

**An evaluation of the vegetation on Portions 41, 179, 183
and 188 of the farm Olifantsfontein 410JR, Gauteng
Province**

by

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Commissioned by
Calgro M3

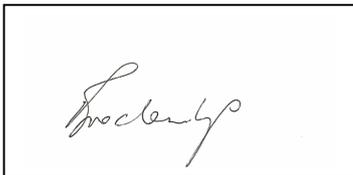
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DECLARATION OF INDEPENDENCE

I, George Johannes Bredekamp, Id 4602105019086, declare that I:

- Am a member of Eco-Agent CC, CK 95/37116/23
- Act as an independent specialist consultant in the field of ecology, vegetation science and botany
- Am registered with the South African Council for Natural Scientific Professions Registration Number 400086/83
- Am assigned as specialist consultant by Calgro M3 for the proposed project “An evaluation of the vegetation on Portions 41, 179, 183 and 188 of the farm Olifantsfontein 410JR, Gauteng Province” described in this report
- Do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work performed
- Have or will not have any vested interest in the proposed activity proceeding
- Have no and will not engage in conflicting interests in the undertaking of the activity
- Undertake to disclose to the client and the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006
- Will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



GJ Bredekamp

THE PROPOSED DEVELOPMENT

A mixed development is planned for the area.

ASSIGNMENT

Eco-Agent CC was commissioned by Calgro M3 to assess the vegetation on the site proposed for development, with special reference to Egoli Granite Grassland.

The assignment is interpreted as follows: Compile a study on the Vegetation on the property of the area, including an assessment of red data plant species. In order to compile this, the following had to be done:

1. Initial preparations:

- Obtain all relevant maps, and information on the natural environment of the concerned area.
- This includes information on red data plant species that may occur in the area.

2. Vegetation and habitat survey: In each vegetation type / plant community on site:

- Identify the Vegetation Type of the area
- List the plant species (trees, shrubs, grasses and herbaceous species) present for plant community and ecosystem delimitation.
- Identify potential red data plant species, alien plant species, and medicinal plants.

3. Plant community delimitation and description

- Process data (vegetation and habitat classification) to determine vegetation types (= plant communities) on an ecological basis.
- Describe the habitat and vegetation.
- Determine the sensitivity of each plant community on basis of biodiversity, veld condition and presence of rare or protected species.

- Prepare a vegetation map of the area if more than one plant community is present.
- Prepare a sensitivity map of the plant communities present.

4. General

- Identify and describe particular ecologically sensitive areas.
- Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
- Make recommendations on aspects that should be monitored during development.

RATIONALE

To ensure that sustainable development takes place, it is therefore important that the environment is considered before relevant authorities approve any development. This led to legislation protecting the natural environment. The Environment Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the the National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004) ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities.

All components of the ecosystems (physical environment, vegetation, animals) of a site are interrelated and interdependent. A holistic approach is therefore imperative to effectively include the development, utilisation and where necessary conservation of the given natural resources in an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001). As far as the request of GDACE goes, it is therefore necessary to make a thorough inventory of the plant species at the site of the proposed development and their associated habitats (i.e. ecosystems), in order to evaluate its potential for the possible presence of the red data plant site species.

Egoli Granite Grassland

Bredenkamp, Brown and Pfab (2006) reported as follows on Egoli Granite Grassland:

Egoli Granite Grassland is restricted to the Gauteng Province of South Africa and is located north of the Roodepoort / Krugerdorp ridge complex and stretches over a distance of approximately 35 km to Centurion in the north. This grassland stretches over a distance of approximately 50 km in a westerly direction from the R21 highway in the east. The 28⁰ longitude and 26⁰ latitudinal lines cross in the centre of the grassland.

Due to high demand for developable land in Gauteng, and especially the Johannesburg / Pretoria corridor, the Egoli Granite Grassland is under extreme pressure. Large areas are already developed for residential, industrial and commercial purposes, which has led to the destruction of vast tracts of this grassland. At least 61% of Egoli Granite Grassland has been permanently transformed, 27% by urban development, 17% by smallholdings, 12% by agriculture (cultivated lands) and 5% by other impacts such as exotic plantations, mining and planted pastures (An estimated additional 17% of Egoli Granite Grassland is degraded due to overgrazing and the operation of edge effects associated with a highly fragmented landscape, such as trampling, increased pollutants and the infestation of weedy and other alien species. It is therefore highly likely that the national target for this grassland type, 25% of the total extent, will never be realized.

Egoli Granite Grassland is extremely poorly conserved, with only 0.02% (26 ha) of the vegetation type currently protected, including 3ha in Glen Austin Bird Sanctuary, 3ha in Melville Koppies Nature Reserve, 9ha in Ruimsig Nature Reserve and 11ha in the Walter Sisulu Botanical Gardens. The current protection status of Egoli Granite Grassland is therefore completely inadequate, with only 0.1% of the national target actually achieved. In order to meet South Africa's international obligations in terms of the Convention on Biological Diversity, it is imperative that the Gauteng provincial government put in place measures to improve the conservation status of Egoli Granite Grassland.

Any viable remnant patch of original Egoli Granite Grassland must therefore be protected from transforming land uses. In order to assess whether a valuable remnant patch will be affected by a proposed development, environmental consultants involved in vegetation impact assessments are required by the Gauteng Department of Agriculture, Conservation and Environment (GDACE) to

assess the presence and condition of Egoli Granite Grassland on any site proposed for development.

The substrate of the Johannesburg Dome granites (Halfway House Granites, is suitable for development. The area is well situated between Johannesburg, the economic powerhouse of South Africa, and Pretoria the administrative capital of the country. There is therefore an enormous demand for developable land in this area, which has resulted in the loss of large tracts of the original Egoli Granite Grassland. Due to general disturbance, ploughing and degradation, an estimated 60% of the remaining original Egoli Granite Grassland has been transformed to *Hyparrhenia hirta* dominated grassland. Only relatively small scattered pockets of the original grassland are still intact and these are considered rare and highly threatened. Due to its high species richness and restricted occurrence, this endemic grassland has a high conservation value.

Furthermore the bottomland areas and wetlands within the Egoli Granite Grassland provide suitable habitat for various sensitive fauna species such as the Red Listed Grass Owl (*Tyto capensis*) and the Near Threatened Giant Bullfrog (*Pyxicephalus adspersus*).

Egoli Granite Grassland is a poorly conserved, severely transformed, highly fragmented and degraded vegetation type. It is estimated that only 22% of the original extent of Egoli Granite Grassland remains in its original state. Many of these remnant areas are likely to be destroyed in the near future due to previously authorized developments (e.g. Cosmo City to the north-west of Johannesburg) or illegal activities. It is therefore essential that any viable remnant patch of original Egoli Granite Grassland is conserved.

Areas associated with transformed grassland, where *Hyparrhenia hirta* is dominant and species richness is low, have a low value with respect to achieving the national conservation target for Egoli Granite Grassland.

A mixture of various grasses and high forb diversity renders the original Egoli Granite Grassland with a high conservation value and conservation of remnant areas is especially important since it **is unlikely that the transformed anthropogenic grassland will return to the original climax vegetation.**

Since Egoli Granite Grassland is endemic to Gauteng, its protection is both a provincial and national priority. It also forms part of an area where biodiversity and ecosystem services are at great risk, due to pressure to develop, and focused on-the-ground conservation actions are required.

STUDY AREA

Location

The property situated on Portions 41, 179, 183 and 188 of the farm Olifantsfontein 410JR, Gauteng. The size of the properties involved is 380.4 hectares.

The following applies:

- There are **no ridges** on the site.
- The site does not fall within a conservancy.
- The site does not fall within a protected area.
- The site does fall within a dolomite area.
- There are **wetland** areas on the site, mainly a pan and man-made quarries, and a small portion of a stream
- There are no sensitive terrestrial areas on the site.

Vegetation Types

The site is situated in the Bankenveld Veld Type as described by Acocks (1988). Low & Rebelo described the vegetation of the area also as Rocky Highveld Grassland. In the new vegetation map of South Africa (Mucina & Rutherford. 2006) the area falls within the **Egoli Granite Grassland**.

The area is topographically a uniform, slightly sloped plain, mostly covered with old fields, planted pasture, secondary Anthropogenic grassland and wattle plantations. .

Due to decades of habitation, the natural vegetation was long ago transformed into agricultural fields now replaced by secondary grassland, wattle plantations and sand and granite mining activities.

Other relevant studies in the area include those of Bredenkamp & Brown (2003), Bredenkamp *et al.* (2006) and Grobler *et al.* (2006).

Figure 1: The garden area at the residence

Figure 2: The *Acacia* veld surrounding the garden

METHODS

The vegetation was mapped into relatively homogenous units based on recent aerial photographs of the area. Very little primary vegetation remained. At several plots within each relatively homogeneous mapping unit, a description of the dominant and characteristic species was made. These descriptions were based on total floristic composition of each unit, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). Data recorded included a list of the plant species present, including trees, shrubs, grasses and forbs. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al.* 2000) and are considered to be an efficient method of describing vegetation and capturing species information. Notes were additionally made of any other features that might have an ecological influence.

The identified system is described in terms of their plant species composition, and evaluated in terms of the potential habitat for red data plant species.

If present, alien invasive species, according to the Conservation of Agricultural Resources Act (Act No.43 of 1983) as listed in Henderson (2001), are indicated. If present, medicinal plants are indicated according to Van Wyk, Van Oudthoorn & Gericke (1997).

The field observations were supplemented by literature studies from the area.

Conservation priority

The following five conservation priority categories were used for each vegetation unit:

High: Ecologically sensitive and valuable land with high species richness that should be conserved and no developed allowed.

Medium-high: Land where smaller sections are disturbed but which is in general ecologically sensitive to development/disturbances. This includes primary grassland that has been disturbed to a certain degree, but should recover when disturbances are removed, or when properly

managed. Development will not be supported.

Medium: Land on which low impact development with limited impact on the vegetation / ecosystem could be considered. It is recommended that certain portions of the natural vegetation be maintained as open space.

Medium-low: Land that has little conservation value on which development could be supported. This includes secondary grassland with little chance to recover to typical primary condition.

Low: Land with no conservation value on which development could be supported.

Sensitivity

According to the GDACE minimum requirement only High and Low sensitivity must be indicated. No development will be allowed on High sensitive areas.

In terms of sensitivity the following criteria applies:

High: High and Medium-High conservation priority categories mentioned above are considered to have a High sensitivity and development should not be supported.

Low: Medium, Medium-Low and Low conservation priority categories mentioned above are considered to have a Low sensitivity and development may be supported. Portions of vegetation with a Medium conservation priority should be conserved.

RESULTS: PLANT COMMUNITY AND PLANT SPECIES

Classification

Number	Vegetation Unit	Sensitivity
1	Old Fields & <i>Eragrostis</i> Planted Pasture	Low
2	Secondary Anthropogenic <i>Hyparrhenia</i> Grassland	Low
3	Transformed Secondary Grassland	Low
4	Extremely disturbed areas	Low
5	Alien Plantations	Low
6a	Pan Wetland	High
6b	<i>Eragrostis</i> Wetland Fringe	High
6c	<i>Stoebe</i> Disturbed Pan Area	High
7	Old Mining Area	Low
8	Spruit	High

DESCRIPTION OF VEGETATION

1. Old Fields and *Eragrostis* Planted Pastures

These areas were old fields long ago, but since *Eragrostis* planted pastures have been established. The general impression of the vegetation of these areas is that it is quite disturbed, with *Eragrostis curvula* dominant. The tall growing anthropogenic grass *Hyparrhenia hirta* is mostly not present but locally in isolated patches it may be present. Weedy species are found throughout the unit. Most of this area is very low in species richness.

Community 1 : Old Fields and <i>Eragrostis</i> Planted Pastures			
Status	Old fields and planted pastures Quite disturbed		
Soil	Sandy soils	Rockiness	0-1%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Medium-Low	Need for rehabilitation	Medium
Dominant spp.	<i>Eragrostis curvula</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	-	-
Shrubs	0.5	<1
Grass	0.4-0.8	65
Forbs	1.5	1-5 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

Stoebe vulgaris

Grasses

Aristida congesta

Cynodon dactylon

Eragrostis chloromelas

d

Eragrostis curvula

d

Eragrostis plana

Hyparrhenia hirta

Forbs

Helichrysum nudifolium

Helichrysum rugulosum

Schkuhria pinnata

W

Senecio erubescens

Solanum incanum

W

Tagetes minuta

W

Discussion and Conclusion

This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported.

2. Secondary Anthropogenic *Hyparrhenia* Grassland

These areas were old fields long ago, or areas where sand was stripped from the surface for sand mining. The general impression of the vegetation of these areas is that it is quite disturbed, with *Hyparrhenia hirta* dominant while *Eragrostis curvula*, *Eragrostis chloromelas*, *Eragrostis plana*, *Cynodon dactylon* and *Aristida congesta* are mostly present. Weedy species are found throughout the unit. Most of this area is very low in species richness. Some road tracks transect the area, here weeds are more prominent.

Community 2 : Secondary Anthropogenic <i>Hyparrhenia</i> Grassland			
Status	Old fields or old mining areas - Quite disturbed but covered with secondary grassland		
Soil	Sandy soils	Rockiness	0-1%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Low	Need for rehabilitation	Medium
Dominant spp.	<i>Hyparrhenia hirta</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	-	<1-
Shrubs	0.5	<1
Grass	0.4-1.8	50-70
Forbs	1.5	1-5 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

<i>Acacia karroo</i>		<i>Solanum mauritianum</i>	A
<i>Acacia mearnsii</i>	A	<i>Stoebe vulgaris</i>	
<i>Searsia pyroides</i>			

Grasses

<i>Aristida congesta</i>		<i>Eragrostis curvula</i>	d
<i>Cynodon dactylon</i>		<i>Eragrostis plana</i>	
<i>Eragrostis chloromelas</i>	d	<i>Hyparrhenia hirta</i>	D

Forbs

<i>Conyza bonariensis</i>	w	<i>Schkuhria pinnata</i>	W
<i>Datura stramonium</i>	W	<i>Selago densiflora</i>	W
<i>Gomphocarpus fruticosa</i>	W	<i>Senecio erubescens</i>	
<i>Helichrysum nudifolium</i>		<i>Solanum incanum</i>	W
<i>Helichrysum rugulosum</i>		<i>Solanum sysimbrifolium</i>	W
<i>Nidorella anomala</i>		<i>Tagetes minuta</i>	W
<i>Pseudognaphaleum luteoalbum</i>	W	<i>Vernonia oligocephala</i>	
<i>Richardia braziliensis</i>	W		

Discussion and Conclusion

The area is dominated by tall grass with most herbaceous species present being weeds. This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported.

3. Transformed Secondary Grassland

These areas were where sand was stripped from the surface for sand mining, or other areas where there had been a severe impact on the natural vegetation. The general impression of the vegetation of these areas is that it is very degraded, rather seen as transformed, with *Hyparrhenia hirta* dominant while weedy species are found throughout the unit. Most of this area is very low in species richness.

Community 3 : Transformed Secondary Grassland			
Status	Highly disturbed, transformed, but covered with secondary grassland		
Soil	Sandy soils	Rockiness	0-5%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Low	Need for rehabilitation	Medium
Dominant spp.	<i>Hyparrhenia hirta</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	-	<1-
Shrubs	0.5	<1
Grass	0.4-1.8	40-60
Forbs	1.5	1-5 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

<i>Acacia mearnsii</i>	A	<i>Searsia pyroides</i>	
<i>Melia azedarach</i>	A	<i>Solanum mauritianum</i>	A
<i>Ricinus communis</i>	A	<i>Stoebe vulgaris</i>	D

Grasses

<i>Aristida congesta</i>		<i>Eragrostis plana</i>	
<i>Cynodon dactylon</i>		<i>Hyparrhenia hirta</i>	D
<i>Eragrostis chloromelas</i>	d	<i>Melinis repens</i>	
<i>Eragrostis curvula</i>	d		

Forbs

<i>Amaranthus hybridus</i>	W	<i>Richardia braziliensis</i>	W
<i>Bidens bipinnata</i>	dW	<i>Schkuhria pinnata</i>	W
<i>Bidens formosa</i>	W	<i>Selago densiflora</i>	W
<i>Conyza bonariensis</i>	w	<i>Senecio erubescens</i>	
<i>Datura stramonium</i>	W	<i>Solanum incanum</i>	W
<i>Gomphocarpus fruticosa</i>	W	<i>Solanum sysimbrifolium</i>	W
<i>Ipomoea purpurea</i>	W	<i>Tagetes minuta</i>	W
<i>Pseudognaphaleum luteoalbum</i>	W	<i>Vernonia oligocephala</i>	

Discussion and Conclusion

The area is totally disturbed and transformed, but often dominated by tall grass and with most herbaceous species present being weeds. This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported.

4. Extremely disturbed areas

These areas were where sand was stripped from the surface for sand mining, or other areas where there had been a severe impact on the natural vegetation. The general impression of the vegetation of these areas is that it is very degraded, rather seen as transformed, with *Hyparrhenia hirta* dominant while weedy species are found throughout the unit. Most of this area is very low in species richness.

Community 4 : Extremely disturbed areas			
Status	Extremely disturbed, transformed, topsoil removed, bare soils		
Soil	Sandy soils with outcrop	Rockiness	0-15%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Low	Need for rehabilitation	High
Dominant spp.	<i>weeds</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	-	-
Shrubs	-	-
Grass	0.3	10-15
Forbs	0.2	1-5 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

<i>Acacia mearnsii</i>	A	<i>Stoebe vulgaris</i>	D
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Grasses

<i>Aristida congesta</i>		<i>Eragrostis curvula</i>	d
<i>Cynodon dactylon</i>		<i>Hyparrhenia hirta</i>	d
<i>Eragrostis chloromelas</i>	d	<i>Melinis repens</i>	

Forbs

<i>Bidens bipinnata</i>	dW	<i>Richardia braziliensis</i>	W
<i>Conyza bonariensis</i>	w	<i>Schkuhria pinnata</i>	W
<i>Datura stramonium</i>	W	<i>Solanum sysimbrifolium</i>	W
<i>Pseudognaphaleum luteoalbum</i>	W	<i>Tagetes minuta</i>	W

Discussion and Conclusion

The area is severely disturbed and transformed, with mainly bare soil but patches may be dominated by tall grass and with most herbaceous species present being weeds. This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported.

5. Wattle Plantations

Several patches of Wattle plantations, or old plantations, or Wattle encroachment are found scattered over the site. Locally, where there were old residences, now only ruins, some other alien trees are also present. The general impression of the original vegetation of these areas is totally transformed, with almost no undergrowth remaining under the wattle trees.

Community 5: Wattle Plantations			
Status	Extremely disturbed, transformed, bare soils		
Soil	Sandy soils	Rockiness	0-1%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Low	Need for rehabilitation	High
Dominant spp.	<i>Acacia mearnsii</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	12-15	60-80
Shrubs	1-3	15
Grass	0.3	1
Forbs	0.2	1-3 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

<i>Acacia mearnsii</i>	DA	<i>Pinus</i> sp	A
<i>Cedrus</i> sp	A	<i>Populus alba</i>	A
<i>Eucalyptus</i> sp	A	<i>Searsia lancea</i> (planted)	
<i>Melia azedarach</i>	A	<i>Solanum mauritianum</i>	A

Grasses

<i>Aristida congesta</i>		<i>Eragrostis curvula</i>	
<i>Cynodon dactylon</i>		<i>Melinis repens</i>	
<i>Eragrostis chloromelas</i>			

Forbs

<i>Bidens bipinnata</i>	dW	<i>Schkuhria pinnata</i>	W
<i>Conyza bonariensis</i>	w	<i>Solanum sysimbrifolium</i>	W
<i>Datura stramonium</i>	W	<i>Tagetes minuta</i>	W

Discussion and Conclusion

The area is severely disturbed and transformed, with mainly wattle trees and with most herbaceous species present being weeds. This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported.

6. Pans

Two pans are situated in the area. The one is located within the site, the other is actually outside the site, but a small portion is inside the far south-western corner. The pans have 2-3 zones, namely:

6a - the wet core area with hygrophilous species,

6b - a fringe area with *Eragrostis plana* and

6c - the outside rim which is the result of mining and this area is highly disturbed, dominated by *Stoebe vulgaris*.

This entire pan area, including all the zones, is considered to be ecologically sensitive, and will be described as a whole..

Community : Pans			
Status	Wetlands with various zones		
Soil	Clay centre and Sandy fringes	Rockiness	0%,
Conservation Value	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Acacia mearnsii</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	-	-
Shrubs	0.4	30 (outer zones)
Grass and sedges	0.4	50 (inner zones)
Forbs	0.2	10

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

Stoebe vulgaris D

Grasses and sedges

Andropogon eucomus

Eragrostis gummiflua

Aristida congesta

Eragrostis plana d

Cynodon dactylon

Hyparrhenia hirta

Cyperus spp

Schoenoplectus corymbosus d

Eragrostis chloromelas

Forbs

Centella coriacea

Persicaria serrulata

Conyza bonariensis

Schkuhria pinnata

W

W

Helichrysum nudifolium

Solanum sysimbrifolium W

Helichrysum rugulosum

Tagetes minuta

Hypoxis rigidula

W

Discussion and Conclusion

The pan areas are ecologically sensitive and should be protected. It is suggested that the pans and a 32 m buffer zone from the outer edge of the pans be protected from any developments and incorporated as green belt in the development plan. This is in accordance with the GDACE and DWAF policies.

7. Old Mining Area

This old mining area is totally disturbed and transformed. Two large dams, old quarrie areas, are present in this unit. The natural vegetation in the area has been replaces and mostly alien tree species occur here. Wattle is dominant. On the water fringe is reed (*Phragmites australis*) very prominent. Other prominent species include *Cortaderia seloana*. The general impression of the vegetation of these areas is that it is very degraded, rather seen as transformed, with Wattle dominant while weedy species are found throughout the unit. Most of this area is very low in species richness.

Community 7 : Old Mining Area			
Status	Extremely disturbed, transformed, mine area, quarries		
Soil	Sandy disturbed soils	Rockiness	0-5%,
Conservation Value	Low	Sensitivity:	Low
Agricultural potential:	Low	Need for rehabilitation	High
Dominant spp.	Wattle, weeds		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	12	25
Shrubs	1-3	10-15
Grass	0.3	10-15
Forbs	0.2	1-5 (mostly weeds)

The following plant species were recorded in this plant community: A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed.

Trees and shrubs

<i>Acacia mearnsii</i>	A	<i>Solanum mauritianum</i>	A
<i>Melia azedarach</i>	A	<i>Stoebe vulgaris</i>	D
<i>Pyracantha</i> sp	A	<i>Tipuana tipo</i>	A
<i>Searsia pyroides</i>			

Grasses

<i>Aristida congesta</i>		<i>Eragrostis curvula</i>	d
<i>Cortaderia seloana</i>	A	<i>Hyparrhenia hirta</i>	d
<i>Cynodon dactylon</i>		<i>Melinis repens</i>	
<i>Eragrostis chloromelas</i>	d		

Forbs

<i>Amaranthus hybridus</i>	W	<i>Richardia braziliensis</i>	W
<i>Bidens bipinnata</i>	dW	<i>Schkuhria pinnata</i>	W
<i>Conyza bonariensis</i>	w	<i>Solanum sysimbrifolium</i>	W
<i>Datura stramonium</i>	W	<i>Tagetes minuta</i>	W
<i>Pseudognaphaleum luteoalbum</i>	W		

Discussion and Conclusion

The area is severely disturbed and transformed, with mainly bare soil but patches may be dominated by Wattle or tall grass and with most herbaceous species present being weeds. This area has no conservation value, low sensitivity. No signs of the original grassland are present and the proposed development can be supported. The quarries could be developed as recreation facilities.

8. Spruit

The spruit is located on the southern boundary with the area where development has been approved (the Remainder Portion). The spruit is mostly in the Remainder Portion located south of the site investigated and reported on in this report. However, a small part of the spruit forming the catchment area, and also a small dam in the spruit fall within the current site. This area forms a moist grassland in the catchment and a wetland at and below the small dam. In the catchment are several *Eucalyptus* trees and at the dam is also a few alien trees, but no indigenous woody riparian vegetation is present. Below the dam the wetland is covered with reeds (*Phragmites australis*), but this merges into the adjacent southern property.

8. Spruit			
Status	Wetland		
Soil	Wetland soil	Rockiness	0
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	High (alien woody species)
Dominant spp.	<i>Eragrostis plana</i> , <i>Sporobolus africanus</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	15	5
Shrubs	0.5-2	1
Grass and Sedge	0.6	75
Forbs	0.3	10

The following plant species were recorded in this plant community (excluding the house gardens): A = Alien woody species, D = Dominant, d = subdominant, M = Medicinal plant species, P = Protected species, RD = Red data listed plant, W = weed, G = Indigenous Planted.

Trees and shrubs

<i>Acacia mearnsii</i>	A	<i>Asparagus lariginus</i>
<i>Eucalyptus</i> sp	A	

Grasses and Sedges

<i>Cyperus</i> spp		<i>Panicum maximum</i>
<i>Eragrostis curvula</i>		<i>Phragmites australis</i>
<i>Eragrostis plana</i>	D	<i>Schoenoplectus corymbosus</i>
<i>Hyparrhenia hirta</i>		<i>Setaria sphacelata</i>
<i>Leersia hexandra</i>		

Forbs

<i>Amaranthus hybridus</i>	W	<i>Solanum sysimbrifolium</i>	W
<i>Bidens bipinnata</i>	W	<i>Tagetes minuta</i>	W
<i>Conyza bonariensis</i>	W	<i>Teucrium trifidum</i>	
<i>Schkuhria pinnata</i>	W	<i>Verbena braziliensis</i>	W

. Discussion and Conclusion

The spruit area is ecologically sensitive and should be protected. It is suggested that the a 32 m buffer zone from the outer edge of the spruit (or the 1 in 100 year flood line, whichever is the greater) be protected from any developments and incorporated as green belt in the development plan. This includes the catchment area. This is in accordance with the GDACE and DWAF policies.

RED DATA PLANT SPECIES

The following plant species were previously recorded from the area grid in which the site is situated:

SPECIES	FLOWERING SEASON	PREFERRED HABITAT	PRIORITY GROUPING	CONSERVATION STATUS	HABITAT ON SITE
<i>Bonatea speciosa</i> var. <i>speciosa</i>	January-March	Savanna.	N/A	Declining	No
<i>Bowiea volubilis</i> subsp. <i>volubilis</i>	September-April	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	N/A	Declining	No
<i>Cheilanthes deltoidea</i>	-	Amongs rocks			No
<i>Ceropegia decidua</i> subsp. <i>pretoriensis</i>	November-April	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.	A1	Vulnerable	No
<i>Cleome conrathii</i>	March-May	On stony slopes, usually on sandy soil, open to closed deciduous woodland, quartzites, red sandy soil, all aspects, 1515m.	A3	Near Threatened	No
<i>Cucumis humifructus</i>	January - April	Woodland on deep sand	B	Endangered	No

<i>Eucomis autumnalis</i> subsp. <i>clavata</i>	November-April	Open grassland, marshes.	N/A	Declining	Marginally – not found
<i>Habenaria barbertoni</i>	February-March	In grassland on rocky hillsides.	A2	Vulnerable	No
<i>Habenaria kraenzliniana</i>	February-April	Terrestrial in stony, grassy hillsides, recorded from 1000 to 1400m.	A3	Near Threatened	Marginally – not found
<i>Habenaria mossii</i>	March-April	Open grassland on dolomite or in black sandy soil.	A1	Endangered	No
<i>Holothrix randii</i>	September-January	Grassy slopes & rocky ledges.	B	Near Threatened	No
<i>Hypoxis hemerocallidea</i>	September-March	Grassland and mixed woodland.	N/A	Declining	Yes not found on the site
<i>Macledium pretoriense</i>	April	Hillsides	A1	Extinct	? not known
<i>Lotononis adpressa</i> subsp. <i>leptantha</i>	February-May	Open grassland.	A1	Data Deficient	No
<i>Melolobium subspicatum</i>	October-May	Grassland.	A1	Vulnerable	No

No red data plant species occur on this site

DISCUSSION AND CONCLUSION

Apart from the pans and the spruit, the entire site is highly disturbed or transformed. It is suggested that the development can be supported, provided that the pans and spruit be protected in green areas within the development plan.



Figure 1: Planted pasture and Wattle plantation



Figure 2: Secondary Anthropogenic *Hyparrhenia* Grassland



Figure 3: Highly Disturbed Areas



Figure 4: Three zones of the pan with *Stoebe* outside, *Eragrostis* and wetland



Figure 5: Mining area and dam



Figure 6: The quarry with reeds in the outer fringe



Figure 7: Small dam and spruit above dam

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Qualifications:

1963 Matriculation Certificate, Kemptonpark High School

1967 B.Sc. University of Pretoria, Botany and Zoology as majors,

1968 B.Sc. Hons. (cum laude) University of Pretoria, Botany.

1969 T.H.E.D. (cum laude) Pretoria Teachers Training College.

1975 M.Sc. University of Pretoria, Plant Ecology .

1982 D.Sc. (Ph.D.) University of Pretoria, Plant Ecology.

Theses: (M.Sc. and D.Sc.) on plant community ecology and wildlife management in nature reserves in South African grassland and savanna.

Professional titles:

- MSAIE South African Institute of Ecologists and Environmental Scientists
 - 1989-1990 Council member
- MGSSA Grassland Society of Southern Africa
 - 1986 Elected as Sub-editor for the Journal
 - 1986-1989 Serve on the Editorial Board of the Journal
 - - 1990 Organising Committee: International Conference: Meeting Rangeland challenges in Southern Africa

- 1993 Elected as professional member
- Pr.Sci.Nat. South African Council for Natural Scientific Professions **Registration Number 400086/83**
 - 1993-1997 **Chairman** of the Professional Advisory Committee: Botanical Sciences
 - 1993-1997: **Council** Member
 - 1992-1994: Publicity Committee
 - 1994-1997: Professional Registration Committee

Professional career:

- Teacher in Biology 1970-1973 in Transvaal Schools
- Lecturer and senior lecturer in Botany 1974-1983 at University of the North
- Associate professor in Plant Ecology 1984-1988 at Potchefstroom University for CHE
- Professor in Plant Ecology 1988-2008 at University of Pretoria.
- 2009 – current Professor Extra-ordinary in the Dept of Plant Science, University of Pretoria
- • Founder and owner of the Professional Ecological Consultancy firms Ecotrust Environmental Services CC and Eco-Agent CC, 1988-present.

Academic career:

- Students:
 - Completed post graduate students: M.Sc. 53; Ph.D. 14.
 - Presently enrolled post-graduate students: M.Sc. 4; Ph.D. 2.
- Author of:
 - 175 scientific papers in refereed journals
 - >150 papers at national and international congresses
 - >250 scientific (unpublished) reports on environment and natural resources
 - 17 popular scientific papers.
 - 39 contributions in books
- Editorial Committee of
 - South African Journal of Botany,
 - Journal Grassland Society of Southern Africa,
 - Bulletin of the South African Institute of Ecologists.
 - Journal of Applied Vegetation Science.(Sweden)
 - Phytocoenologia (Germany)
 -
- FRD evaluation category: C2 (=leader in South Africa in the field of Vegetation Science/Plant Ecology)

Membership:

- International Association of Vegetation Science.
- British Ecological Society
- International Society for Ecology (Intecol)
- Association for the Taxonomic study of the Flora of Tropical Africa (AETFAT).
- South African Association of Botanists (SAAB)
 - 1988-1993 Elected to the **Council** of SAAB.
 - 1989-1990 Elected as **Chairman** of the Northern Transvaal Branch
 - 1990 Elected to the Executive Council as **Vice-President**
 - 1990- Sub-editor Editorial Board of the Journal
 - 1991-1992 Elected as **President** (2-year period)
 - 1993 **Vice-President** and Outgoing President
- Wildlife Management Society of Southern Africa
- Suid-Afrikaanse Akademie vir Wetenskap en Kuns
(=South African Academy for Science and Art).
- Wildlife Society of Southern Africa
 - 1975 - 1988: Member
 - 1975 - 1983: Committee member, Pietersburg Centre
 - 1981 - 1982: **Chairman**, Pietersburg Centre
- Dendrological Society of Southern Africa
 - 1984 - present: Member
 - 1984 - 1988: Committee member, Western Transvaal Branch
 - 1986 - 1988: **Chairman**, Western Transvaal Branch
 - 1987 - 1989: Member, Central Committee (National level)
 - 1990 - 2000: Examination Committee
- Succulent Society of South Africa
 - 1987 - 2000
- Botanical Society of South Africa
 - 2000 – present: Member
 - 2001- 2008: Chairman, Pretoria Branch
 - 2002 – 2006: Chairman, Northern Region Conservation Committee
 - 2002- 2007: Member of Council

Special committees:

- Member of 10 special committees re ecology, botany, rangeland science in South Africa.
- Member of the International Code for Syntaxonomical Nomenclature 1993-present.

Merit awards and research grants:

1968 Post graduate merit bursary, CSIR, Pretoria.

1977-1979 Research Grant, Committee re Research Development, Dept. of Co-operation and Development, Pretoria.
1984-1989 Research Grant, Foundation for Research Development, CSIR, Pretoria.
1986-1987 Research Grant, Dept. of Agriculture and Water Supply, Potchefstroom.
1990-1997 Research Grant, Dept. of Environmental Affairs & Tourism, Pretoria.
1991-present Research Grant, National Research Foundation, Pretoria.
1991-1993 Research Grant, Water Research Commission.
1999-2003 Research Grant, Water Research Commission.
2006 South African Association of Botanists Silver Medal for outstanding contributions to South African Botany

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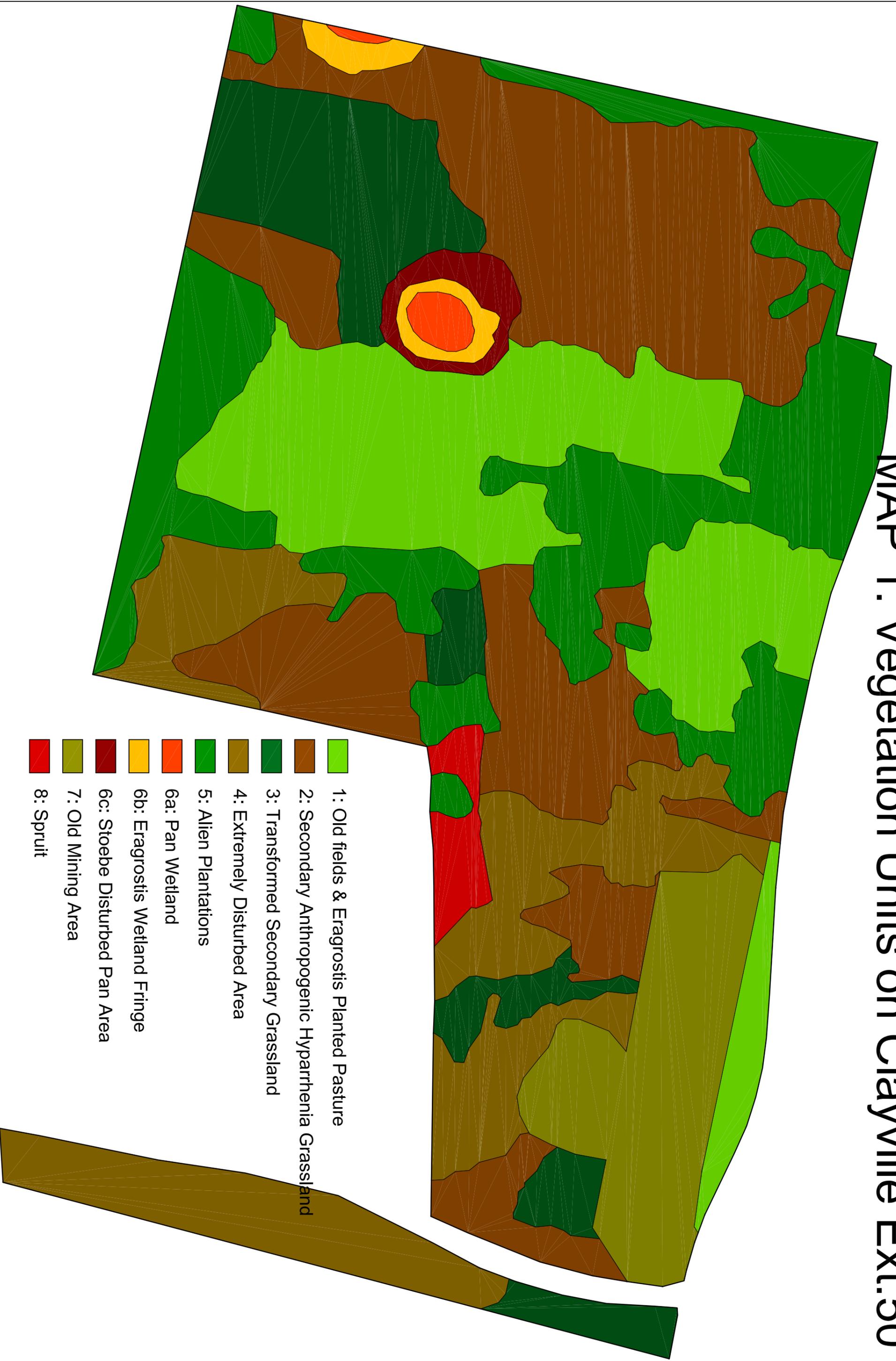
1986 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom
Visits to Israel, Italy, Germany, United Kingdom, Portugal.
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1993 Travel Grant, University of Pretoria.
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2000 Travel Grant, University of Pretoria, Visit Poland, Italy, Greece.
2001 Travel Grant, NRF, Visit Brazil
2006 German Grant Invited lecture in Rinteln, Germany

Consultant

Founder and owner of Ecotrust Environmental Services CC and Eco-Agent CC
Since 1988 >250 reports as consultant on environmental matters, including:

- Game Farm and Nature Reserve planning,
- Environmental Impact Assessments,
- Environmental Management Programme Reports,
- Vegetation Surveys,
- Wildlife Management,
- Veld Condition and Grazing Capacity Assessments,
- Red data analysis (plants and animals).

MAP 1: Vegetation Units on Clayville Ext.50



MAP 2: Ecosystem Sensitivity on Clayville Ext.50

