

# BIODIVERSITY ASSESSMENT

## PROPOSED CONSTRUCTION OF A PACKING SHED ON PORTION 2373 OF ERF 1731, KAKAMAS SOUTH SETTLEMENT

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## 1 INTRODUCTION

This report investigates the botanical impacts of a proposed packing shed on Portion 2373 of Erf 1731, southwest of Alheit, nearby Kakamas in the Northern Cape interior (see Map 1). It is in support of a detailed biophysical survey undertaken by Dr Noel van Rooyen in 2010 for the larger area (Farm Kakamas Suid). This report must be therefore read in conjunction with Van Rooyen's report (see Appendix). The site is located on a flat gravelly plain characterised by ephemeral drainage lines and washes. The vegetation found on site is described as an open dwarf shrubland with scattered thorny trees, notably *Boscia foetida* and *Rhigozum trichotomum*. According to the 2006 Vegetation Map of South Africa, the site is located in Bushmanland Arid Grassland. Also found in the general area is Lower Gariep Alluvial Vegetation. Bushmanland Arid Grassland is currently listed as Least Threatened in the National List of Threatened Ecosystems (December 2011). The site is sparingly covered with dwarf shrubs, few grasses and scattered thorny shrubs. It was found degraded by a farm road and several other cleared strips across the site.

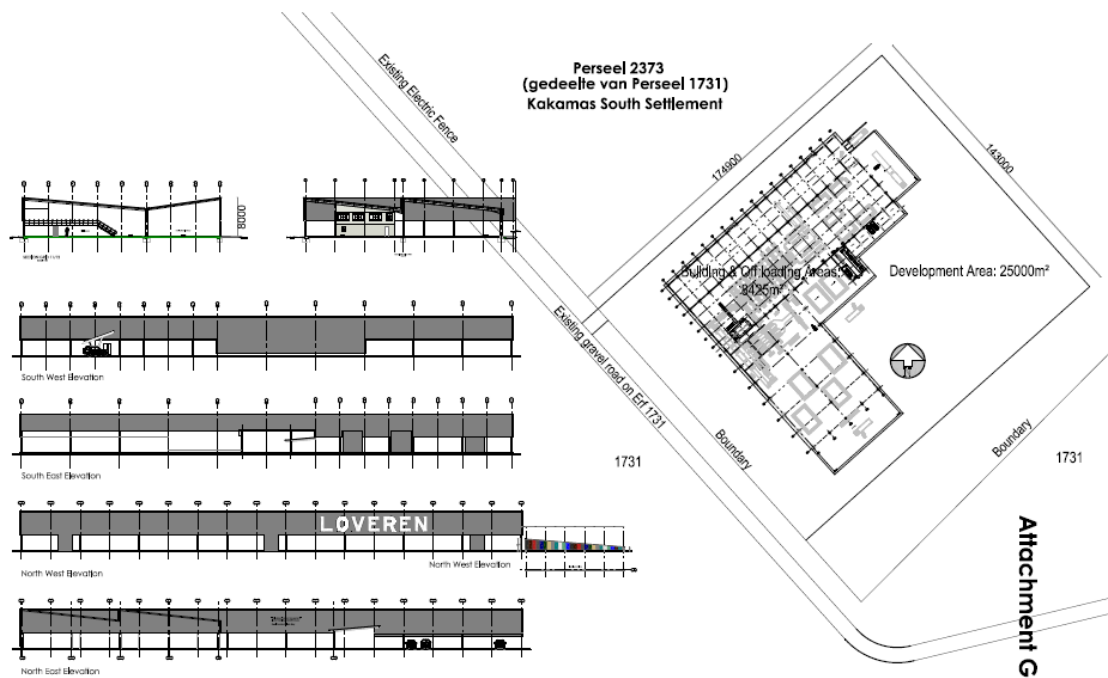


**Map 1** Satellite photo showing the locality of the site (yellow marker), southwest of Alheit and the Orange River.

## 2 PROJECT DESCRIPTION

The applicant is applying for an environmental (NEMA) authorisation to built a 8425 m<sup>2</sup>

packing shed and off loading area on a 2.5 ha development footprint next to a gravel road leading past the site from the N14 main road (see Map 2). It is also located opposite a large number of labourer cottages.



**Map 2** Site plan showing details of the proposed packing shed.

### 3 TERMS OF REFERENCE

The terms of reference for this study are as follows:

- To determine if vegetation of high conservation value will be affected by the project. Reference will be made to its conservation value and potential impact on ecological linkages, CBA's, etc.
- To determine if any rare and threatened (Species of Conservation Concern) plant species will be affected.
- To assess the impacts on flora and vegetation.
- To propose mitigation measures to be included in method statements to ensure that the impact on biodiversity is minimised.

### 4 METHODOLOGY

A biodiversity survey of the site was undertaken on 1 May 2017. A qualitative assessment of the type and condition of affected vegetation, disturbance and presence of alien species and

Species of Conservation Concern was carried out. Plant species not identified in the field, were collected or photographed and identified at the Compton (Kirstenbosch) Herbarium in Cape Town. Mucina & Rutherford's (2006) vegetation map and the latest floristic taxonomic literature and reference books were used for the purpose of this specialist study. Any plants classified as rare or endangered in the Red List of South African Plants online database are highlighted.

The following information was recorded during the site visit:

1. The condition of the vegetation. Is the vegetation either disturbed or degraded? A disturbed or degraded area could range from old/existing agricultural fields (fallow land), or areas previously disturbed by construction activities, to an area that has been severely eroded or degraded as a result of bad land management.
2. The species diversity. This refers to the numbers of different indigenous plant species occurring on site. Observed fauna was also recorded.
3. Species of Conservation Concern occurring on site. This would include rare, vulnerable, endangered or critically endangered plants and animals (where possible).
4. Fatal flaws. These would include finding large numbers of threatened plants or local endemics that would be negatively impacted upon if project was allowed to continue.
5. Identification of the vegetation type(s) on the site. This would include trying to establish the known range of a vegetation type and whether or not this vegetation type is vulnerable (VU), endangered (EN) or critically endangered (CR).

## **5 LIMITATIONS TO THE STUDY**

Since fieldwork was carried out during a dry spell in autumn, flowering plants that only flower at other times of the year (e.g. late summer, winter and spring) may have been missed, especially herbaceous species, bulbs and grasses. However, the overall confidence in the completeness and accuracy of the botanical findings is considered to be moderate to good.

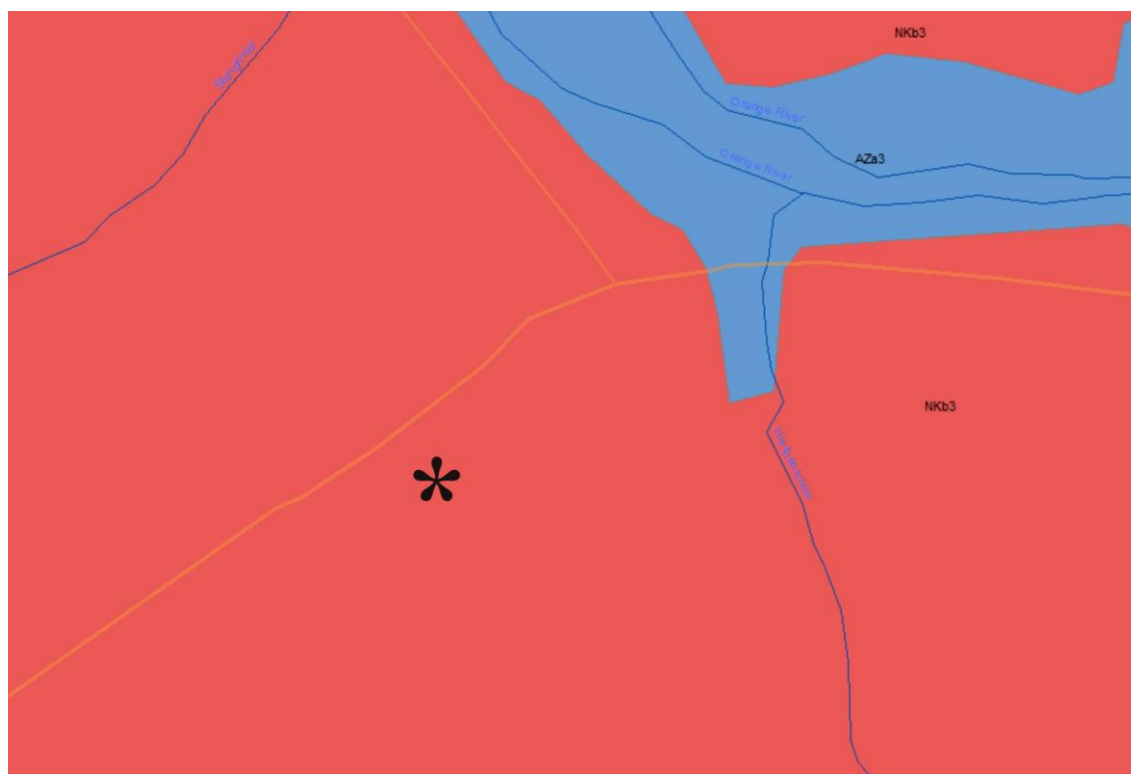
## **6 LOCALITY & BRIEF SITE DESCRIPTION**

The study site is located on a level gravelly plain south of the Orange River (see Map 1). The closest settlements are Alheit (2.5 km to the northeast) and Kakamas (10 km to the east). The surrounding area comprises numerous ephemeral drainage lines and washes covered by a gravelly substratum. The ephemeral washes all drain northwards towards the Orange. There are no significant topographical features, such as mountain backdrops and valleys, in the area. The study area falls within the Namaqua metamorphic province, a geologically complex region of crystalline rock exposed from east of Upington to west of Springbok (Norman &

Whitfield 2006). According to Van Rooyen's report (2010), the underlying geology comprises Kenhardt migmatite, with alluvium along the main drainage lines outside the site. Migmatite is a gneiss type high-grade metamorphic rock where partial melting has taken place and the molten component has been injected into the unmelted rock (Norman & Whitfield 2006). Nearby farming activities comprise mainly vineyards. Black wildebeest are kept on the property.

## 7 BIOGEOGRAPHICAL CONTEXT

Being located in the Northern Cape interior, the site lies in the Nama-Karoo biome, with the Savanna biome (Gordonia Duneveld) encroaching from the north-east. It is described as a sparsely vegetated grassland dominated by white grasses (*Stipagrostis* species) (Mucina & Rutherford 2006). It falls in a largely late summer/early autumn rainfall area. Bushmanland Arid Grassland has a mean annual rainfall of 133 mm (Mucina & Rutherford 2006). The mean annual precipitation recorded at Augrabies is 83 mm (see Van Rooyen's report). The low rainfall is described as unpredictable and unreliable. The Vegetation Map of South Africa (Mucina & Rutherford 2006) classifies the vegetation found in the area as Bushmanland Arid Grassland (see Map 3).



**Map 3** Extract of the SA Vegetation Map (Mucina & Rutherford 2006), showing the position of the study site (black asterisk) within Bushmanland Arid Grassland (NKb3). Also found in the larger area is Lower Gariep Alluvial Vegetation (AZa3) along the Orange River.

The latter unit (one of the largest in the Northern Cape) stretches across a wide area from Aggeneys in the west to Prieska in the east (Mucina & Rutherford 2006). Important Bushmanland Arid Grassland species recorded on site include *Boscia foetida*, *Rhigozum trichotomum*, *Aptosimum spinescens* and the grass *Stipagrostis uniplumis*. Bushmanland Arid Grassland is well represented in the larger area, while Lower Gariiep Alluvial Vegetation (found along the Orange River floodplain) has been greatly transformed by farming activities.

## 8 VEGETATION & FLORA



**Map 4** Satellite photo of the site outlined in red. The dashed blue line indicates a nearby ephemeral drainage line, while the green spot indicates the approximate position of a quiver tree (*Aloidendron dichotomum*).

The vegetation on site comprises an open dwarf shrubland, with scattered low thorny shrubs such as *Rhigozum trichotomum* and *Lycium* species (see Photos 1-2). A single quiver tree (*Aloidendron dichotomum*) was recorded outside the site to the northwest (see Map 4 above and picture on front cover). Vegetation cover ranges from <10% in the open bare areas to 20-30% in the shrubby patches. Vegetation height is generally less than 0.5 m. Bare patches devoid of any vegetation cover are not uncommon on site. A noticeable scarcity of grasses can perhaps be ascribed to the low rainfall experienced in the Northern Cape coupled with overgrazing. The ephemeral drainage line on the north-western side of site is noticeably shrubbier (see Photo 3). Disturbances noted around the site include a farm tracks and grazing. No alien infestation was noted. The substratum varies from sandy (compacted red

sand) to gravelly to exposed rock.

The following tree and shrub species were recorded, namely *Rhigozum trichotomum*, *Boscia foetida*, *Lycium* sp, *Aloidendron dichotomum* (only one tree outside the site), *Hoodia gordonii* (also recorded outside the site), *Euphorbia gariepina*, *Mesembryanthemum coriarium*, *Mesembryanthemum* sp, *Hermannia spinosa*, *Justicia australis*, *Salsola aphylla*, *Parkinsonia africana*, *Asparagus cf exuvialis* and the stem parasite *Viscum capense*. Dwarf shrubs, herbaceous species and annuals recorded include *Acanthopsis disperma*, *Blepharis* sp, *Aptosimum spinescens*, *Ptychlobium biflorum* subsp *biflorum*, *Kewa salsaloides*, *Dicoma capensis* and *Tribulus cristatus*. Grasses recorded are *Stipagrostis uniplumis* (common on site) and *S. obtusa*.

The site falls within Van Rooyen's (2010) mapped *Aridaria* sp - *Oropetium capense* open dwarf shrubveld community, while the adjacent drainage line community has been mapped as a *Rhigozum trichotomum* - *Montinia caryophyllacea* drainage line. *Aridaria* sp - *Oropetium capense* open dwarf shrubveld occurs on plains covered by shallow yellow sands with surface rocks. Important species in this community include *Boscia foetida*, *Rhigozum trichotomum* and *Hermannia spinosa*. The drainage line community occurs on deeper sandy soil, with surface rocks mostly absent. See Van Rooyen's report for more detail.



**Photo 1** Typical view of site.



**Photo 2** View across a relatively bare area on site towards the labourer cottages. Insert: *Hoodia gordonii*, recorded outside the site in the vicinity of the quiver tree.



**Photo 3** Ephemeral drainage line on the north-western side of site.



## Species of Conservation Concern and protected species

Two Species of Conservation Concern<sup>1</sup> were recorded outside the site to the northwest, namely *Aloidendron dichotomum* and *Hoodia gordonii*, both single recordings. *A. dichotomum* is currently listed as Vulnerable. According to the online Red List of South African Plants (Raimondo *et al.* 2009), “Climate change models project a 36% decline in its range in 100 years, assuming dispersal into newly suitable areas. Patterns of modelled declines have been supported by field and repeat photo studies. However no colonization of newly suitable areas has yet happened. Without dispersal, the models predict a 73% decline in 100 years, qualifying the species as Endangered.” *Hoodia gordonii*, which is listed as Data Deficient (see Map 4), “has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. International and national demand was particularly high between 2004 and 2006 and as a result of the high economic value of this species even remote areas of its distribution range are suspected to have been harvested. Unfortunately data do not exist to quantify the degree of decline to the population and as this species is widespread and can be locally common it is not possible to estimate overall population decline.”

*Aloidendron dichotomum* and *Hoodia gordonii* are listed as Schedule 1 specially protected species in the Northern Cape Nature Conservation Act (Act 9 of 2009), while *Boscia foetida*, *Euphorbia gariiepina* and all Aizoaceae species are listed as Schedule 2 protected species. A permit is required if any of these plants are to be removed or cleared.

## 9 FAUNA

With regards to indigenous mammal/reptile fauna occurring in the area, only evidence of the Cape ground squirrel (their burrows were observed on site) was recorded. Other mammals that may frequent or inhabit the area, include aardvark, Cape porcupine and yellow mongoose. Caracal and black-backed jackal may also move through the area in search of prey. Relatively rare mammals that could potentially occur in the surrounding area, include pangolin (rocky areas), rock hyrax, aardwolf, African wild cat, bat-eared fox, Cape fox, small-spotted genet, striped pole-cat and short-tailed gerbil. Background information on fauna has been obtained from Van Rooyen’s report (2010).

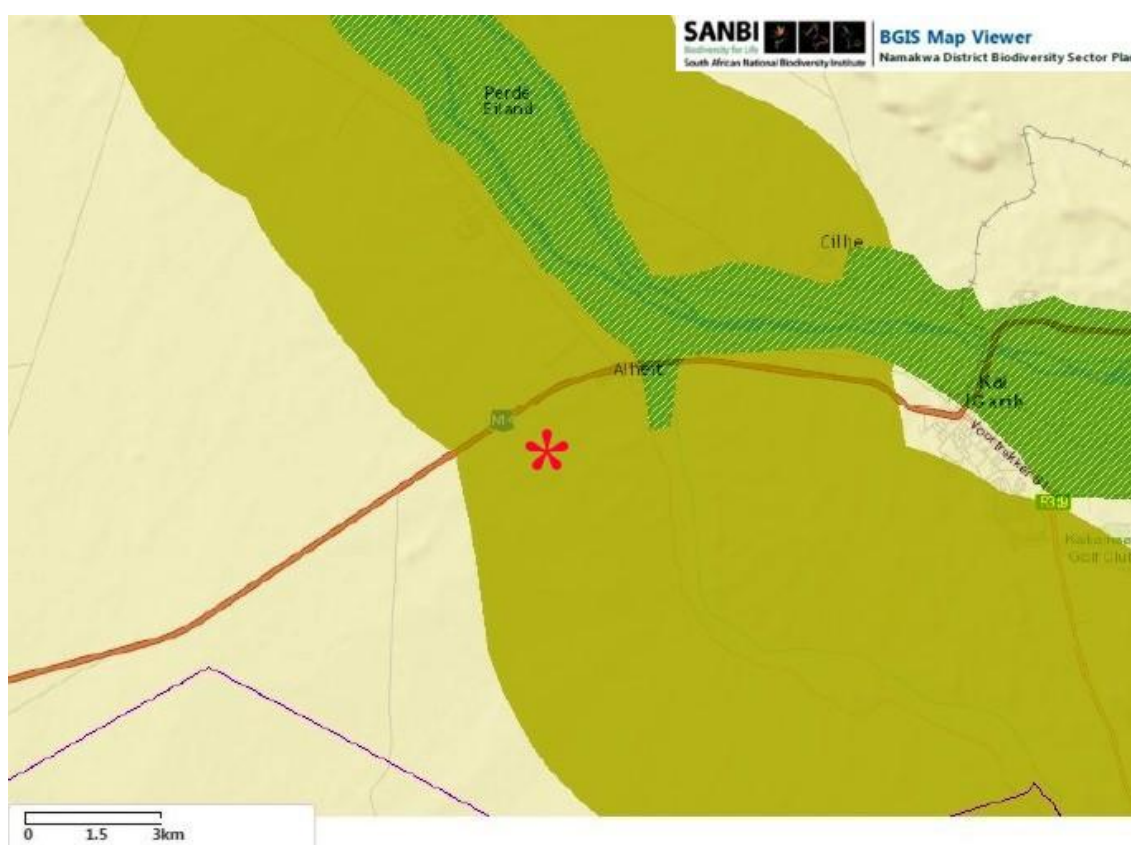
## 10 CONSERVATION STATUS

Bushmanland Arid Grassland is well represented with less than 1% transformed (Mucina &

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<sup>1</sup> The Red List of South African Plants (Raimondo *et al.* 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

Rutherford 2006). It is currently considered a least threatened vegetation type and does not appear on the national list of threatened ecosystems (DEA 2011). Despite this, it is poorly conserved. Less than 1% is formally conserved in the Augrabies National Park and Goegab Nature Reserve (Mucina & Rutherford 2006). Locally it is being impacted by severe drought conditions, overgrazing and mining activities. Lower Gariep Alluvial Vegetation, which is 53% transformed by agricultural activities along the Orange, is listed as Endangered.



**Map 5** Critical Biodiversity Area (CBA) map of the Alheit-Kakamas area. The study site (red asterisk) is located inside a broad Ecological Support Area (ESA) (light green). The dark green area shows the original extent of Lower Gariep Alluvial Vegetation.

According to the Namakwa District Biodiversity Sector Plan (2009), the study site falls within an Ecological Support Area (ESA) (see Map 5 above). Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. ESA's, on the other hand, are supporting zones required to prevent the degradation of CBA's and Protected Areas. An ESA may also be an ecological process area that connects and therefore sustains CBA's. The biodiversity corridor network identified is based on existing corridor networks, such as the Richtersveld and Namaqualand Wilderness, and follows alignments along upland-lowland, climatic and latitudinal gradients.

## 11 IMPACT OF THE PROPOSED DEVELOPMENT ON BIODIVERSITY

The proposed development (see Map 2) is located inside partially disturbed Bushmanland Arid Grassland. A farm road and other cleared strips across the site have degraded it significantly. The most sensitive feature in the immediate area is the ephemeral drainage line on the north-western side of site. It is recommended that the development should not encroach onto the drainage line. It should be positioned as far away from it as practically possible. Being well represented (<1% transformed) and not threatened, the impact on vegetation type *per se* will be of low significance, with mitigation (Table 1 summarises the impact). About 8400 m<sup>2</sup> of veld will need to be cleared and the impact will be permanent.

**Table 1** Impact on vegetation type, habitat and CBA's.

Mitigation	Extent	Duration	Intensity	Probability of occurrence	Significance	Status	Confidence
Without mitigation	Limited to site & surroundings	Permanent	Med	Probable	Low-med	-	Med-high
With mitigation	Limited to site & surroundings	Permanent	Med	Probable	Low	-	Med-high

Two Species of Conservation Concern were recorded in the area of which only one (i.e. *Hoodia gordonii*) may actually occur on site. Cuttings or replanting of rescued plants are not recommended, as the severed ends rarely form a callus from where roots will eventually form. Propagation of *Hoodia gordonii* is done mainly from seed. Table 2 summarises the impact on Species of Conservation Concern.

**Table 2** Impact on Species of Conservation Concern.

Mitigation	Extent	Duration	Intensity	Probability of occurrence	Significance	Status	Confidence
Without mitigation	Limited to site	Permanent	Low	Unlikely	Low-med	-	Med-high
With mitigation	Limited to site	Permanent	Low	Unlikely	Low	-	Med-high

As an indirect impact, soil disturbance caused by construction activities will normally provide ideal conditions for the establishment of alien invasive vegetation. In this instance, no alien

species were recorded on or directly adjacent to the site. The risk of alien infestation post construction is therefore low.

## 12 CONCLUSION & MITIGATION MEASURES

The proposed development is located inside partially disturbed Bushmanland Arid Grassland, a well represented and not threatened vegetation type. A farm road and other cleared strips across the site have degraded it significantly. No Species of Conservation Concern were recorded on site, although there may be a slight possibility that *Hoodia gordonii* may be present. The most sensitive feature in the immediate area is an ephemeral drainage line on the north-western side of site. It is therefore recommended that the development should go ahead subject to consideration of the recommendations below.

The following mitigation options should be considered:

- The development should not encroach onto the ephemeral drainage line directly northwest of the site. It should be positioned as far as practically possible away from it.
- The development area should be demarcated or fenced off prior to the start of construction activities. No disturbance, stockpiling or spoiling should be allowed outside the demarcated area, especially on the north-western side facing the drainage line. Fencing must not be moved during construction.
- If considered practical, succulents belonging to the Aizoaceae family should be search and rescued. It can be transplanted in a suitable rehabilitation area adjacent to the site. A suitably qualified and experienced contractor should be appointed for this purpose.

## REFERENCES

DEA 2011. National List of Ecosystems that are threatened and in need of protection. *Government Gazette* No. 34809, Government Notice No. 1002. National Printer, Pretoria.

Mucina, L. & Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Norman, N. & Whitfield, G. 2006. Geological Journeys: a traveller's guide to South Africa's rocks and landforms. Struik Nature, Cape Town.

## PERSONAL COMMUNICATION

Mr Piet de Necker, site manager of the Friersdale (Afrimat) Mine.

**APPENDIX 1      CV OF BIODIVERSITY SPECIALIST**

## CURRICULUM VITAE

**M.G. (Mark) BERRY**  
**ENVIRONMENTAL CONSULTANT / ECOLOGIST**

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**BORN:** 13 December 1965

**IDENTITY NUMBER:** 6512135145082

**NATIONALITY:** South African

**MARITAL STATUS:** Married, two daughters

**DRIVERS LICENCE:** Code EB

**LANGUAGES:** Proficient in speaking, reading and writing English and Afrikaans

**QUALIFICATIONS:** BSc (1988) University of Stellenbosch (majored in Botany and Zoology)  
 BSc-Hons in Botany (1991) University of Stellenbosch  
 MSc in Botany (1993) Nelson Mandela Metropolitan University  
 PhD in Botany (2000) Nelson Mandela Metropolitan University

**CAREER SUMMARY:** **1997-2005:** Employed as an environmental specialist at **Planning Partners**, a multi-disciplinary consultancy specialising in town and regional planning, environmental planning and landscape architecture. Started **Mark Berry Environmental Consultants** in **June 2005**.

**EXPERIENCE:** **Environmental Impact Assessments (EIA's)** for residential, commercial, industrial, agricultural and civil engineering projects. EIA applications include the upgrading of Murray's Bay Harbour at Robben Island; an abalone farm near Saldanha; several bulk sewer and stormwater pipelines; the upgrading of access to and restoration of an archaeological site (Klipgat Cave) near De Kelders; the rehabilitation of the flood-damaged Koringlands River in Swellendam; a regional shopping mall in Hawston; low-cost housing projects; and cell phone masts in the Mossel Bay area.

With a PhD in the botanical field, I regularly undertake **biodiversity assessments** of fynbos, strandveld, renosterveld, thicket and karoo vegetation types as part of the EIA application process. For my PhD I have assessed the impact of informal settlement on the coastal vegetation and flora of the south-eastern Cape coastal zone.

**Environmental Management Plans (EMP's)** for a wide range of activities, including golf estates, residential and commercial developments, wineries, bulk municipal infrastructure, a harbour and several borrow-pits/quarries.

**Environmental Control Officer (ECO)** on construction sites, including residential and commercial developments, the upgrading of a harbour and other civil engineering projects.

### CONFERENCES &

**PUBLISHED PAPERS:** The impact of informal housing settlements on coastal vegetation. *The Naturalist*, Eastern Province Branch of the Wildlife Society of Southern Africa, Vol 37(1) 1993.

Impacts of informal settlements on south-eastern Cape coastal vegetation (South Africa). *Global Ecology and Biogeography Letters* 4: 129-139, 1994.

Aspects on the history and development of informal settlements in the south-eastern Cape coastal zone. *South African Geographical Journal* 86 (1): 23-39, 2004.

Impact of cutting and collecting of firewood associated with informal settlement in the south-eastern Cape coastal zone. *South African Journal of Botany* 71 (2): 2005.

South-eastern Cape vegetation and the impacts of informal settlements. Annual SAAB congress held at Wits, Johannesburg in 1994.

Informal settlements in the south-eastern Cape coastal region and associated environmental impacts. First International Geography Congress held at University of Durban-Westville in 1995.

**EXAMINER:**

Between 2000 and 2006 I have acted as examiner for the Board of Control for Landscape Architects (BOCLA), responsible for the setting up and marking of the Environmental Planning Section of exam paper.

**PROFESSIONAL MEMBERSHIP:**

Professional member (reg. no. 400073/98) of the South African Council for Natural Scientific Professions (SACNASP).

**REFERENCES:**

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**APPENDIX 2      BIOPHYSICAL SURVEY REPORT**