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BOTANICAL SURVEY OF THE PROPOSED
NORTHERN SECTION OF THE BRIDGETOWN
DOLOMITE QUARRY

AUGUST 1997

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1. INTRODUCTION

A dolomite quarry site has been identified at Bridgetown approximately 20km east of Morreesburg (Figure 1). The quarry site is situated on the western bank of the Berg River near the Misverstand Dam. The proposed quarry is situated on a dolomite outcrop which at present is covered with natural vegetation (Figure 2). The majority of the surrounding areas have been transformed by wheatlands. Very little natural vegetation remains in the surrounding areas. If mining were to occur in the area a large proportion of the remaining natural vegetation on the dolomite outcrop would be permanently destroyed. The aim of this survey was to provide a description of the vegetation on the site and along the river bank and to assess the conservation implications of the proposed quarry on the vegetation of the area.

2. BRIEF

The brief for this survey was as follows:

1. Identify and map the vegetation in the area of the proposed quarry site.
2. Rate the sensitivity of the site according to conservation status and likelihood of rare or endemic species.
3. Measure the degree and distribution of exotic vegetation, if any, on the property.
4. Discuss, from a botanical perspective, the proposed quarry site with regard to transplanting of sensitive species.

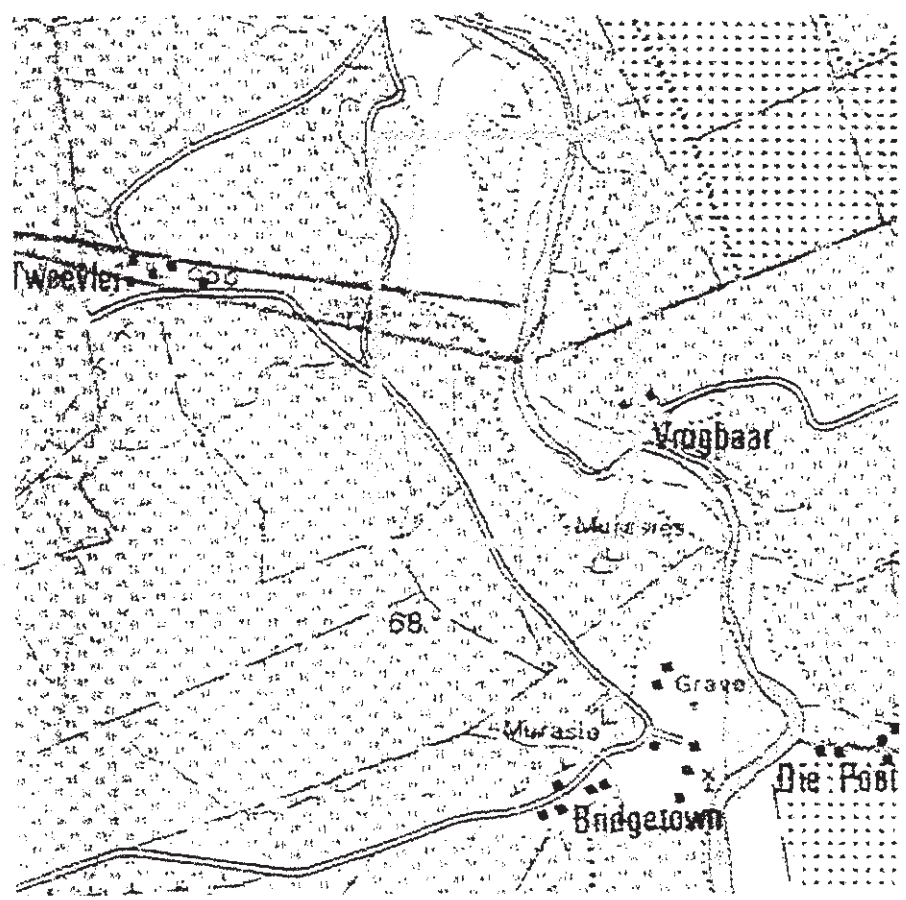
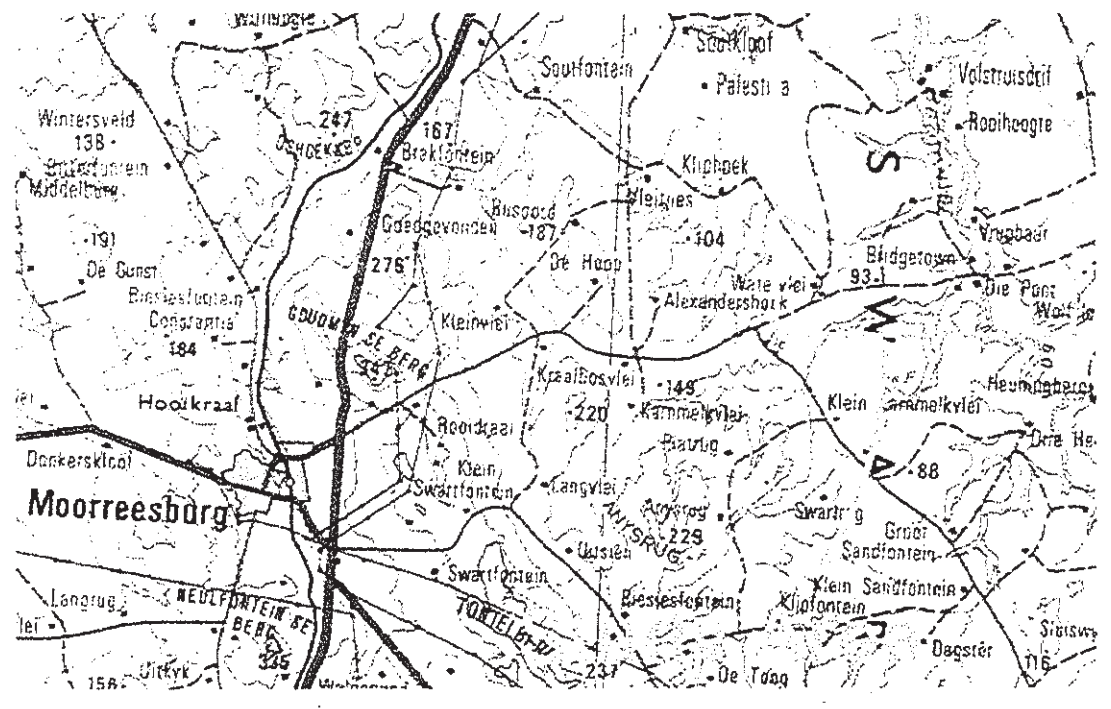


Figure 1. The regional locality of the study site.

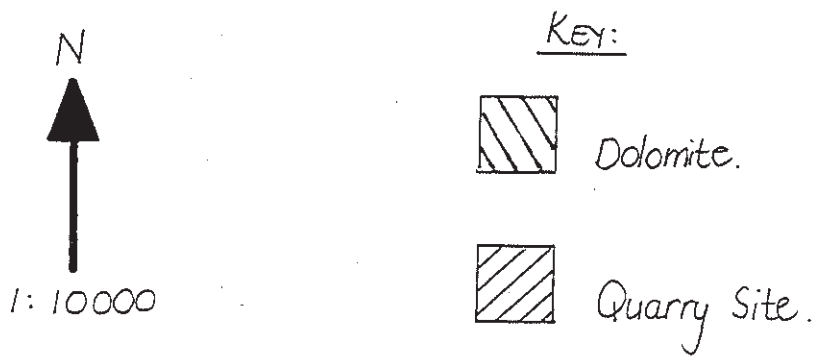


Figure 2. The position of the quarry site and the underlying geology.

3. VEGETATION

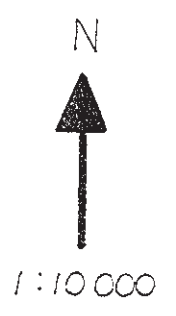
There are two vegetation types in the study area. The vegetation on the dolomite substrate in which the quarry will be situated (Succulent Karoo) and floodplain vegetation along the Berg River (Figure 3).

3.1. Succulent Karoo

The vegetation on the dolomite areas with heavy, red clay soils supports an unusual subset of Succulent Karoo vegetation. The conservation value of this vegetation type within the Swartland area is high, as there are very few examples still in existence. A preliminary species list for the Succulent Karoo areas is included in appendix 1.

The dominant plants in this vegetation are an unidentified shrub (?*Salvia* sp.), *Asparagus capensis*, *Eriocephalus paniculatus*, and *Lampranthus montaguensis*. There is a high proportion of succulent plants, particularly in the vygie family (Mesembryanthemaceae), and in the euphorbia family (Euphorbiaceae), both being typical of the Succulent Karoo. Of the plants collected on the site on the field trip in July 1997 it is thought that two of the vygie species (*Lampranthus* sp., and *Antimima* sp.) are extremely rare, and may be only known from a few small rocky outcrops in the Swartland. These species would thus fall into the Endangered category in the Red Data Book. The confusion about their identities relates to the revision of these groups by German taxonomists, who have not yet published all their work.

Indications are that there may be a large number of geophyte (bulb) species present in this vegetation. It was not possible to identify most of the geophytes since they were not in flower at the time of the survey and due to the time constraints of the study only a preliminary species list could be drawn up.



KEY:

- | | | | |
|----------------------------|------------------------|----------------------------|-------------|
| <input type="checkbox"/> F | Floodplain Vegetation. | <input type="checkbox"/> W | Wheatlands. |
| <input type="checkbox"/> K | Succulent Karoo. | <input type="checkbox"/> | River. |

Figure 3. The natural vegetation of the study area indicating the position of the proposed quarry.

Although as mentioned above there may be at least two Red Data species on the site, at this stage it is not known how many rare plants occur on site. It is recommended that a follow-up study be conducted in early September, in order to identify the large number of spring flowering bulbs suspected to occur in the area. Some of these may be rare species.

Aliens recorded on the Succulent Karoo site were the following: *Acacia saligna* (Port Jackson Willow, one plant only), *Schinus molle* (Pepper Tree, scattered plants) and *Secale* sp. (Cultivated oats (1%)). In general, however, alien vegetation presence was not significant and has had little effect on the natural vegetation of the area.

3.2. Floodplain Vegetation

The banks of the Berg river in the study area consist of two floodplain areas separated by a section of steep dolomite cliffs. The Northern floodplain is significantly more invaded by alien vegetation such as *Sesbania punicea* (1-5% cover), and *Acacia saligna* (10-20% cover) than the southern floodplain. The southern floodplain area supports a thicket community composed of *Buddleia salviifolia* and *Podocarpus elongatus* (yellowwood) amongst others. *Salix mucronata* is common along the immediate river bank. A list of some of the species found on the floodplain areas is given in appendix 2.

The understorey of the floodplain area has been heavily trampled by sheep and cattle resulting in a limited number of species still surviving there. The understorey consisted mainly of *Oxalis pes-caprae*, with scattered *Hebenstreitia* sp.

4. QUARRY VS VEGETATION

The Succulent Karoo vegetation of the study area is of high conservation value and if at all possible the entire site should be protected. This would require another source of dolomite to be found.

If, notwithstanding the conservation value of the Succulent Karoo vegetation of the site, the quarry is to be situated here then every effort should be made to conserve a viable, representative portion of this rare shrubland habitat. Figure 3 shows the vegetation distribution of the site with the quarry position indicated. If this figure is read with figure 2 then it can be seen that there are areas of Succulent Karoo vegetation on dolomite which will not be mined.

The two Mesembryanthemaceae which are likely to be endangered, along with other species which may be found to be significant in the follow up survey, could possibly be transplanted into these areas which have similar soil conditions. This is not the ideal method of conservation but if required this would be a possibility.

If mining is to go ahead in the area it is essential that certain conditions are attached which will guarantee the survival of the undisturbed areas. These would have to be addressed in a detailed management plan.

5. MANAGEMENT PLAN

It is important that a management plan be established for the area, especially if mining does occur. In order to ensure the minimum damage to the natural environment during mining, a management plan should be drawn up for the development of the quarry as well as for the general management of the natural environment surrounding the quarry site. Important issues which,

amongst others, will have to be addressed in the management plan would include:

1. The quarry area should be fenced off, limiting disturbance to as small an area as possible. If possible the fenceline should run within a meter of the edge of the quarry pit.
2. Mechanisms should be put in place to reduce the risk of erosion of the edges of the quarry or possible collapsing of the sides of the quarry, although these may be unlikely due to the nature of the substrate.
3. If possible there should be only one access road to the quarry and the approach should be over agricultural land only.
4. An environmental control officer should be employed to monitor the mining and to ensure that the measures that need to be taken to protect the remaining vegetation are implemented.
5. The mining company should be responsible for the employment of a person or persons to carry out the transplanting of plants to new sites.
6. The remaining Succulent Karoo vegetation as well as the adjacent floodplain vegetation should be protected in a proclaimed nature reserve. This would be a reserve which would almost entirely surround the quarry site.
7. Disturbed areas within the nature reserve should be rehabilitated and no grazing should be permitted in these areas.
8. No dumping of any form should be allowed in the nature reserve.
9. Mitigation measures should be implemented to reduce excessive dust levels.
10. Alien vegetation should be cleared from the nature reserve and an ongoing eradication programme should be implemented.

6. ENVIRONMENTAL AUDIT

An environmental auditing system should be established if the mining goes ahead. An environmental consultant should regularly visit the site (e.g. at least once every 3 months). This would help to ensure that the conditions of approval are being adhered to and that management guidelines are being correctly implemented. Every few years a part of the audit should be to reassess and refine the management plan as circumstances change. These audits should be handed to the local authority for scrutiny on completion.

7. SUMMARY

The Succulent Karoo vegetation of the proposed quarry site is of botanical importance and conservation worthy. The ideal situation from a conservation perspective, therefore, would be to find an alternative source of dolomite.

A follow up survey should be carried out in early September in order to evaluate the geophyte flora of the site. At this stage a more complete species list will be available.

If the area is to be mined then a detailed management plan should be established to ensure the protection of the remaining areas of natural vegetation. The protected area would include the floodplain vegetation as well as Succulent Karoo vegetation.

Compiled by:

Doug Jeffery and Nick Helme

Appendix 1. A list of the plant species found in the Succulent Karoo areas of the study site.

AIZOACEAE

Galenia africana

Tetragonia herbacea

Tetragonia sp. 1

AMARYLLIDACEAE

Brunsvigia appendiculata

Haemanthus coccineus

H. pubescens

ANACARDIACEAE

Rhus glauca

Rhus incisa var. *incisa*

APIACEAE

Lichtensteinia beiliana

ARACEAE

Zantedischia aethiopica

ASCLEPIADACEAE

Microloma sagittatum

ASPARAGACEAE

Asparagus capensis

A. declinatus

A. kraussianus

ASPHODELACEAE

Trachyandra muricata

ASTERACEAE

Cotula turbinata

Elytropappus rhinocerotis

Eriocephalus paniculatus

Othonna quercifolia

COLCHICACEAE

Androcymbium burchellii

CRASSULACEAE

Crassula tomentosa

Tylecodon paniculatus

T. ventricosus

EBENACEAE

Euclea acutifolia

ERIOSPERMACEAE

Eriospemum lanceifolium

EUPHORBIACEAE

Euphorbia burmanii

E. mauritanica

FABACEAE

Lessertia rigida

FERNS

Cheilanthes hastata

HYACINTHACEAE

Albuca sp.

Drimia elata

Lachenalia sp.

Ornithogalum sp.

HYPOXIDACEAE

Spiloxene sp.

IRIDACEAE

Chasmanthe aethiopica

Ferraria uncinata

Hexaglottis lewisiae

Melasphaerula ramosa

LOGANIACEAE

Buddleia salvifolia

MENISPERMACEAE

Cissampelos capensis

MESEMBRYANTHEMACEAE

Antimima sp. (Possible Red Data)

Dorotheanthus sp.

Drosanthemum hispidum

Lampranthus montaguensis

Lampranthus sp. (Possible Red Data)

Prenia pallens

OLEACEAE

Olea africana subsp. *africana*

OXALIDACEAE

Oxalis adspersa

O. bifida

O. pes-caprae

O. purpurea

O. tenella

O. tomentosa

POLYGONACEAE

Rumex cordatus

SOLANACEAE

Solanum tomentosum

STERCULIACEAE

Hermannia cuneifolia

H. prismatocarpa

57 species (two possible Red Data species)

Appendix 2. A list of plant species found in the floodplain areas of the study site.

AIZOACEAE

Galenia africana

ANACARDIACEAE

Rhus angustifolia

R. glauca

CELASTRACEAE

Maytenus heterophylla

CYPERACEAE

Cyperus sp.

FABACEAE

Wiborgia fusca

LOGANIACEAE

Buddleia salviifolia

MELIANTHACEAE

Melianthus major

OLEACEAE

Olea europea subsp. *africana*

OXALIDACEAE

Oxalis pes-caprae

PODOCARPACEAE

Podocarpus elongatus

SALICACEAE

Salix mucronata)

SOLANACEAE

Solanum guineense

SELAGINACEAE

Hebenstreitia sp.

14 Species