

# **VEGETATION AND FLORA ASSESSMENT:**

## Bundu Mining on the Farm Uitzicht alias Rietvalei 314-JR, east of Hartbeespoort, Gauteng 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 Bundu Mining to provide specialist consulting services for an Initial Site Sensitivity Assessment on the Farm Uitzicht alias Rietvalei 314-JR, east of Hartbeespoort in Gauteng Province. The consulting services comprise an initial assessment of sensitivity with respect to Plants and Vegetation in the study area.

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## Summary of expertise

Dr David Hoare:

- Dr Hoare has majors in Botany and Zoology with distinction from Rhodes University, Grahamstown, an Honours Degree (with distinction) in Botany from Rhodes University, an MSc (cum laude) from the Department of Plant Science, University of Pretoria, and a PhD in Botany from the Nelson Mandela Metropolitan University, Port Elizabeth with a focus on grassland diversity.
- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science, Botanical Science), registration number 400221/05.
- Founded David Hoare Consulting cc, 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, Botswana and Swaziland.
- Conducted, or co-conducted, over 400 specialist ecological surveys as an ecological consultant. Areas of specialization include general ecology, biodiversity assessments, vegetation description and mapping, plant species surveys and remote sensing of



vegetation. Has undertaken work in grassland, thicket, forest, savannah, fynbos, coastal vegetation, wetlands and Nama-Karoo vegetation, but has a specific specialization in grasslands and wetland 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.

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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.

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## Introduction

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

On 30 June 2020 David Hoare Consulting (Pty) Ltd was appointed by Bundu Mining to undertake an initial site sensitivity 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 requirement of the study was to undertake an Initial Site Sensitivity Verification, according to the Protocol for the Assessment and Reporting of Environmental Impacts on Terrestrial Biodiversity, published in Government Notice No. 648, Government Gazette 45421, dated 10 May 2019.



# 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 mine is west of Pretoria, east of Hartbeespoort Dam, south of Van der Hoff Road (R514) and north of the Witwatersberg ridge (Figure 1). There are extensive existing sand mining operations immediately to the north of the proposed site and an abandoned quarry immediately to the south-east (Figure 2). The boundaries of the site are proposed mining boundaries. The site is within the quarter degree grid 2528CA.

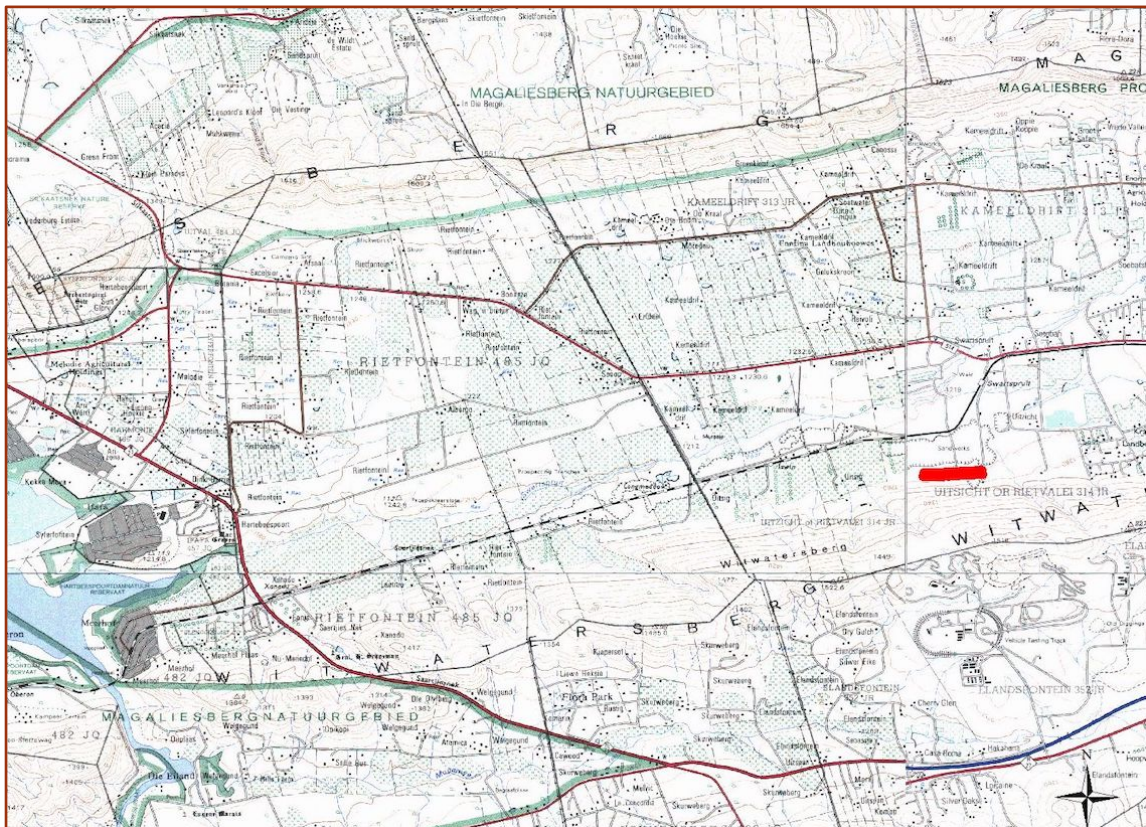


Figure 1: Location of the site approximately 10 km east of Hartbeespoort Dam.

With the exception of the abandoned quarry, the ridge to the south of the site is in a natural state. The boundary between the ridge and the surrounding lowlands is an almost straight line that runs from west to east around the middle of the image shown in Figure 2. The surrounding lowland areas have been extensively quarried for sand and, prior to that, were mostly cultivated. There is currently no existing infrastructure on site. There are various vehicle tracks crossing the site.

### *Topography*

The study area is situated on a gently sloping landscape. The landscape slopes very gently towards the north as well as towards the west. The site is at an elevation of approximately 1255–1270 m. The highest point is on the south-eastern boundary of the site and the lowest part is on the north-western corner.



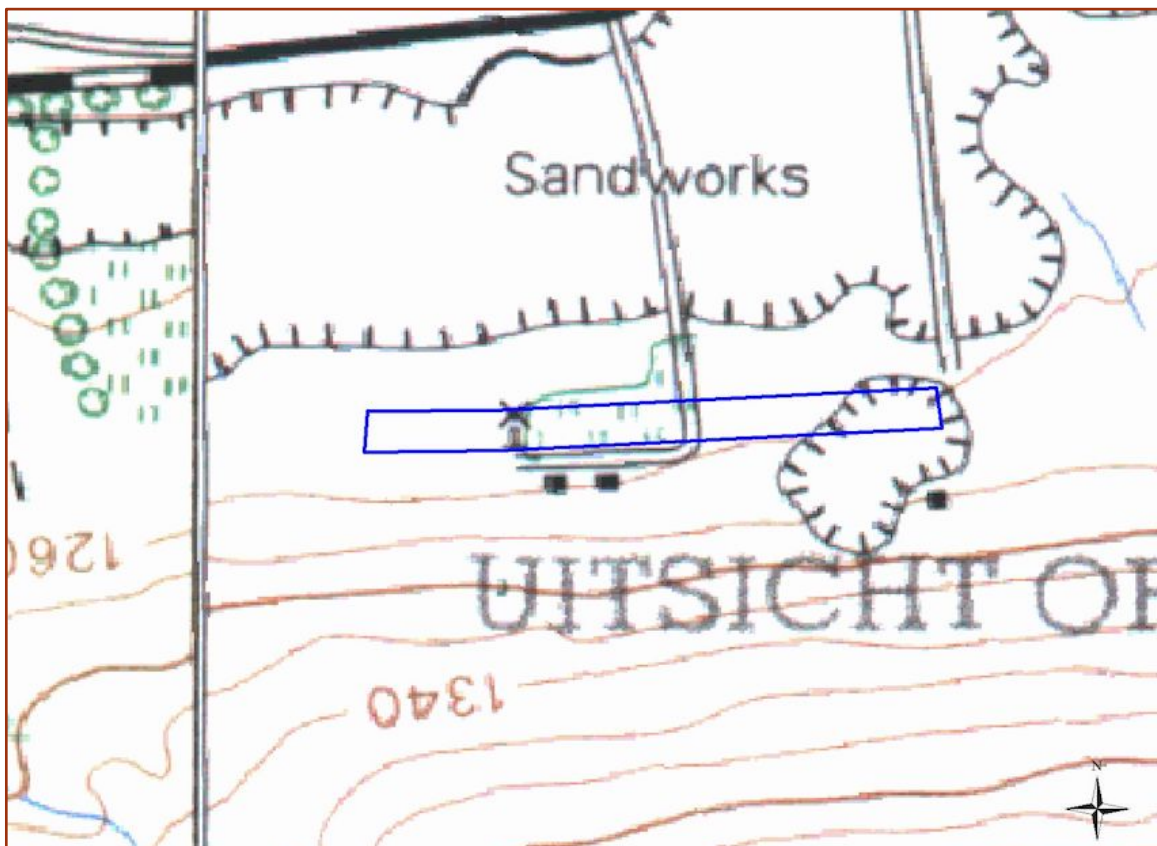
**Figure 2: Current aerial image of the site and surrounding areas.**



### *Landuse and landcover*

The patterns indicated on the Surveyor-General's 1:50 000 topo-cadastral map of the area that includes the site (Figure 3) shows that the central to western parts of the site were previously cultivated. However, typical plough-line patterns evident on the aerial image of the site dated 22 June 2020 (Figure 4) clearly indicate that the entire western half was previously cultivated.

It is also evident from desktop information that the site was heavily impacted by quarrying across a large part of the eastern part of the site (see quarry indicated on the Surveyor-General's 1:50 000 topo-cadastral map of the area in Figure 3). This quarry and associated disturbance is clearly visible on aerial imagery for the site (Figure 5).



**Figure 3: Surveyor-generals 1:50 000 topo-cadastral map of the site and surrounding areas.**



Figure 4: Aerial images dated 22/6/2020 showing plough lines in western half of site.



Figure 5: Aerial images dated 22/6/2020 showing quarry on eastern side of site.



## 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 Gold Reef Mountain Bushveld. There are no other vegetation type mapped as being within close proximity to the site. Any remaining vegetation on site therefore falls within Gold Reef Mountain Bushveld.

### *Gold Reef Mountain Bushveld*

#### **Distribution**

Gold Reef Mountain bushveld is found in North-West, Gauteng, Free State and Mpumalanga Provinces. It occurs along rocky quartzite ridges of the Magaliesberg and the parallel ridge to the south, from around Boshhoek and Koster in the west to near Bronkhorstspuit in the east. The west-east-trending ridge of the Witwatersrand from around Krugersdorp in the west, through Roodepoort and Johannesburg to Bedfordview (Germiston District). Inner ridges (e.g. Dwarsberg and Witkop) of the Vredefort Dome on the Vaal River northwest of Parys and part of the Suikerbosrand and some other hills around Heidelberg. The altitude range is 1 200–1 750 m

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

It is found on rocky hills and ridges often west-east trending with more dense woody vegetation often on the south-facing slopes associated with distinct floristic differences (e.g. preponderance of *Vachellia caffra* on the southern slopes). Tree cover elsewhere is variable. Tree and shrub layers are often continuous. Herbaceous layer is dominated by grasses.

#### **Geology & Soils**

This area consists predominantly of quartzites, conglomerates and some shale horizons of the Magaliesberg, Daspoort and Silverton Formations (Vaalian Pretoria Group) and the Hospital Hill, Turffontein and Government Subgroups (Randian Witwatersrand Supergroup). Soils are shallow, gravel lithosols of the Mispah and Glenrosa forms. Land types mainly Ib and Fb.

#### **Climate**

Summer rainfall with very dry winters. MAP about 600–750 mm. Frost frequent in winter (especially in the south), but less common on the ridges and hills. Mean monthly maximum and minimum temperatures for Krugersdorp 30.8°C and –1.8°C for January and July, respectively.

#### **Important Taxa**

Small Trees: *Acacia caffra* (d), *Combretum molle* (d), *Protea caffra* (d), *Celtis africana*, *Dombeya rotundifolia*, *Englerophytum magalimontanum*, *Ochna pretoriensis*, *Rhus leptodictya*, *Vangueria infausta*, *V. parvifolia*, *Ziziphus mucronata*.



Tall Shrubs: *Canthium gilfillanii*, *Ehretia rigida* subsp. *rigida*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Myroxylon aethiopicum* subsp. *burkeanum*.

Low Shrubs: *Athrixia elata*, *Pearsonia cajanifolia*, *Rhus magalismontana* subsp. *magalismontana*, *R. rigida* var. *rigida*.

Woody Climber: *Ancylobotrys capensis*.

Graminoids: *Loudetia simplex* (d), *Panicum natalense* (d), *Schizachyrium sanguineum* (d), *Trachypogon spicatus* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Bewsia biflora*, *Digitaria tricholaenoides*, *Diheteropogon amplexans*, *Sporobolus pectinatus*, *Tristachya biseriata*, *T. leucothrix*.

Herbs: *Helichrysum nudifolium*, *H. rugulosum*, *Pentanisia angustifolia*, *Senecio venosus*, *Xerophyta retinervis*.

Geophytic Herbs: *Cheilanthes hirta*, *Hypoxis hemerocallidea*, *Pellaea calomelanos*.

#### **Endemic Taxa**

Succulent Shrub: *Aloe peglerae*.

Succulent Herb: *Frithia pulchra*



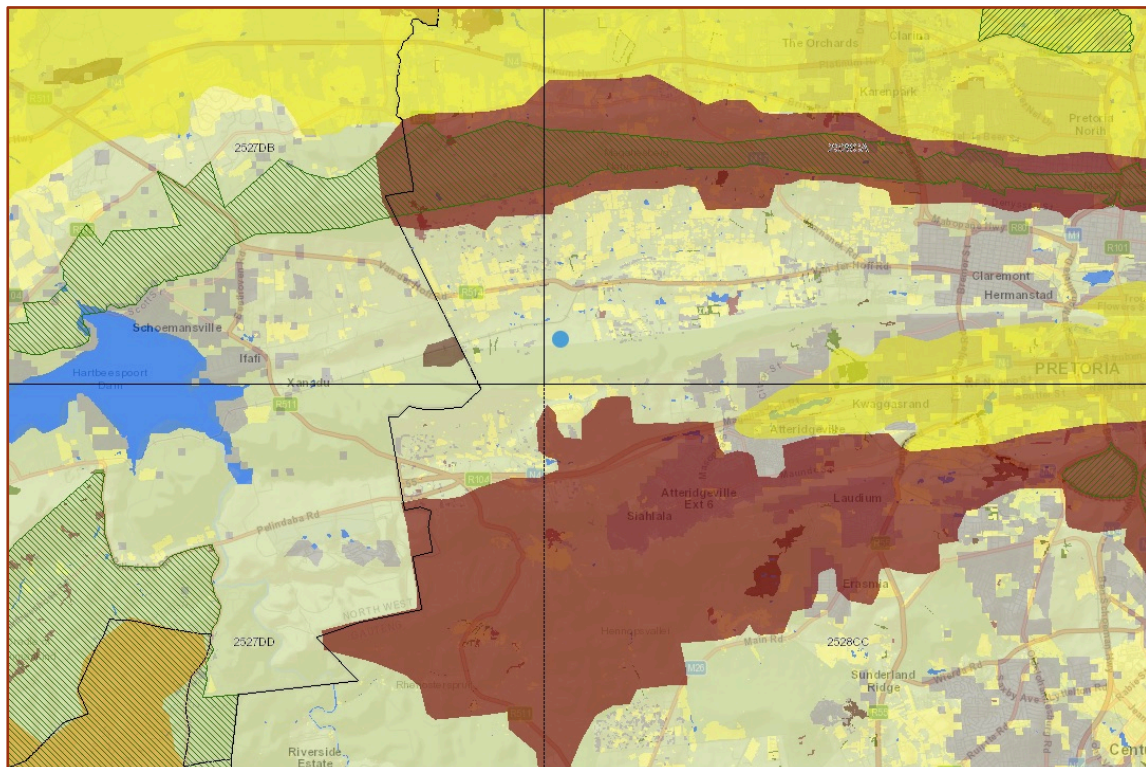
## Vegetation conservation status

### *National status*

The conservation status of Gold Reef Mountain bushveld is Least threatened with 23% conserved of a target of 24% and 15% transformed (Mucina et al., 2006).

**Gold Reef Mountain Bushveld** is not 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).

There are two other threatened ecosystems in the general area that are associated with the Magaliesberg, namely **Magaliesberg Pretoria Mountain Bushveld** (listed as Critically Endangered), delineated as the Magaliesberg ridge system and associated koppies in Pretoria North, Pretoria and Silverton, and **Witwatersberg Pretoria Mountain Bushveld** (listed as Critically Endangered), delineated as the Witwatersberg ridge system and associated koppies, rivers and drainage lines in Pretoria West. Neither of these ecosystems is in proximity to the current site (see Figure 6).



**Figure 6: Threatened ecosystems relative to the site (blue dot near centre of map).**

**Table 3: 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)
Gold Reef Mountain Bushveld	Least Threatened	Not listed

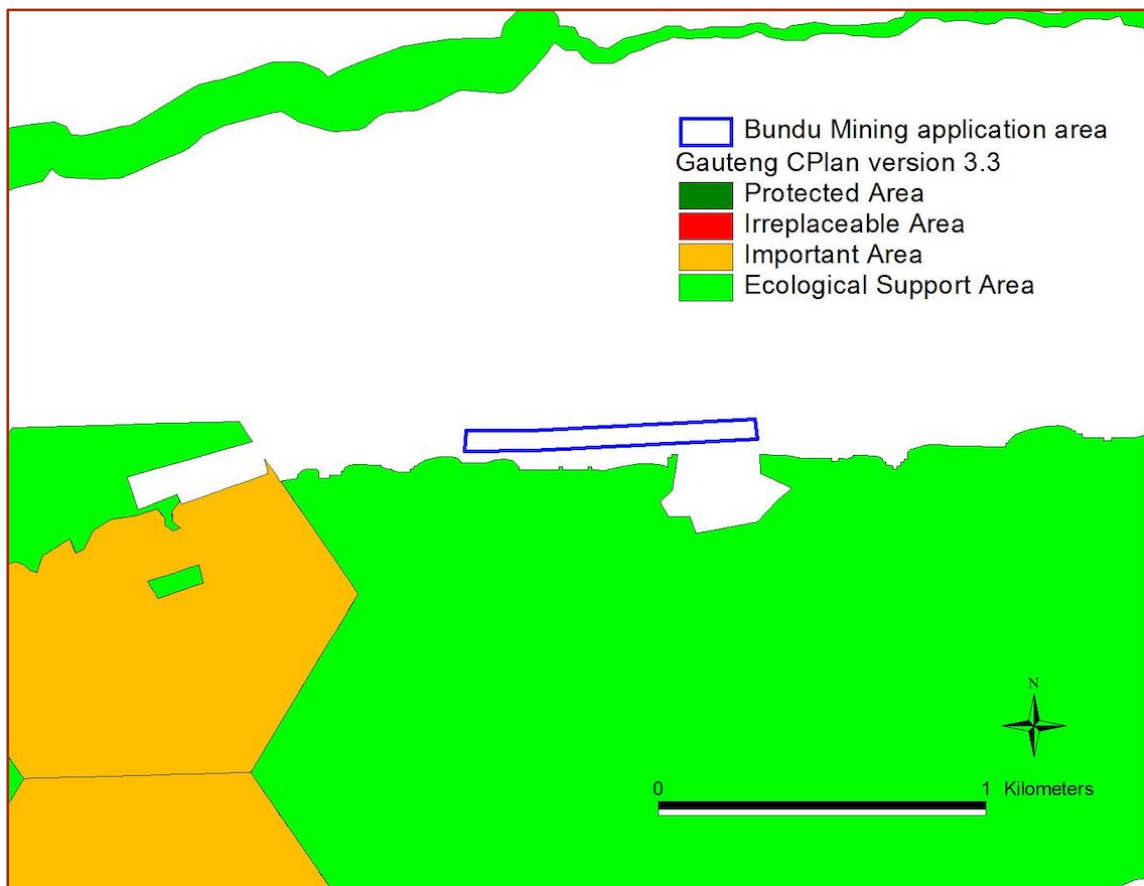


### *Provincial C-Plan status*

The Gauteng C-Plan version 3.3 classifies the natural vegetation of the province according to conservation value in decreasing value, as follows:

1. Protected
2. Irreplaceable
3. Important
4. Ecological Support Area

According to the Gauteng Conservation Plan, no parts of the site are mapped as within any C-Plan area, although the entire ridge directly to the south is mapped as “Ecological Support Area” (see map in Figure 7). This indicates that the remaining vegetation on site is not considered to be important for the conservation of biodiversity in the Province nor for maintaining ecological patterns in the landscape.



**Figure 7: Gauteng C-Plan of the site and surrounding areas.**

# Methodology

## Requirements for Initial Site Sensitivity Verification

Prior to beginning the assessment, the current use of the land and the potential environmental sensitivity of the site as identified by the national web based environmental screening tool must be confirmed by undertaking an Initial Site Sensitivity Verification.

1. The Initial Site Sensitivity Verification must be undertaken by an Environmental Assessment Practitioner or a registered specialist with expertise in the relevant environmental theme being considered.
2. The Initial Site Sensitivity Verification must be undertaken through the use of:
  - a. a desk top analysis, using satellite imagery; and
  - b. a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.
3. The outcome of the Initial Site Sensitivity Verification must be recorded in the form of a report that-
  - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the national web based environmental screening tool;
  - b. contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
  - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

An applicant intending to undertake an activity identified in the Scope of this Protocol, on a site identified as being of “very high sensitivity” for terrestrial biodiversity on the national web based environmental screening tool must submit a Terrestrial Biodiversity Impact Assessment.

However, where the information gathered from the Initial Site Sensitivity Verification or the specialist assessment differs from the designation of “very high” terrestrial biodiversity sensitivity from the national web based environmental screening tool and it is found to be of a “low” sensitivity, then a terrestrial biodiversity impact assessment is not required.

Should the above apply, a Terrestrial Biodiversity Compliance Statement is to be provided. An Environmental Assessment Practitioner or a suitably qualified and SACNASP registered specialist, must append to the Terrestrial Biodiversity Compliance Statement a motivation and evidence (e.g. photographs) of the changed Terrestrial Biodiversity sensitivity.





## Site survey

A reconnaissance survey of the entire site was conducted on 7 July 2020. At that time 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. Photographs and other information were collected to determine the current status of the site.

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 in 2016 was not favourable for documenting biodiversity but was adequate for determining the natural status of the site. It is likely that only a proportion of species present on site were identifiable at the time of the survey. A follow-up survey would be required to fully quantify floristic diversity, if this is considered to be necessary.

## 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 GDARD within the quarter degree squares in which the site is located. Information about the species on this list were updated from literature sources and from information provided by GDARD. 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.

According to GDARD “Requirements for Biodiversity Assessments”, all untransformed grasslands have to be classified as having high sensitivity.



## 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.

### 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 on the site is shown in Figures 8 to 11.



**Figure 8: View from eastern end of site (note alien trees in background).**

Significant parts of the site consists of previously mined or disturbed areas as well as previously cultivated areas. Based on historical aerial imagery, there is a small patch of vegetation on site that may possibly be in a natural state, but the species composition does not indicate this, which means this small area is probably also disturbed. All the habitat on site is covered with a uniform secondary grassland in which there are dotted indigenous and exotic trees.

Secondary grassland contained a variety of grass species, including *Andropogon appendiculatus*, *Aristida congesta subsp. congesta*, *Aristida diffusa*, *Cynodon dactylon*, *Digitaria erianthe*, *Eragrostis species*, *Eragrostis superba*, *Heteropogon contortus*, *Melinis repens*, *Pogonarthria squarrosa*, *Perotis patens*, *Brachiaria serrata*, *Setaria sphacelata* and *Sporobolus africanus*, accompanied by *Bulbostylis burchellii*, *Bidens bipinnata*, *Ceratotherca triloba*, *Pygmaeothamnus zeyheri*, *Senecio species*, *Pollichia campestris*, *Schkuhria pinnata*, *Nidorella hottentotica*, *Tagetes minuta* and *Vernonia poskeana*. This is a relatively diverse species composition for secondary vegetation, but includes primarily species expected in disturbed or secondary habitats, along with some remnants of nautal habitat. There were a number of woody species on site, including the indigenous species, *Searsia lancea*, *Searsia leptodictya*, *Lopholaena coriifolia*, *Vachellia nilotica*,



**Figure 9: Remnant surface gravel on parts of the site from quarrying activities.**

*Ziziphus mucronata*, *Dichrostachys cinerea*, *Ozoroa paniculosa*, *Vangueria infausta* and *Burkea africana*, and the exotic species *Acacia podalyriifolia*, *Eucalyptus camaldulensis*, *Lantana camara*, and *Melia azedarach*. Note that the woody species all occurred in the eastern half of the site that had not been previously cultivated.

### Flora of the site

All plant species found during the survey in remaining natural areas are listed in Appendix 2. Due to the fact that the fieldwork component of this survey was based on a single survey in winter, the species list provided is unlikely to be comprehensive, but provides a good indication of the species composition of the study area. It also provides adequate information for determining the natural status of habitats on site. In the species list (Appendix 2) all exotic species are indicated by an asterisk.



**Figure 10: Disturbed areas (excavations and stockpiles) from quarrying.**

A total of 54 species were recorded on the site during the field survey, 3 of which are exotic and an additional 9 of which are declared weeds or invader plants. The proportion of naturalized exotic and invader species is moderate high (22%), despite the high levels of disturbance of habitat on site. Any further analysis of the flora patterns is limited by the winter survey of the site which generates a reduced list of species present on site.



**Figure 11: Jeep track through previously cultivated part of site.**



### Disturbance on site

The vegetation on site is secondary and previously disturbed. This is due to previous sand mining and disturbance due to quarrying of most of the eastern part of the site (purple area in Figure 12), and previous cultivation on the western half of the site (yellow area in Figure 12). The remaining parts of the site have been continuously disturbed by various activities related to these two main disturbances.



**Figure 12: Previously cultivated areas (yellow) and previously mined areas (purple).**

### Plant species of concern

Listed species known for the grid in which the site is located are listed in Appendix 1. The list contains 29 species assessed according to IUCN Ver. 3.1 (IUCN, 2001) criteria (Appendix 1).

On the basis of habitat preferences the species could be allocated to habitats within the study area where they are most likely to be found. On the basis of information provided by GDARD, a total of 3 species were considered to have a moderate possibility of occurring on site. The other species listed (Appendix 1) have a low chance of occurring in the study area. All three species are found in grassland and, although secondary, the main habitat structure on site is grassland. The fact that it is secondary means it is unlikely that any of these three species would occur there.

Two species identified in the DEA online screening tool were included in this assessment and were considered to have a low likelihood of occurring on site. The orchid, *Brachycorythis conica* subsp. *transvaalensis* is found in short grasslands and/or hillsides, on sandy gravel overlying dolomite, sometimes also on quartzites; occasionally in open woodland, at elevations of 1000-1705 m. At around 1260 m above sea level, the site is within this altitude range, and the substrate is potentially suitable, but the species is unlikely to occur in previously disturbed areas. The herb, *Dicliptera magaliesbergensis*, is found in forest, savanna, riverine forest and bush, which does not occur on site.

None of the other species listed in Appendix 1 were found on site and, on the basis of the field survey and habitat requirements, there is a possibility that they could occur there.





### **Sensitivity assessment**

There are no parts of the site that are considered to be sensitive. None of the vegetation on site is considered to be in a natural state (all secondary). No parts of the site are within a listed ecosystem or within a C-Plan designated category.



## Discussion

The requirements of this study were to undertake an Initial Site Sensitivity Verification with respect to Terrestrial Biodiversity, as well as for Plants. The web-based screening tool identified the site as being of Very High sensitivity with respect to Terrestrial Biodiversity and Medium sensitivity for Plants. The Initial Site Sensitivity Verification is based on a desktop assessment and a field site verification visit. The results presented here are based on a combination of these two sources.

There appears to be a discrepancy between the sensitivity from the online screening tool and mapped regional Plans. The Very High sensitivity for Terrestrial Biodiversity appears to be a mapping error whereby a C-Plan designated polygon for an “Important” area was not “closed”. The result is that the entire area surrounding this was included within this C-Plan area, whereas the Gauteng C-Plan clearly shows that the site is NOT within any such area (see Figure 7). The site is also not within any threatened ecosystem (see Figure 6) and was found to have only secondary vegetation in previously disturbed areas (based on field site visit as well as historical aerial imagery, Figures 4 and 5, and information from the Surveyor-General’s 1:50 000 topocadastral map of the site, Figure 3). The historical disturbances on site due to previous cultivation on site as well as to quarrying and sand mining activities. The combination of these various historical activities has entirely modified the original natural vegetation so that it is currently composed of secondary grassland with scattered indigenous and exotic trees.

The site is within one regional vegetation type, a grassland vegetation type called Gold Reef Mountain Bushveld, classified as Least Concern, and not 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).

According to the Gauteng C-Plan (version 3.3), none of the site is within a designated area, although adjacent areas to the south are within areas mapped as “Ecological Support Area”.

There are three listed plant species that have habitat requirements that are partially met by those found on site, but none of these species were found on site. Based on the field survey, it is considered unlikely that any of these species could occur there.

Transformed areas on site are not considered to be particularly sensitive or valuable from a botanical perspective. All other areas on site are considered to have LOW sensitivity.



## Conclusion

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

- The entire site is considered to have secondary grassland in previously cultivated and/or mined areas. These areas are considered to have LOW sensitivity. This is in contrast to the VERY HIGH sensitivity given in the online screening tool assessment for the site. The verification provided here, supported by a desktop assessment and a field verification, confirms that the site has LOW sensitivity.



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## Appendix 1: Red / Orange List plant species recorded within the quarter degree within which the study area is situated, namely 2528CA.

<i>Taxon</i>	<i>Latest (IUCN version 3.1) Conservation Status**</i>	<i>Habitat</i>	<i>Flowering Time</i>	<i>Probability of occurrence*</i>
<i>Adromischus umbraticola subsp. umbraticola</i>	Near Threatened (NT)	Rock crevices on rocky ridges, usually south-facing, or in shallow gravel on top of rocks, but often in shade of other vegetation.	September-January	<b>LOW</b> , habitat does not match
<i>Alepidia attenuata</i>	Near Threatened (NT)	Wetlands in grassland.	January-March	<b>LOW</b> , habitat does not match
<i>Aloe peglerae</i>	Endangered (EN)	Grassland, in shallow, gravelly quartzitic soils on rocky north-facing slopes or summits of ridges.	July-August	<b>LOW</b> , no suitable habitat on site
<i>Boophone disticha</i>	Declining	Dry grassland and rocky areas.	October-January	<b>LOW</b> , habitat does not match
<i>Bowiea volubilis subsp. volubilis</i>	Near Threatened (NT)	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	September-April	<b>LOW</b> , no suitable habitat on site
<i>Brachycorythis conica subsp. transvaalensis</i>	Endangered (EN)	Short grasslands, hillsides, on sandy gravel overlying dolomite, sometimes also on quartzites; occasionally open woodland, 1000-1705 m.	January-March	<b>LOW</b> , no suitable natural habitat on site
<i>Callilepis leptophylla</i>	Declining	Grassland or open woodland, often on rocky outcrops or rocky hillslopes.	August–January & May	<b>LOW</b> , no suitable habitat on site
<i>Cheilanthes deltoidea subsp. silicola</i>	Vulnerable (VU)	Southwest-facing soil pockets and rock crevices in chert rock.	November-June	<b>LOW</b> , geology & habitat does not match

<i>Cineraria austrotransvaalensis</i>	Near Threatened (NT)	Amongst rocks on steep slopes of hills and ridges, as well as at the edge of thick bush or under trees; on all aspects and on a range of rock types: quartzite, dolomite and shale; 1400 – 1700 m.	March-June	<b>LOW</b> , habitat does not match
<i>Ceropegia deciduas subsp. pretoriensis</i>	Vulnerable (VU)	Direct sunshine or shaded situations, rocky outcrops of the quartzitic Magaliesberg mountain series, in pockets of soil among rocks, in shade of shrubs and low trees, can be seen twining around grass spikes. 2528CC	November-April	<b>LOW</b> , geology / habitat does not match
<i>Cleome conrathii</i>	Near Threatened (NT)	Stony quartzite slopes, usually in red sandy soil, grassland or open to closed deciduous woodland, all aspects.	March-May, December-January	<b>LOW</b> , habitat does not match
<i>Crinum macowanii</i>	Declining	Grassland, along rivers, in gravelly soil or on sandy flats.	October-January	<b>LOW</b> , no suitable habitat on site
<i>Delosperma leendertziae</i>	Near threatened (NT)	Rocky ridges on rather steep south-facing slopes of quartzite in mountain grassveld.	October-April	<b>LOW</b> , habitat does not match
<i>Dicliptera magaliesbergensis</i>	Vulnerable (VU)	Forest, savanna, riverine forest and bush.	February-April	<b>LOW</b> , habitat does not match
<i>Drimia altissima</i>	Declining	Hot, dry bushveld and thicket.	September-February	<b>LOW</b> , habitat does not match
<i>Drimia sanguinea</i>	Near threatened (NT)	Open veld and scrubby woodland in a variety of soil types.	August-December	<b>LOW</b> , habitat does not match
<i>Eucomis autumnalis subsp. clavata</i>	Declining	Open grassland, marshes.	November-April	<b>LOW</b> , habitat does not match
<i>Gunnera perpensa</i>	Declining	Western Cape to Ethiopia. Damp marshy area and vleis from coast to 2400 m.	October-March	<b>LOW</b> , habitat does not match
<i>Habenaria barbetoni</i>	Near threatened (NT)	In grassland on rocky hillsides.	February-March	<b>LOW</b> , habitat does not match
<i>Habenaria kraenzliniana</i>	Near threatened (NT)	Terrestrial in stony, grassy hillsides, recorded from 1000 to 1400 m.	February-April	<b>LOW</b> , habitat does not match

<i>Habenaria mossii</i>	Endangered (EN)	Open grassland on dolomite or in black sandy soil.	March-April	<b>LOW</b> , habitat does not match
<i>Holothrix randii</i>	Near threatened (NT)	Grassy slopes and rock ledges, usually southern aspects.	September-October	<b>LOW</b> , habitat does not match
<i>Hypoxis hemerocallidea</i>	Declining	Grassland and mixed woodland.	January-March	<b>MEDIUM</b> , habitat partially matches
<i>Ilex mitis var. mitis</i>	Declining	Riverbanks, streambeds, evergreen forests.	October-December	<b>LOW</b> , habitat does not match
<i>Lithops lesliei subsp. lesliei</i>	Near threatened (NT)	Primary habitat appears to be the arid grasslands in the interior of South Africa where it usually occurs in rocky places, growing under the protection of surrounding forbs and grasses.	March-June	<b>LOW</b> , habitat does not match
<i>Melolobium subspicatum</i>	Vulnerable (VU)	Grassland.	September-May	<b>MEDIUM</b> , habitat partially matches
<i>Pearsonia bracteata</i>	Near threatened (NT)	Plants in Gauteng and North West occur in gently sloping Highveld grassland, while those in the Wolkberg were collected from steep wooded slopes and cliffs in river valleys.	December-April	<b>MEDIUM</b> , habitat partially matches
<i>Prunus africana</i>	Vulnerable (VU)	Evergreen forests near the coast, inland mistbelt forests and afro-montane forests up to 2100 m.	December-June	<b>LOW</b> , habitat does not match
<i>Xerophyta adendorffii</i>	Vulnerable (VU)	Dolomite and quartzite ridges and outcrops.	September-March	<b>LOW</b> , habitat does not match

\* 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. \*IUCN (3.1) Categories: VU = Vulnerable, EN = Endangered, CR = Critically Endangered, NT = Near Threatened.



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

Species	Category
<i>Acacia podalyriifolia</i> *	Category 1b
<i>Andropogon appendiculatus</i>	
<i>Aristida congesta</i> subsp. <i>congesta</i>	
<i>Aristida diffusa</i>	
<i>Aristida</i> species	
<i>Bidens bipinnata</i> *	
<i>Brachiaria serrata</i>	
<i>Bulbostylis burchellii</i>	
<i>Burkea africana</i>	
<i>Cenchrus setaceus</i> *	Category 1b
<i>Ceratotheca triloba</i>	
<i>Cereus jamacaru</i> *	Category 1b
<i>Combretum zeyheri</i>	
<i>Croton gratissimus</i>	
<i>Cryptolepis oblongifolia</i>	
<i>Cymbopogon pospischillii</i>	
<i>Cynodon dactylon</i>	
<i>Dichrostachys cinereus</i>	
<i>Digitaria erianthe</i>	
<i>Dombeya rotundifolia</i>	
<i>Englerophytum magalismsontanum</i>	
<i>Eragrostis rigidior</i>	
<i>Eragrostis superba</i>	
<i>Eucalyptus camaldulensis</i> *	Category 1b within riparian areas, Protected Areas, Listed Ecosystems, Fynbos, Grassland, Savanna, Albany Thicket, Forest, Indian Ocean Coastal Belt, with some exclusions (see Act)
<i>Heteropogon contortus</i>	
<i>Jacaranda mimosifolia</i> *	Category 1b in GP, KZN, LIM, MP, NW, not listed for urban areas, with other exclusions (see Act)
<i>Lantana camara</i> *	Category 1b
<i>Lopholaena coriifolia</i>	
<i>Melia azeradach</i> *	Category 1b, 3 in urban areas
<i>Melinis repens</i>	
<i>Nidorella hottentotta</i>	
<i>Ozoroa paniculosa</i> subsp. <i>salicina</i>	
<i>Parinari capensis</i>	
<i>Pelargonium</i> species	
<i>Pennisetum sphacelatum</i>	
<i>Perotis patens</i>	
<i>Pollichia campestris</i>	
<i>Pogonarthria squarrosa</i>	

<i>Polydora poskeana</i>	Category 2
<i>Pygmaeothamnus zeyheri</i>	
<i>Schkuhria pinnata</i> *	
<i>Searsia lancea</i>	
<i>Searsia leptodictya</i>	
<i>Senecio</i> species	
<i>Setaria sphacelata</i>	
<i>Solanum mauritianum</i> *	Category 1b
<i>Sporobolus africanus</i>	
<i>Tagetes minuta</i> *	
<i>Themeda triandra</i>	
<i>Triumfetta</i> species	
<i>Vachellia nilotica</i>	
<i>Vachellia robusta</i>	
<i>Vangueria infausta</i>	
<i>Ziziphus mucronata</i>	

