetation type (which represents similar climatic and soil conditions), all similar-sized drainage lines where no mechanical disturbance has taken place are occupied by similar dense woodlands. There is therefore a consistent regional pattern that shows that drainage valleys of similar dimensions to those found on site are occupied by dense woodlands.

It is therefore accepted here that the woodland is riparian in nature and should be treated as such in terms of future management, designation of sensitivity and understanding of processes in the landscape.



**Figure 6: Example of woodland on site.**



The Riparian Woodland in the south-eastern drainage line consists of a dense woodland through which a narrow wetland channel meanders. The soil is deep, black clay soil with little rock or stone. The woody vegetation is dominated overwhelmingly by *Searsia lancea*, with common occurrences of *Ziziphus mucronata*, *Melia azedarach*\* and *Olea europaea* subsp. *cuspidata*. Other species recorded in this habitat are provided in Table 3. There were a high number of alien invasive species, some of which were common to locally dominant. The herbaceous layer contained a variety of grass and forb species, but the total diversity within this component of the flora of this habitat are likely to be significantly under-represented due to the season of the survey.

**Table 3: Plant species occurring within Riparian Woodland vegetation on site.**

Species	Life-form	Abundance
<i>Araujia sericifera</i> * (Category 1b)	Creeper	Occasional
<i>Asparagus laricinus</i>	Shrub	Common
<i>Bidens pilosa</i> *	Forb	Occasional
<i>Bothriochloa insculpta</i>	Grass	Common
<i>Carissa bispinosa</i>	Shrub	Occasional
<i>Celtis africana</i>	Tree	Occasional
<i>Cynodon dactylon</i>	Grass	Common
<i>Datura stramonium</i> * (Category 1b)	Forb	Occasional
<i>Dichrostachys cinerea</i>	Tree	Occasional
<i>Diospyros lycioides</i>	Shrub	Occasional
<i>Eragrostis</i> sp.	Grass	Occasional
<i>Euclea crispa</i>	Shrub	Common
<i>Gomphocarpus fruticosus</i> #	Forb	Occasional
<i>Gymnosporia buxifolia</i>	Shrub	Occasional
<i>Hilliardiella oligocephala</i>	Forb	Occasional
<i>Lantana camara</i> * (Category 1b)	Shrub	Locally dominant
<i>Melia azedarach</i> * (Category 1b)	Tree	Locally dominant
<i>Olea europaea</i>	Tall shrub	Common
<i>Opuntia ficus-indica</i> * (Category 1b)	Shrub	Occasional
<i>Rubia horrida</i>	Climber	Rare
<i>Rumex</i> cf. <i>crispus</i> *	Forb	Occasional
<i>Searsia lancea</i>	Tall shrub	Dominant
<i>Setaria sphacelata</i> var. <i>torta</i>	Grass	Occasional
<i>Tagetes minuta</i> *	Forb	Occasional
<i>Themeda triandra</i>	Grass	Common
<i>Tipuana tipu</i> * (Category 3)	Tree	Occasional
<i>Vachellia karroo</i>	Tree	Common
<i>Xanthium strumarium</i> * (Category 1b)	Forb	Occasional
<i>Zinnia peruviana</i> *	Forb	Occasional
<i>Ziziphus mucronata</i>	Tree	Common

There was strong evidence of wood harvesting within this unit (see Figure 7). This appears to be occurring along the fringes, which would have the effect of diminishing the extent of the woodland progressively. Harvesting appeared to target any woody species which have combustible wood.



**Figure 7: Harvesting of wood in woodland on site.**

The riparian zone on the western edge of the study area consisted of a distinct riverbed fringed by steep stream banks and sparse woodland along these banks (Figure 8). It is probable that the original woodland in these areas has been lost. The only woody species remaining within this area are *Combretum erythrophyllum*, *Eucalyptus camaldulensis*\*, *Populus X canescens*\*, *Melia azedarach*\*, *Searsia lancea*, and *Acacia nilotica*. This area was also significantly invaded by the Spanish reed, *Arundo donax*\*.





**Figure 8: Riparian zone on western boundary of site.**





### *Rocky Mosaic*

There are areas of remaining natural vegetation in the south-eastern part of the study area that extend southwards out of the boundaries of the study area. These areas consist of a mosaic of low rock outcrops of rounded rocks, interspersed by open areas with black clay soils. The vegetation in these areas is an open low woodland, with more dense woodland on the rocky areas. The biodiversity importance of the habitat is the fact that the rocks provide a diversity of habitats for plant species, so that there is a constant species turnover from one rock outcrop to the next, as well as a difference in species composition between the rocky areas and the adjacent clay soil areas. The rocky areas are also unsuitable for cultivation, so they have been spared the historical loss of habitat associated with cultivation. This means that these areas are now the only remaining open habitats not lost due to historical land use and are therefore important repositories of biodiversity. The species composition is diverse, although likely to be more species rich than recorded during the current winter survey. Species recorded in this habitat are given in Table 4.



**Figure 9: Example of rocky outcrop vegetation on site.**

**Table 4: Plant species occurring within Rocky Mosaic vegetation on site.**

Species	Life-form	Abundance
<i>Aloe grandidentata</i>	Succulent forb	Common
<i>Aristida bipartita</i>	Grass	Common
<i>Aristida congesta barbicollis</i>	Grass	Occasional
<i>Aristida stipitata</i>	Grass	Occasional
<i>Asparagus laricinus</i>	Shrub	Occasional
<i>Bulbostylis burchellii</i>	Graminoid	Common
<i>Canthium gilfillanii</i>	Small tree	Common
<i>Carissa bispinosa</i>	Shrub	Occasional
<i>Cereus hildmanianus*</i> (Category 1b)	Succulent shrub	Occasional
<i>Cymbopogon species</i>	Grass	Occasional
<i>Dicoma anomala</i>	Forb	Occasional
<i>Enneapogon cenchroides</i>	Grass	Occasional
<i>Eragrostis curvula</i>	Grass	Occasional
<i>Euclea crispa</i>	Shrub	Common
<i>Euclea natalensis</i>	Shrub	Occasional
<i>Gymnosporia buxifolia</i>	Shrub	Occasional
<i>Heteropogon contortus</i>	Grass	Occasional
<i>Hilliardiella oligocephala</i>	Forb	Occasional
<i>Ischaemum afrum</i>	Grass	Occasional
<i>Leonotis nepetifolia</i>	Forb	Common
<i>Pappea capensis</i>	Small tree	Common
<i>Peltophorum africanum</i>	Tree	Common
<i>Pennisetum sphacelatum</i>	Grass	Occasional
<i>Pogonarthria squarrosa</i>	Grass	Occasional
<i>Sansevieria aethiopica</i>	Succulent forb	Occasional
<i>Scolopia zeyheri</i>	Small tree	Occasional
<i>Searsia lancea</i>	Tall shrub	Common
<i>Searsia leptodictya</i>	Tall shrub	Common
<i>Selaginella dregei</i>	Forb	Common
<i>Senegalia caffra</i>	Tree	Common
<i>Vachellia karroo</i>	Tree	Common
<i>Vachellia nilotica</i> subsp. <i>kraussiana</i>	Small tree	Occasional
<i>Vangueria infausta</i>	Small tree	Occasional
<i>Viscum rotundifolium</i>	Parasitic shrub	Occasional
<i>Vitex zeyheri</i>	Small tree	Common
<i>Xanthoxylum capense</i>	Small tree	Occasional
<i>Xerophyta retinervis</i>	Forb	Occasional
<i>Ximenia caffra</i>	Tree	Occasional

There are rocky outcrops scattered in the area between some of the cultivated lands. These have been degraded due to the disturbance from cultivation but have still retained a diverse woody species composition despite the surrounding disturbance.

### *Wetlands*

There are two areas on site that have been mapped as wetlands. The first is the channel running through the woodland in the south-eastern part of the site. The second is a patch of wetland on the side of the road in the northern part of the site. The south-eastern channelled wetland is a natural system associated with a low drainage valley. The channel meanders through the woodland but has been canalized in the central section where the woodland has been removed. Both within the woodland and in open areas the channel is characterised by the presence of the tall graminoid, *Cyperus sexangularis*. There are other species that were found within these areas, but the season of survey and recent burning had temporarily eliminated most other species at the time of the survey. No comprehensive species list could therefore be compiled for these areas.

The northern wetland on the side of the road was enigmatic and did not appear to be associated with any landscape feature that would explain its presence. It is likely that it has developed as a result of



**Figure 10: Wetlands within drainage channel in south-central part of site.**



irrigation water leaking on to the ground over an extended period of time. The vegetation here included additional species, such as *Juncus effusus*\*, *Andropogon eucomis* and *Typha capensis*.

### *Secondary Savanna*

There is a band of vegetation through the southern part of the site that was either previously cultivated or else disturbed by major earthworks between 2004 and 2009 (see section above). The landscape here has developed a secondary savanna with scattered thorn trees and a well-developed perennial grass cover. The species composition of this area was poorly recorded due to the survey as well as recent burning. The small trees were mostly *Vachellia karroo* and *Vachellia nilotica*, accompanied by *Dichrostachys cinereus* and *Vachellia tortilis*, all of which were of relatively low stature and even size, suggesting a common time of development that is consistent with a previous major disturbance. Grasses that could be identified within unburnt patches were *Bothriochloa insculpta*, *Aristida bipartita* (regularly dominant in previously cultivated areas in this landscape), *Heteropogon contortus* and *Cynodon dactylon*.

The composition of the secondary savanna on site is a useful indicator of the expected species composition over time of rehabilitated areas on flat, open terrain with low rock cover. Unfortunately, the species richness appears to be relatively low, although this assessment could differ from a survey during the growing season.



**Figure 11: Secondary savanna in previously cleared areas.**

### *Degraded Savanna*

There is a small area of vegetation in open habitat on the extreme western side of the study area that does not appear from aerial imagery or other evidence to have had soil disturbance, such as cultivation, taking place. It is probable that some removal of woody plants has taken place, given the evidence that such activities have taken place throughout the study area. The result is that the vegetation is an open grassland with a few scattered woody plants. The lack of soil disturbance means that the grassland is not secondary. Unfortunately, the vegetation was too dry due to the season of the survey and had also been partially burnt. It was therefore not possible to identify the species composition of the grassland. The species diversity and composition is therefore unknown until a survey during the growing season can take place. Of the woody plants, the following were observed: *Vachellia karroo*, *Searsia lancea* and *Melia azedarach*\*, all of which are known to colonise previously disturbed areas or natural habitats where the original woody component has been lost for some reason.

### **Flora of the site**

All plant species found during the survey in remaining natural areas are listed in Appendix 2. The species list was compiled from a single field survey, which was undertaken late in the height of the winter season. The species list is probably far from complete and probably provides a poor indication of the species diversity and composition of the study area. In the species list (Appendix 2) all exotic species are indicated by an asterisk (\*), indigenous weeds are shown with the hash symbol (#) and species associated with wetlands are marked with a "w".

A total of 83 plant species were recorded on site, of which 16 are declared weeds or alien invader plants (as per the Alien and Invasive Species Regulations, 2014 of NEMBA), 7 are naturalized exotics and 2 are indigenous weeds of disturbed places. This leaves 58 indigenous species for the site (70%), most of which were found in the woodland and rocky outcrops. This is a relatively low species richness, which is a function of the time of the year of the field survey, and it is expected that the actual indigenous diversity would be significantly higher than indicated by the current checklist.

### **Plant species of concern**

Listed species known for North West Province are listed in Appendix 1. The list contains 28 species assessed according to IUCN Ver. 3.1 (IUCN, 2001) criteria (Appendix 1). Three of these species have a distribution that includes the site and habitat requirements that are met by those that are found on site. These species are *Drimia sanguinea*, *Lithops lesliei* subsp. *lesliei* and *Stenostelma umbelliferum* (all listed as Near Threatened).

*Drimia sanguinea* occurs in the Northern Cape and across to Limpopo and Mpumalanga Provinces, Namibia, Botswana and Zimbabwe. It is found in open veld and scrubby woodland in a variety of soil types. It is therefore possible that it could occur on site.



*Lithops lesliei* (N.E.Br.) N.E.Br. subsp. *lesliei* is found from Douglas in the Northern Cape Province to central Limpopo Province and south-eastern Botswana. It is found primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. There is therefore a possibility it may be found within rocky areas on site.

*Stenostelma umbelluliferum* has been previously found in Pretoria North and adjacent areas in North West Province. It is found in deep black turf in open woodland mainly in the vicinity of drainage lines and has been recorded from nearby to the site. There is therefore a strong possibility of it occurring on site.

Based on the site visit and the analysis provided here, it is considered possible that any one of these listed plant species could occur on site. Based on distribution data and habitat requirements, it is highly unlikely that any of the other species listed in Appendix 1 would occur on site.

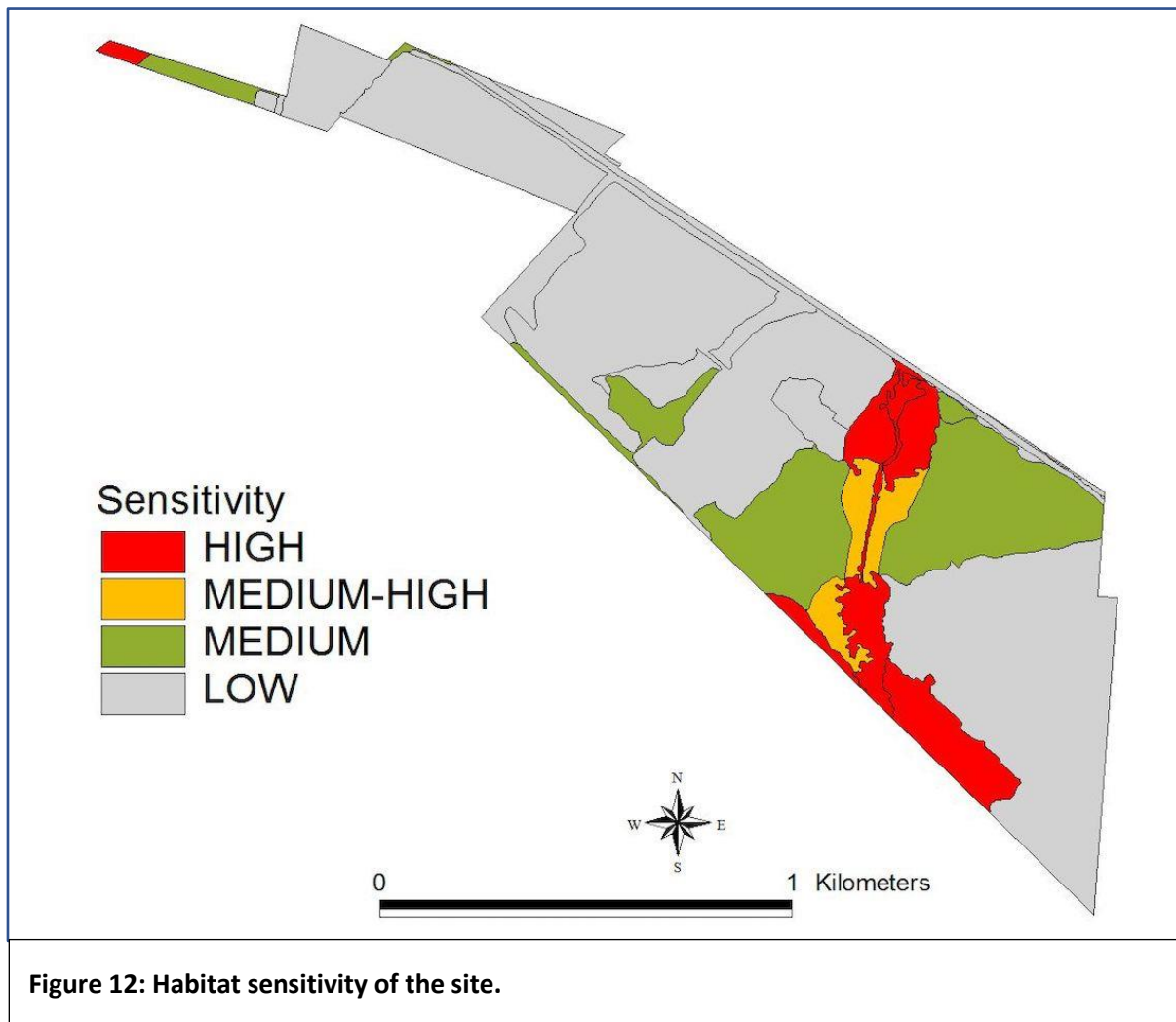
### Sensitivity assessment

There are features on site that need to be taken into account in order to evaluate sensitivity of the site and its surroundings. These include the following:

1. Listed Ecosystem: The site is within Marikana Thornveld, listed as Vulnerable according to the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).
2. Wetlands: These are described here only in terms of being a unique botanical habitat and not in the sense of a formal wetland delineation, which is normally assessed in a separate specialist study. A more in-depth discussion of possible wetlands on site is made in a separate section, in which it was decided that only one wetland on site has natural origins, the remainder are secondary or derived.

A map of site sensitivity is provided on the next page (Figure 12). This shows that all woodlands, rocky outcrop vegetation and natural wetlands are mapped as having HIGH sensitivity, habitats within the drainage valley as having MEDIUM-HIGH sensitivity (despite being secondary), secondary savanna and disturbed outcrops as having MEDIUM sensitivity, and all other areas as having LOW sensitivity.





**Figure 12: Habitat sensitivity of the site.**

## Discussion

The requirements of this study were to undertake a specialist study to describe the vegetation and flora of the site.

The site is within one regional vegetation type, a savanna vegetation type called Marikana Thornveld. The Marikana Thornveld vegetation is classified as Endangered in the scientific literature and is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).

According to the North West Biodiversity Sector Plan, most of the vegetation on site is not considered to have high conservation value, although parts are mapped within the CBA2 category, which indicates that it has importance for meeting conservation goals and/or maintaining ecological processes in the landscape.

The largest constituent of the site is cultivated lands. Remaining patches of natural vegetation, which have been disturbed to varying degrees, include riparian woodland, vegetation of rocky outcrops and wetland vegetation. There are some secondary savanna areas that have developed in areas that are currently not cultivated.

On the basis of ecological process factors and the conservation value of remaining natural habitat within Marikana Thornveld, all woodlands, rocky outcrop vegetation and natural wetlands are mapped as having HIGH sensitivity, habitats within the drainage valley are mapped as having MEDIUM-HIGH sensitivity (despite being secondary), and secondary savanna and disturbed rocky outcrops are mapped as having MEDIUM sensitivity.

There are a three listed plant species of lower conservation concern (Near Threatened that could potentially occur on site, i.e. they have a geographical distribution that includes the site and habitat conditions on site are favourable for them. These species are *Drimia sanguinea*, *Lithops lesliei* subsp. *lesliei* and *Stenostelma umbelluliferum*. None of these species were found on site during the field survey, but the survey was undertaken at the incorrect time of the year to detect any of them. A follow-up survey during the growing season is required to determine whether they occur or are likely to occur on site.

A GIS calculation of the remaining area of habitat on site shows that there is 16.662 hectares of remaining natural habitat on site. This is more than the 1 hectare that would trigger an EIA within a listed ecosystem, according to the EIA regulations.





## Recommendations

Based on the botanical assessment, this section of the report provides recommendations for the project. The following recommendations are made:

1. Riparian Woodland and Rocky Mosaics represent remnants of indigenous natural vegetation on site, which is within a listed ecosystem, namely Marikana Thornveld. It is recommended that these areas, as well as an appropriate buffer zone, are omitted from any development plans and that they are maintained as ecological corridors in the landscape.
2. The declared aliens that occur on site are listed in Appendix 2. In terms of the National Environmental Management: Biodiversity Act, invasive species are either prohibited or require a permit to be retained on site. It is recommended that these species are controlled using registered control methods.
3. It is recommended that a summer survey be undertaken to properly document the botanical diversity within natural habitats, as well as to confirm the ecological status of areas mapped as having secondary vegetation.
4. A summer survey is required to determine whether any of three Near Threatened plant species occur or are likely to occur on site. These species are *Drimia sanguinea*, *Lithops lesliei* subsp. *lesliei* and *Stenostelma umbelluliferum* (all listed as Near Threatened).



## Conclusion

The following conclusions can be made with regards to the proposed development of the site:

1. Parts of the site are within Provincial Critical Biodiversity Areas and the site also falls within a listed Vulnerable ecosystem, namely Marikana Thornveld. Although significant parts of the site are in a degraded state or transformed and do not represent areas of ecological value, there are patches of high value habitat on site, all within the C-Plan designated areas. Development within these particular high value patches may lead to loss of areas with biodiversity value. The botanical value of these areas could not be comprehensively documented due to the season of the survey, which was unfavourable for detecting herbaceous plant species.



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## Appendix 1: Red / Orange List plant species recorded within North West Province.

Taxon	Latest (IUCN version 3.1) Conservation Status**	Habitat	Probability of occurrence*
<i>Aloe braamvanwykii</i> Gideon F. Sm. & Figueiredo	Endangered (EN)	Stella to Schweizer-Reneke and Wolmaransstad. Thornveld, deep sandy soils on plains.	<b>LOW</b> , distribution, habitat
<i>Aloe peglerae</i> Schönland	Critically endangered (CR)	Magaliesberg and Witwatersberg. Grassland, in shallow, gravely quartzitic soils on rocky, north-facing slopes or summits of ridges.	<b>LOW</b> , habitat does not match
<i>Anacampseros decapitata</i> P. Burgoyne & J. van Thiel	Vulnerable (VU)	Magaliesberg Mountain Range, near Rustenburg. Shallow soils derived from coarse quartzite and sandstone sediments.	<b>LOW</b> , habitat does not match
<i>Brachystelma canum</i> R.A.Dyer	Critically Endangered (CR)	Between Setlagole and Mafeking. Sandy Terminalia veld.	<b>LOW</b> , distribution, habitat
<i>Brachystelma gracillimum</i> R.A. Dyer	Critically Endangered (CR)	Marico district, east of Ramotswa. Sandy loams in thornveld.	<b>LOW</b> , distribution, habitat
<i>Brachystelma incanum</i> R.A.Dyer	Vulnerable (VU)	Lichtenburg to Wolmaransstad and Sasolburg. Sandy loam soils in thornveld and Themeda-grassland.	<b>LOW</b> , distribution, habitat
<i>Ceropegia insignis</i> R.A. Dyer	Endangered (EN)	Northern North West province and adjacent areas in Limpopo between Ramotswa and Dwaalboom. It possibly also occurs in adjacent areas in Botswana. Stony slopes and sandy soils in grassland and open savanna.	<b>LOW</b> , distribution, habitat
<i>Ceropegia stentiae</i> E.A. Bruce	Endangered (EN)	Polokwane to Mookgophong. Rocky outcrops and hill slopes in short, open sparse woodland.	<b>LOW</b> , distribution, habitat
<i>Ceropegia turricula</i> E.A.Bruce	Near Threatened (NT)	Gauteng, Limpopo, North West, Lichtenburg to Gravelotte. Grassland slopes in savanna.	<b>LOW</b> , distribution
<i>Cineraria austrotransvaalensis</i> Cron	Near Threatened (NT)	Scattered throughout Gauteng and the North West Province and at Standerton in southern Mpumalanga. Amongst rocks on steep hills and ridges, at the edge of thick bush or under trees on a range of rock types: quartzite, dolomite and shale, 1400-1700 m.	<b>LOW</b> , records from POSA do not show occurrence in NW.
<i>Cleome conrathii</i> Burtt Davy	Near Threatened (NT)	Gauteng, Northern Cape, North West, Kuruman to Pretoria. Stony quartzite slopes, usually in red sandy soil, grassland or deciduous woodland, all aspects.	<b>LOW</b> , records from POSA do not show occurrence near study area, habitat unsuitable.

<i>Cullen holubii</i> (Burt Davy) C.H.Stirt. = <i>C. tomentosum</i> (Thunb.) J.W.Grimes	Vulnerable (VU)	Zeerust to Bela Bela. Bushveld on sandy flats.	<b>LOW</b> , habitat partially matches, but POSA indicates known distribution is much further north
<i>Delosperma leendertziae</i> N.E.Br.	Near Threatened (NT)	Magaliesberg. Steep, south-facing slopes of quartzite in mountain grassland.	<b>LOW</b> , habitat
<i>Dicliptera magaliesbergensis</i> K. Balkwill	Vulnerable (VU)	Krugersdorp to Onderstepoort. Riverine forest and bush, including within Marikana Thornveld.	<b>LOW</b> , habitat partially matches, but POSA indicates known distribution is much further east
<i>Drimia sanguinea</i> (Schinz) Jessop	Near Threatened (NT)	Northern Cape and across to Limpopo and Mpumalanga Provinces, Namibia, Botswana and Zimbabwe. Open veld and scrubby woodland in a variety of soil types.	<b>HIGH</b> , habitat and distribution matches
<i>Euphorbia perangusta</i> R.A. Dyer = <i>E. knobelii</i> Letty	Endangered (EN)	Marico district north of Zeerust. Woodland and thornveld, wedged among large rocks on the slopes of quartzitic ridges, 1000-1200 m.	<b>LOW</b> , distribution, habitat
<i>Frithia pulchra</i> N.E.Br.	Rare	Magaliesberg. Coarse, shallow, quartzitic soils on sandstones.	<b>LOW</b> , geology does not match
<i>Gladiolus filiformis</i> Goldblatt & J.C.Manning	Critical Rare	Makadima Mountains between Lobatse and Zeerust. Grassland and scrubland on hill slopes and plateaus.	<b>LOW</b> , distribution, habitat
<i>Gnaphalium nelsonii</i> Burt Davy	Near Threatened (NT)	Pretoria to Vereeniging and Wolmaransstad. Seasonally wet places in grassland and savanna, and along dry watercourses.	<b>LOW</b> , distribution
<i>Kniphofia typhoides</i> Codd	Near Threatened (NT)	Parys to Lydenburg to Paulpietersburg to Newcastle. Low lying wetlands and seasonally wet areas in climax Themeda triandra grasslands on heavy black clay soils, tends to disappear from degraded grasslands.	<b>LOW</b> , distribution – POSA indicates no records north of Magaliesberg, although habitat there is possibly suitable, probably too hot.
<i>Ledebouria atrobrunnea</i> S.Venter	LC (previously VU)	Plains north of Pilanesberg to Rustenburg and Borakalalo. Quartzitic outcrops on flats and lower slopes in grassland and woodland.	<b>LOW</b> , geographical distribution matches, but restricted to quartzite.
<i>Lithops lesliei</i> (N.E.Br.) N.E.Br. subsp. lesliei	Near Threatened (NT)	Douglas in the Northern Cape Province to central Limpopo Province and south-eastern Botswana. Primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses.	<b>MEDIUM</b> , habitat partially matches and distribution matches
<i>Miraglossum laeve</i> Kupicha	Critically Endangered (CR)	Hills south of Pretoria and the Vredefort Dome north-east of Parys. Hills in Gold Reef Mountain Bushveld and possibly Gauteng Shale Mountain Bushveld.	<b>LOW</b> , distribution, habitat
<i>Nerine gracilis</i> R.A. Dyer	Vulnerable (VU)	Belfast and Ermelo to Wolmaransstad. Undulating grasslands in damp areas.	<b>LOW</b> , distribution, habitat

<i>Prunus africana</i> (Hook.f.) Kalkman	Vulnerable (VU)	Widespread in Africa from the southern Cape, through KwaZulu-Natal, Swaziland and northwards in to Zimbabwe and central Africa and the islands of Madagascar and Comoros. Evergreen forests near the coast, inland mistbelt forests and afro-montane forests up to 2100 m.	<b>LOW</b> , distribution matches, but wrong habitat
<i>Pentzia</i> (Rennera) <i>stellata</i> P.P.J. Herman	Near Threatened (NT)	Postmasburg to Vryburg. Seasonally waterlogged calcrete pans.	<b>LOW</b> , distribution, habitat
<i>Searsia maricoana</i> (Moffett) Moffett = <i>S. ciliata</i> (Licht. ex Schult.) A.J. Miller	Vulnerable (VU)	Zeerust district. Grassland, at the transition from bushveld, in dark soil among igneous rocks.	<b>LOW</b> , distribution, habitat
<i>Stenostelma umbelliferum</i> (Schltr.) Bester & Nicholas	Near Threatened (NT)	Pretoria North and adjacent areas in North West Province. Deep black turf in open woodland mainly in the vicinity of drainage lines.	<b>HIGH</b> , distribution and habitat matches, previously recorded near site

\* Conservation Status Category assessment according to IUCN Ver. 3.1 (IUCN, 2001), as evaluated by the Threatened Species Programme of the South African National Biodiversity Institute in Pretoria (<http://redlist.sanbi.org/>).

\* Probability of occurrence, as follows: **LOW** – no suitable habitats occur on site / habitats on site do not match habitat description for species, **MEDIUM** – habitats on site match general habitat description for species (e.g. grassland), but microhabitat requirements are absent (e.g. rocky grassland on shallow soils overlying dolomite), **HIGH** – habitats on site match very strongly the general and microhabitat description for the species, **DEFINITE** – species found on site.



## Appendix 2: Checklist of plant species found on the site

Species
Agave americana* (Category 3)
Aloe grandidentata
Andropogon eucomis
Araujia sericifera* (Category 1b)
Argemone ochroleuca* (Category 1b)
Aristida bipartita
Aristida congesta subsp. barbicollis#
Aristida stipitata
Arundo donax* (Category 1b)
Asparagus laricinus
Bidens pilosa*
Bothriochloa insculpta
Bulbostylis burchellii
Canthium gilfillanii
Carissa bispinosa
Celtis africana
Cereus hildmannianus* (Category)
Combretum erythrophyllum
Combretum molle
Cymbopogon sp.
Cynodon dactylon#
Cyperus sexangularis
Datura stramonium* (Category 1b)
Dichanthium annulatum
Dichrostachys cinereus
Dicoma anomala
Diospyros sp.
Ehretia rigida
Enneapogon cenchroides
Eragrostis sp
Eragrostis curvula
Erythrina lysistemon (ex hort)
Eucalyptus camaldulensis* (Category 1b in riparian areas, listed ecosystems and grasslands)
Euclea crispa
Euclea natalensis
Fingerhuthia africana
Gomphocarpus fruticosus#
Gymnosporia buxifolia
Heteropogon contortus
Hilliardiella elaeagnoides
Ischaemum afrum



Juncus effusus*
Lantana camara* (Category 1b)
Leonotis nepetifolia
Melia azeradach* (Category 1b, 3 in urban areas)
Nerium oleander* (Category 1b)
Oenothera laciniata*
Olea europaea
Opuntia ficus-indica* (Category 1b)
Pappea capensis
Peltophorum africanum
Pennisetum sphacelatum
Pogonarthria squarrosa
Populus x canescens* (Category 2)
Rubia horrida
Rumex cf crispus*
Sansevieria aethiopica
Scolopia zeyheri
Searsia lancea
Searsia leptodictya
Selaginella dregei
Senegalia caffra
Setaria sphacelata
Solanum panduriforme
Sorghum bicolor*
Sporobolus pyramidalis
Tagetes minuta*
Tecoma stans* (Category 1b)
Themeda triandra
Tipuana tipu* (Category 2)
Tithonia rotundifolia*
Typha capensis
Vachellia karroo
Vachellia nilotica subsp. kraussiana
Vangueria infausta
Verbena bonariensis* (Category 1b)
Viscum rotundifolium
Vitex zeyheri
Xanthium strumarium* (Category 1b)
Xerophyta retinervis
Ximenia caffra
Zanthoxylum capense
Ziziphus mucronata