

**SPECIALIST VEGETATION/ECOLOGICAL
SURVEY FOR MR. W.J. VILJOEN, ROBERTSON**

**PROPOSED MINING FOR SAND PORTION 4 OF
THE FARM ZANBERG FONTEIN NO. 97,
ROBERTSON DISTRICT**

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Executive Summary

An ecological survey for the proposed mining of 20.00 ha of “natural land” was done on Portion 4 of the farm Zandberg Fontein No. 97. The survey was undertaken in the Robertson district on 29 October, 2010 for Mr. W.J. Viljoen (owner).

The proposed site lies south and west of the existing sand mine pit face.

The survey area falls within the Cape Floristic Region (CFR) winter rainfall area. The vegetation type in which the proposed mining activity falls is Breede Sand Fynbos, considered *endangered* as per the new Vegetation Map of South Africa (Mucina & Rutherford 2006 editors). The condition of the vegetation is good in places. There are “pure” sandy patches (plumes) in places.

Veld type influencing vegetation patterns on the site:

North Sonderend Sandstone Fynbos (LT). north and west of site

Robertson Karoo (LT) south and east of site

Muscadel Riviere (EN) to the north of the site

Table 1.1: Impact significance ratings – Portion 4 of the farm Zandberg Fontein No. 97 – Robertson

Impact	Consequence	Probability	Significance	Status	Confidence
Impact 1. Loss of floral species Without mitigation	High	Possible	Medium	Negative	Medium
With mitigation	Medium	Improbable	Medium/Low	Negative	Medium
Impact 2. Loss of veg type Without mitigation	High	Probable	Medium	Negative	Medium
With mitigation	Medium	Improbable	Medium/Low	Negative	Medium
Impact 3. Loss of habitat – mining Without mitigation	High	Possible	Medium	Negative	Medium
With mitigation	Medium	Improbable	Medium/Low	Negative	Medium
Impact 4. Loss of fauna incl. reptiles Without mitigation	High	Possible	Medium	Negative	Low
With mitigation	Medium	Possible	Low	Negative	Low

1. Introduction

An ecological survey was conducted on portion 4 of the farm Zantberg Fontein No. 97 – Robertson district. Biodiversity with special reference to plants on the site was assessed.

Presently low scale mining for building sand is taking place. Open cast mining has been taking place for a number years. These mining activities have been active for at least twenty-five years.

As the crow flies the site is 8.16 kilometres south west of Robertson. The vegetation type is Breede Sand Fynbos considered endangered (EN).

2. Terms of reference for the studies

The terms of reference for this study are as follows:

- Conduct vegetation and plant species surveys noting their conservation significance and status. Example: occurrence of any rare & endangered species (red data species) or localized endemics. Additional information - Raimondo, T et al. Editors. (2009) *Strelitzia 25 series* - Red List of southern African plants.
- Indicate the conservation status of the vegetation.
- Indicate the biological connectivity between plant communities.
- Assess the potential impacts associated with land clearing with and without management plans in place.
- Identify any ecological/landscape pattern, for example a seasonal wetland or quartzite patches that may be impacted upon by the proposed mining development.
- Recommend appropriate and practical mitigation measures to minimize the negative impacts and maximize potential benefits associated with the site.
- Include a physical inspection of the site.
- Indicate the extent of alien cover – if applicable.
- Identify ecosystems associated with vegetation identified on the site.
- Include (if necessary) individual checklists of plant species found on and in the immediate vicinity of the study areas concerned.
- Include impact rating methodology tables (impact assessment tables).
- Make recommendations to mitigate the likely impacts on the vegetation and surrounding area.
- Indicate the condition of the land, plus current or previous land usage and restoration of degraded lands.
- Make use of photographs, maps, and plans etc. to illustrate any important issues.

3. Methodology

One (1) site visit was undertaken on Friday 29 October, 2009.

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, or areas that have been used as a dumping ground for garden/building rubble (disturbed), to an area that has dongas and gullies as a result of bad land management (degraded).
2. The species diversity. This refers to the numbers of different indigenous plants (species) occurring on each site. Indigenous fauna will be noted.
3. Red Data species occurring on the site. This would include vulnerable, endangered or critically endangered plants and animals (where possible). Use latest information available.
4. Fatal flaws. These would include finding large numbers of threatened plants or local endemics that would be negatively impacted upon if agricultural activities were 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).

Based on knowledge of the local flora, fauna and vegetation types, the site was examined. The latest floristic taxonomic literature and reference books were used for the purpose of this specialist study. In addition, information on the revised classification of vegetation types (Mucina, and Rutherford, 2006 editors) was used, including information pertaining to land usage of the various vegetation types where the sites are situated.

Plant communities and individual plant species that are growing within the study areas were examined. Any plants classified as rare or endangered in the *Red Data List of southern African Plants*, Craig Hilton-Taylor, 1996 are highlighted and Raimondo, T. et al. Editors. (2009) *Strelitzia 25 series* - Red List of southern African plants.

Based on all the relevant information, for example: digital photographic site images, floral images, vegetation maps and 1: 50 000 topographical maps, the ecological vegetation management report was compiled.

4. Description of biodiversity and impact assessment

The main vegetation type is identified as Breede Sand Fynbos “endangered”. No other vegetation types influence the proposed footprint of the site. Muscadel Riviere vegetation “endangered” lies to the East of the site. To the South is Robertson Karoo “least threatened” which is mainly transformed (vineyards).

For the most part the proposed area to be mined is pristine. Plant diversity is relatively low. Open sand dune plumes to the north and west of the site are common. As such *top soil* is extremely *limited* and in some places is *non existent*.

Table 4.1: Biodiversity assessment of the vegetation types found in and near the area

Vegetation type	Remaining	Protected	Conservation Status	Ecosystem Status
Breede sand Fynbos ON SITE	49%	2%	Poorly protected	Endangered
Robertson Karoo	84%	16% Mainly Vrolijkheid Nature Reserve	Hardly protected	Least threatened
North Sonderend Sandstone Fynbos	96%	5%	Hardly protected	Moderately protected

Source: National Spatial Biodiversity Assessment – as updated www.nbi.ac.za/biodiversitynsba.htm

Vegetation and fauna

The proposed sand mining footprint is well within the *Breede Sand Fynbos* (EN) vegetation type. South is Robertson Karoo vegetation (LT), east is *Muscadel Riviere* vegetation (EN) and to the west and north lies *Northern Sonderend Sandstone Fynbos* (LT). There are no apparent ecotones (transitional vegetation types) present in the floral landscape. The vegetation is very sparse, low and shrubby and is mainly comprised of *restioid fynbos*. There are open patches of sand dunes (plumes) to the north and west on the proposed site. Restioid Fynbos is very dominant, followed by Asteraceae species. Common plant taxa encountered on the site included *Willdenowia incurvata*, *Leucospermum calligerum*, *Metalasia densa*, *Hermannia specie Elytropappus rhinocerotis* (renosterbos), *Ruschia caroli*, and *Pelargonium ovata*.

Floral diversity on the site is relatively low. It is estimated that approximately 50% of the site is covered with the restio *Willdenowia incurvata*. Other species encountered include *Wiborgia fusca*, *Protea laurifolia*, *Aspalathus hetrophylla*, *Hebenstreitia specie*, *Crotalaria specie* and *Dodonae viscosae var angustifolia*. Succulents are virtually absent except for

Ruschia caroli, which grows in small groups on lower sections of the proposed site. Geophytes seen in the landscape were minimal, no doubt due to the approaching of summer. Geophytes seen include *Brunsviga orientalis* and an *Albuca* specie.

The condition of the vegetation is good. There is no evidence of animals (sheep or cattle) browsing the veld.

Smaller reptiles on site may include the Padlopers (*Homopus species*) and Ploegskaarskilpad (*Cherisina angulata*). The Namaqua Dwarf chameleon should be in the area, especially as there is very little human habitation.

Mammals that may exist could include Cape Grey Mongoose (*Hepestes pulverulentus*), Grysbok (*Raphicerus melanotis*) and Porcupine (*Hystrix africaeaustralis*).

Ecological/ landscape patterns: the area is situated on steep to moderately sloping terrain. The upper areas are comprised of more gentle slopes towards the south eastern side. There are no permanent or seasonal streams. The soils are comprised of high volumes of pure sand; stones and shales are limited. Sand plumes are visible especially on the western and northern sides of the site.

Ecological drivers: the ecosystem is partially fire driven; the sparse vegetation cover in places may inhibit serious fire threat in places. Small mammals (mice) and ants play a small part in the recruitment of some restioid and aster species.

From a floral biodiversity point of view, the significance rating is med/low (with management actions and medium (without management actions). From a vegetation point of view, (representing the Breede Sand Fynbos) the significance rating is medium/low (with mitigation) and medium (without mitigation). See full ecological impact assessment tables with and without management actions. See tables 4.2 and 4.3.

Biological connectivity: The existing Breede Sand Fynbos (EN) vegetation on the proposed site is well connected to the same vegetation type and other vegetation types nearby. These tracts of land are well connected and are uninterrupted. Because of continuous connectivity of vegetation types, biotic forces will ensure that local indigenous plants continue the recruitment process ensuring plant species survival.

Table 4.2: Loss of floral species

Actions	Impact	Extent	Intensity	Duration	Consequenc	Probability of occurrence	Significance	Status	Confidence
Without actions	Loss of floral species	Regional 2	Med 2	Long term 3	High 7	Possible	Med	Neg	Med
With actions	Loss of floral species	Regional 2	Low 1	Long term 3	Med 6	Improbable	Med/Low	Neg	Med

Table 4.3: Loss of vegetation type (Breede Sand Fynbos and sand plumes)

Actions	Impact	Extent	Intensity	Duration	Consequenc	Probability of occurrence	Significance	Status	Confidence
Without actions	Loss of veg type	Regional 2	Med 1	Long term 3	High 7	Possible	Med	Neg	Med
With actions	Loss of veg type	Regional 2	Low 1	Long term 3	Med 6	Improbable	Med/Low	Neg	Med

Table 4.4: Land transformation phase (mining sand)

Actions	Impact	Extent	Intensity	Duration	Consequenc	Probability of occurrence	Significance	Status	Confidence
Without actions	Loss of habitat	Regional 2	Med 2	Long term 3	High 7	Possible	Med	Neg	Med
With actions	Loss of habitat	Regional 2	Low 1	Long term 3	Med 6	Improbable	Low	Neg	Med

Table 4.5: Loss of fauna

Actions	Impact	Extent	Intensity	Duration	Consequenc	Probability of occurrence	Significance	Status	Confidence
Without actions	Loss of fauna inc reptiles	Regional 2	Med 2	Long term 3	High 7	Possible	Med	Neg	Low
With actions	Loss of fauna inc reptiles	Regional 2	Low 1	Long term 3	Med 6	Possible	Low	Neg	Low

5. Assumptions, limitations and gaps in information

- From a floral diversity point of view, it would be informative to know what plant species, with special reference to geophytes (bulbs), occur in this vegetation type. The survey was done in late October (early summer). Remnants seen of *Brunsvigia orientalis* and *Albuca* specie would confirm that certain geophytes grow there. It is possible that lachenalia, oxalis, massonia and *Ixia pumilio* (local endemic) occur on this site.

6. Conclusions and Mitigation

Mitigating (management) considerations have been given in order to soften the effect of the proposed sand mining activity. It is estimated that due to deep sands of the proposed mining area 20.0 hectares of Breede Sand Fynbos (EN) will last several decades. Forty-nine percent (49%) of this vegetation type remains intact, with 2% protected in the form of private land owners and nature reserves. The proposed sand mining site is in a pristine condition. No aliens, degradation or disturbance were seen on the proposed sand mining site.

The site does not have a particularly high floral diversity. There is some good biological connectivity between plant communities on the proposed site and those some distance away.

If this operation is to proceed, it is very important that mining be kept well within the dedicated footprint. This would include no haul or maintenance roads being permitted outside the footprint.

The significance of the impact, in some cases, is rated medium without management actions and medium/low with management actions. The significance in terms of loss of plant species (flora) is rated as medium/low with management actions.

No *threatened* or *endangered* indigenous plant species were recorded on the site during the inspection on 29 October, 2010.

In order to minimise the impact and address other issues, the following mitigation measures are suggested:

- Alien vegetation should be removed from adjacent areas near the existing mine site. There are a number of *Acacia cyclops* (Rooikrans) on the site which should be removed. The owner/developer could employ people to extract the alien vegetation for their own self gain. Ideally a programme for the removal of “opslag” on an annual basis needs to be set in place. See map number three (3) indicating where alien vegetation lies in relation to the sand mine.
- Rehabilitation of the old disturbed mining areas, preferably with top soil, is not a viable proposition. Many of these areas are mined down to existing bedrock or mudstone. In real terms it would not be viable to attempt to import top soil to rehabilitate some of these areas. Topsoil from the immediate area is not available and the little there is, is very limited. In any event, any attempt to remove virgin top soil from the immediate area would have a negative impact. Simply put, it does not make much ecological sense to trash one area to rehabilitate another degraded area. Another point is the introduction of top soils may well create another problem in the form of the introduction of alien weeds that will exacerbate the problem, instead of trying to improve the situation. An additional problem is the prevailing winds which are probably the reason why there are deep sands in this area to start with. Any top soil placed in this area will no doubt blow away – biotic wind action on this site is severe. Interestingly enough, some natural recruitment is taking place in certain sections of those degraded areas (see photo number 8) where annual grasses and some woody plants are starting to come back.
- Systematic re-profiling of the disturbed landscapes and re-seeding should take place as mining in a designated area is concluded.

- The present haul road should be kept in good order on a regular basis and adequate drainage should be installed to remove any excess water in the event of any downpours or surface water that percolates through the nearby sand dunes.
- If the present access road needs to be widened, it should only be widened by one meter on either side. This will be used for the transportation of any heavy machinery on and off site.
- Reasonable measures should be taken to prevent soil erosion resulting from a diversion, restriction or increase in the flow of storm water, or wind, caused by mining operations.
- The machinery used to expose and remove sand should only be allowed to operate within the proposed mining area. Thus no mining should be permitted outside the designated foot print of the proposed site.
- Once strip clearing of a particular piece of land has been targeted, the Karoo Desert NBS in Worcester (023 34 707 85) should be given the opportunity for search and rescue of any geophytes (bulbs) that will be lost due to mining activities. Search and rescue operations should be conducted in autumn as this is the time of the year when winter rainfall geophytes are conspicuous.
- During the operational life of the mine, employees and contractors should be warned against disturbing, injuring or killing any wild mammals, reptiles or birds.
- Any tortoises found should be relocated to places of safety nearby.
- Employees and contractors alike should be sensitised to the fact that they are working in a natural area and ALL wildlife must be treated with respect.

7. References

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Mucina, L and Rutherford, M.C. Editors. (2006). The Vegetation of South Africa, Lesotho and Swaziland. Tien Wah Press, Singapore.

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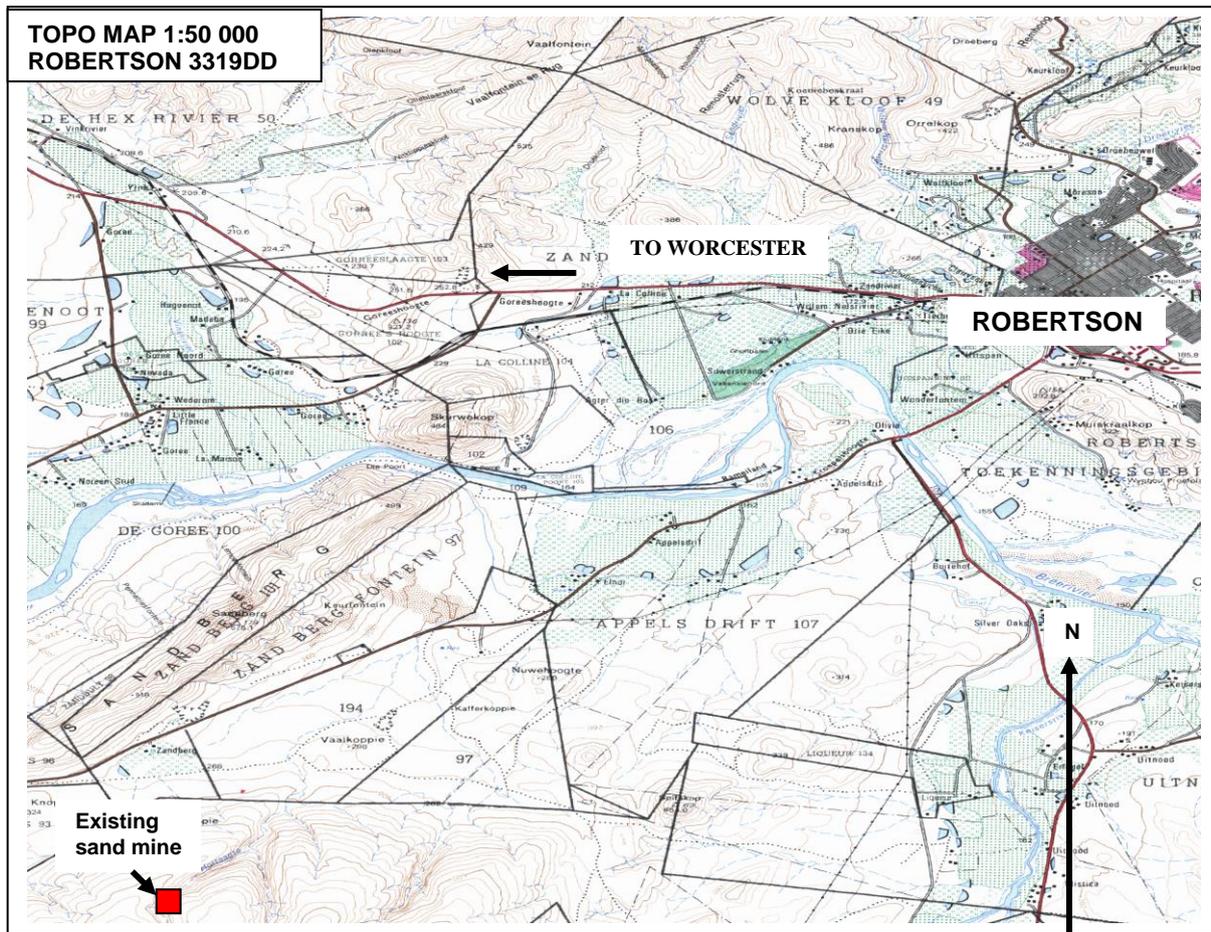
Monday, 22 November, 2010

Appendix 1: Maps

Map No. 1

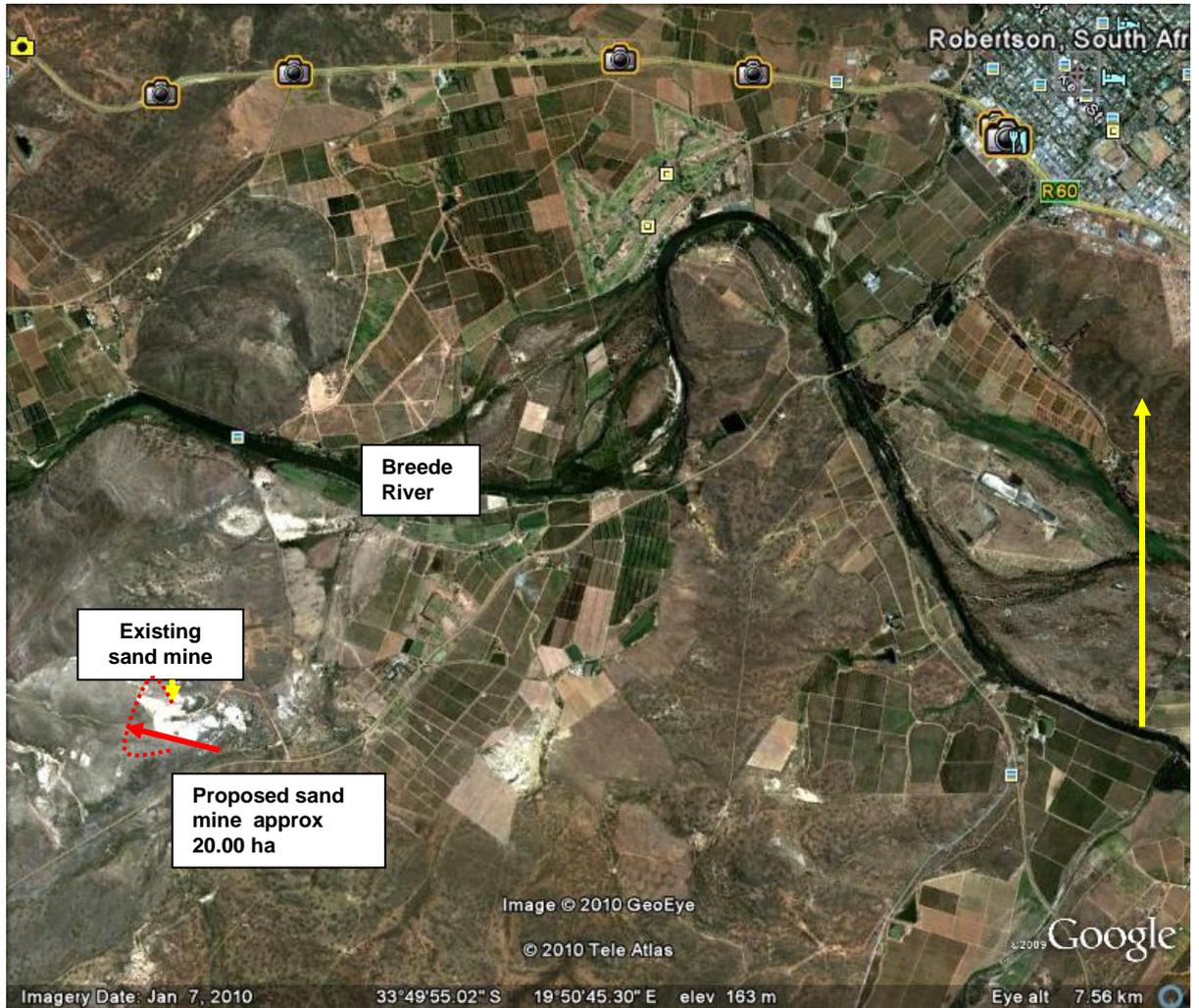
Location of site portion 1 of the farm Goedvertou No. 45 (Klaas Voogds West) in relation to the surrounding area viewed on a topographical map 1:50 000.

Proposed mining area illustrated in red square.



Map No. 2

Arial map of the proposed mining area on portion 4 of the farm Zantberg Fontein No. 97



Map No. 3

Close-up of proposed mining site at portion 4 of the farm Zantberg Fontein No. 97 Robertson.

