

Phase 1 Heritage Impact Assessment of a proposed new
landfill site near Jagersfontein, Kopanong Local
Municipality, FS Province.

Report prepared for:
MDA Environmental Consultants

by

L. Rossouw
Archaeological Impacts Unit
National Museum Bloemfontein
9300

Executive Summary

- At the request of MDA Environmental Consultants in Bloemfontein, a Phase 1 Heritage Impact Assessment was carried out at a site demarcated for the development of a new landfill site on farm Jagersfontein no. 14 near Jagersfontein in the Free State.
- The field assessment indicates that the proposed development will primarily impact on superficial deposits and dolerite bedrock.
- Two singular cores were recorded, but no evidence was found of *in situ* or capped Stone Age artifacts.
- There are no indications of prehistoric structures or rock art within the footprint area.
- There is also no evidence of informal graves or historical structures older than 60 years within the confines of the footprint.
- The extent of the proposed upgrade is considered low in terms of palaeontological and archaeological impact.
- Recommended Grading: General Protection C (Field Rating IV C).

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Introduction

At the request of MDA Environmental Consultants in Bloemfontein, a Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a site demarcated for the development of a new landfill site on farm Jagersfontein no. 14 (**Fig. 1 - 2**). The extent of the proposed development (over 5000 m²) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999). The site visit and subsequent assessment took place in November 2013. The task involved identification of possible archaeological and paleontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Methodology

The palaeontological and archaeological significance of the affected area was evaluated on the basis of existing field data, database information, published literature and maps. This was followed up with a field assessment by means of a pedestrian survey and investigation of all exposed sections within the footprint. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Description of the Affected Area

Maps: 1:50 000 topographical map 2925CD Jagersfontein

1:250 000 geological map 2924 Koffiefontein

General Site Coordinates (**Fig. 3**):

A) 29 46 54.4S 25 26 50.1E

B) 29 46 58.5S 25 26 54.0E

C) 29 47 5.93S 25 26 49.3E

The site is located approximately 3 km southeast from the historically important mining town of Jagersfontein. It consists of flat, and fairly disturbed open grassland terrain surrounded by the Charlesville and Itumeleng townships (situated about 900 m east and 300 m south of the site, respectively) (**Fig. 3 - 5**). A rubbish dump is located near old diggings about 200 m east of the affected area.

Geology

The bedrock geology to the south and west of the study area is characterized by argillaceous rocks of the Tierberg Formation, *Pt* (**Fig. 6**). The formation represents the uppermost unit of the Ecca Group (Karoo Supergroup) and primarily comprises well-laminated, dark shales with abundant carbonate concretions, inter-bedded by siltstones and fine-grained sandstones (Zawada 1992). An outcrop area of Adelaide Subgroup (*Pa*, Beaufort Group, Karoo Supergroup) strata, which are represented by blue-grey and purple mudstone inter-bedded with yellow sandstone and siltstone, is located to the north of Jagersfontein. The site itself is underlain by resistant dolerite bedrock (**Fig.7**). Superficial sediments consist mainly of wind-blown sands and well-developed, residual soils (**Fig. 8**).

Background

Karoo Fossils

Fossils from the Tierberg Formation are poorly represented and occur mainly as sparsely distributed and generally not diverse assemblages of trace fossils (Anderson 1976; De Beer *et al.* 2002; Viljoen 2005; Johnson *et al.* 2006). These ichno-assemblages include arthropod trackways and associated resting impressions, fish swimming trails, horizontal epichnial furrows often attributed to gastropods, as well as a variety of different kinds of small burrows. Impressions of *Gondwanidium validum* and pieces of *Dadoxylon* have been discovered between Douglas and Belmont, south of Kimberley (McLaren 1976). Sponge spicules, fish scales and disarticulated microvertebrate remains from calcareous concretions have also been recorded (Zawada 1992, Bosch 1993).

Adelaide Subgroup strata are assigned to the *Dicynodon* Assemblage Zone (AZ). Therapsids from this biozone occur generally well-preserved in mudrock horizons and are usually found as dispersed and isolated specimens associated with an abundance of calcareous nodules (Kitching 1995). Other vertebrate fossils include fish, amphibians and amniotes. Molluscs, insects, plant (*Dadoxylon*, *Glossopteris*) and trace fossils (arthropod trails, worm burrows) can also occur.

Dolerites

Dolerite, in the form of dykes and sills, is common throughout the region. Regarded as feeders of Drakensberg lavas, dolerites are not palaeontologically significant and

can be excluded from further consideration in the present evaluation. On the other hand, dolerite outcrop can be regarded as archaeologically significant since Stone Age artifacts in the region are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. In addition, rock engravings could be found on dolerite hills.

Late Cenozoic Deposits

Overbank deposits and alluvial terraces of large river courses such as the nearby Riet River to the northwest of Jagersfontein have previously yielded numerous Quaternary vertebrate fossil remains and Stone Age open sites as well as several prehistoric pastoralist settlement sites (Goodwin and Van Riet Lowe 1929; Maggs 1976). Stone tools have been recorded from small tributaries of the Prosesspruit south and east of Jagersfontein,, but vertebrate fossils are usually not well-preserved in shallow alluvial deposits along small river courses and stream beds in the region.

Field Assessment

The field assessment indicates that the proposed development will primarily impact on residual soils and dolerite bedrock. The pedestrian survey showed no evidence of intact Quaternary fossils. Two singular cores were recorded, but no evidence was found of *in situ* or capped Stone Age artifacts (**Table 1, Fig. 9**). There are no indications of prehistoric structures or rock art within the footprint area. There is also no evidence of informal graves or historical structures older than 60 years within the confines of the footprint.

Impact Statement

The field assessment indicates that the proposed development will primarily impact on superficial deposits and dolerite bedrock (**Table 2**). Impact on potentially intact Stone Age archaeological remains or Quaternary fossils is considered unlikely. The extent of the proposed development is considered low in terms of palaeontological and archaeological impact.

Recommendation

The terrain is not considered palaeontologically or archaeologically vulnerable.
Recommended Grading: General Protection C (Field Rating IV C).

References

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- Viljoen, J.H.A. 2005. Tierberg Formation. SA Committee for Stratigraphy, Catalogue of South African Lithostratigraphic Units 8: 37-40.
- Zawada, P.K. 1992. *The geology of the Koffiefontein area*. Geological Survey. Pretoria. Pp 1- 30.

Tables & Figures

Table 1. Site coordinates of artifacts recorded during the pedestrian survey.

Item	Coordinates	
Hornfels core	29°46'58.82"S	25°26'51.04"E
Hornfels core	29°47'0.52"S	25°26'51.36"E

Table 2. Summary of potential impacts at the site.

Rock type / Age	Duration of Development	Palaeontological significance	Archaeological significance	Palaeontological Impact at site	Archaeological Impact at site
Residual soils (Quaternary)	Permanent	High	High	Low	Low
Dolerite (Jurassic)	Permanent	Low	Moderate - High	None	None

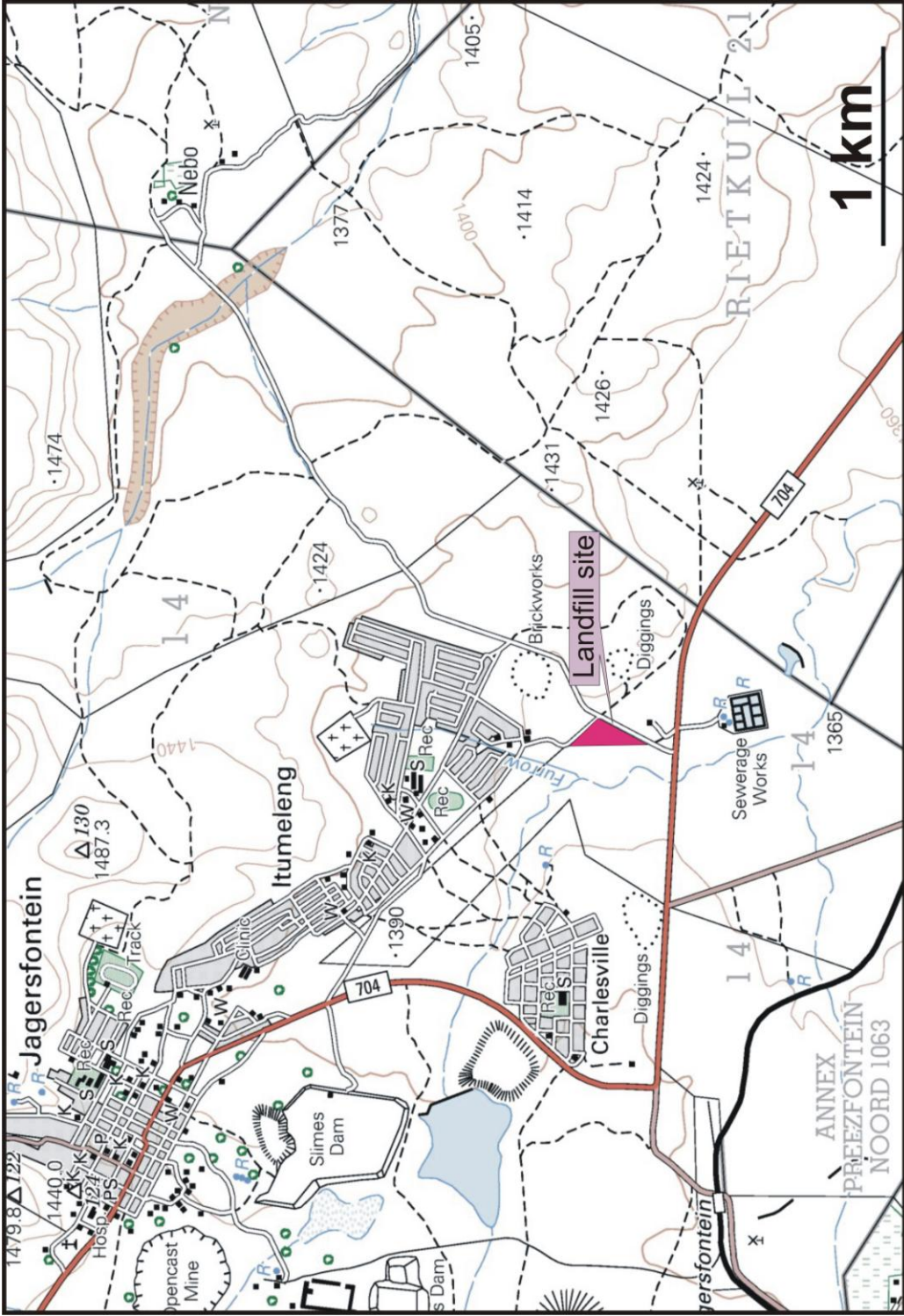


Figure 1. Position of the proposed landfill site on farm Jagersfontein 14 (portion of 1:50 000 scale topographic map 2925CD Jagersfontein).

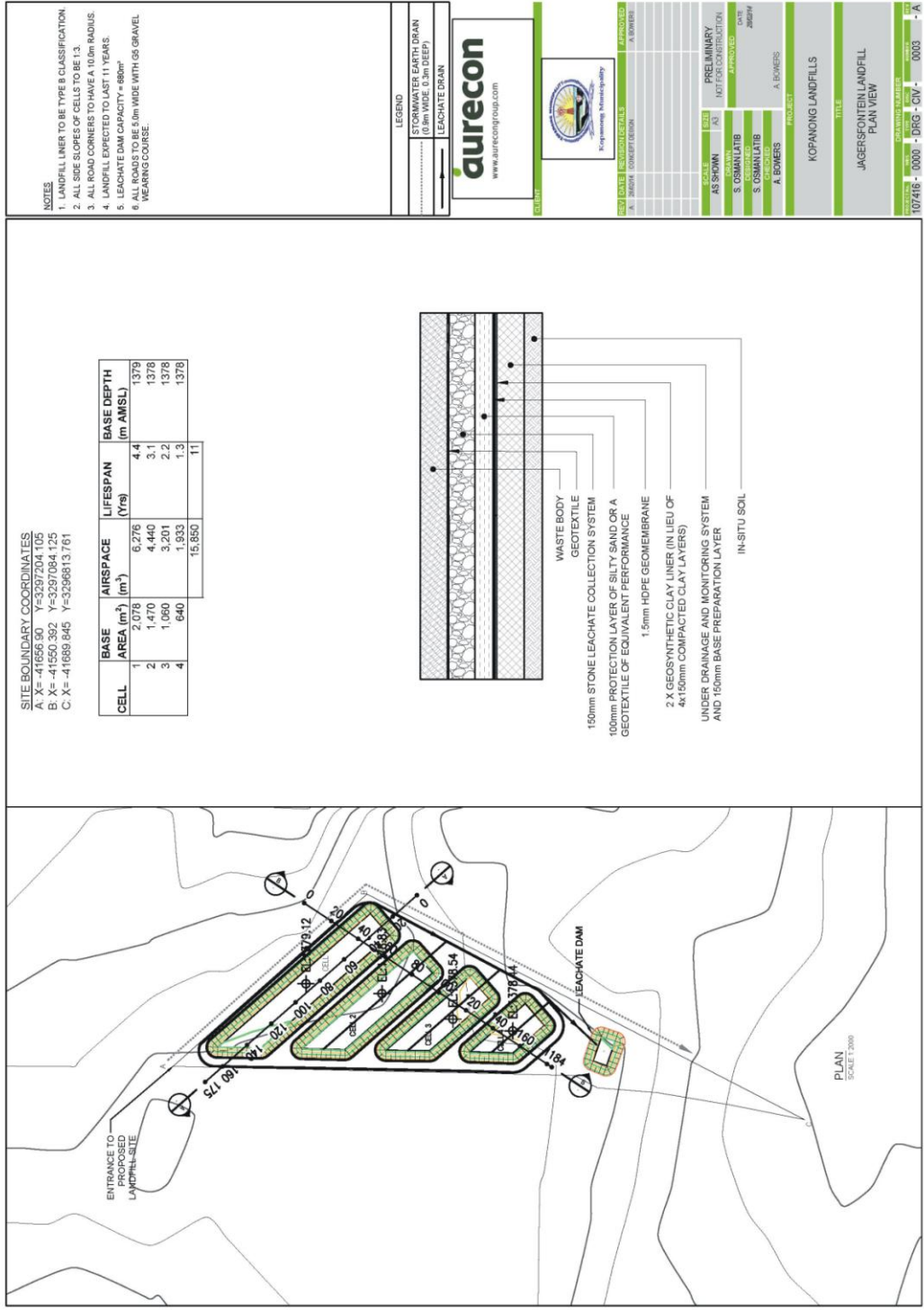


Figure 2. Plan view of the proposed Jagersfontein landfill development (provided by MDA Consultants).



Figure 3. Position of the affected area in relation the Charlesville and Itumeleng townships.

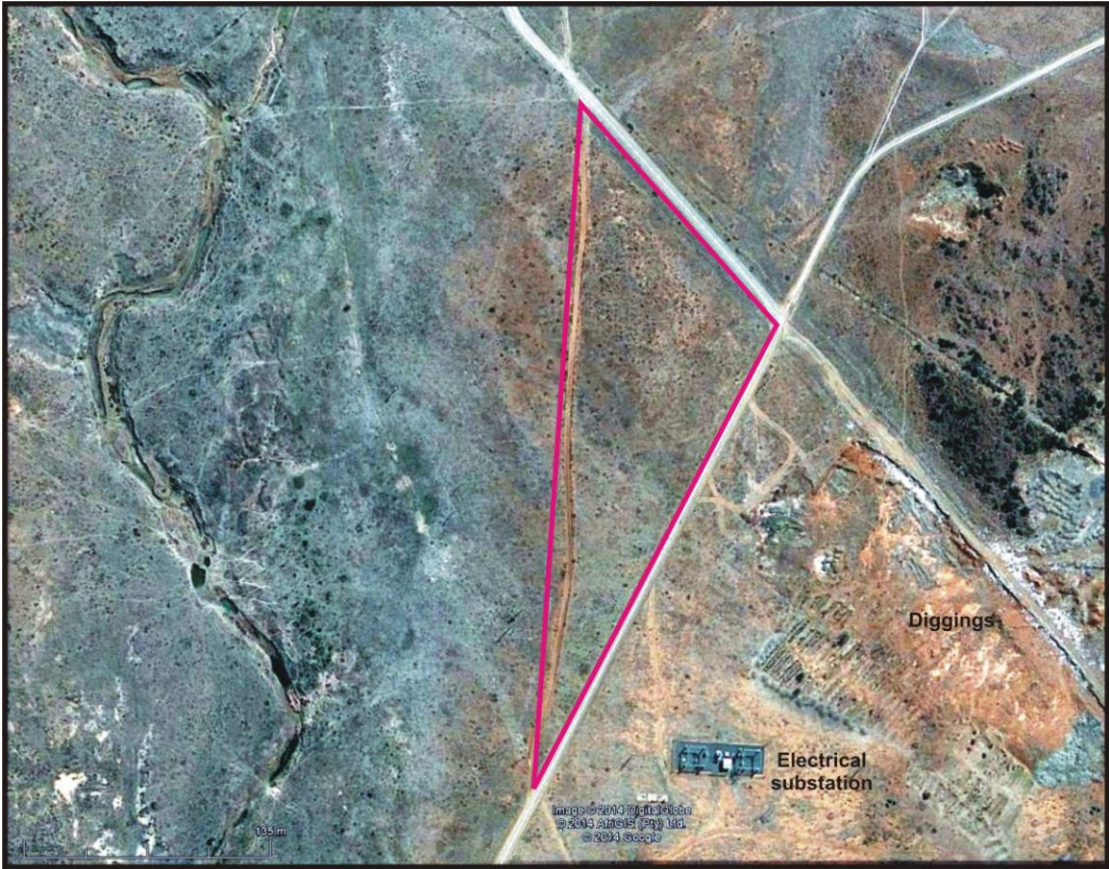


Figure 4. Aerial view of the affected area.



Figure 5. The affected area, looking south (above). The site consists of flat, and fairly disturbed open grassland terrain (below left). Looking north towards the Itumeleng township (below right).

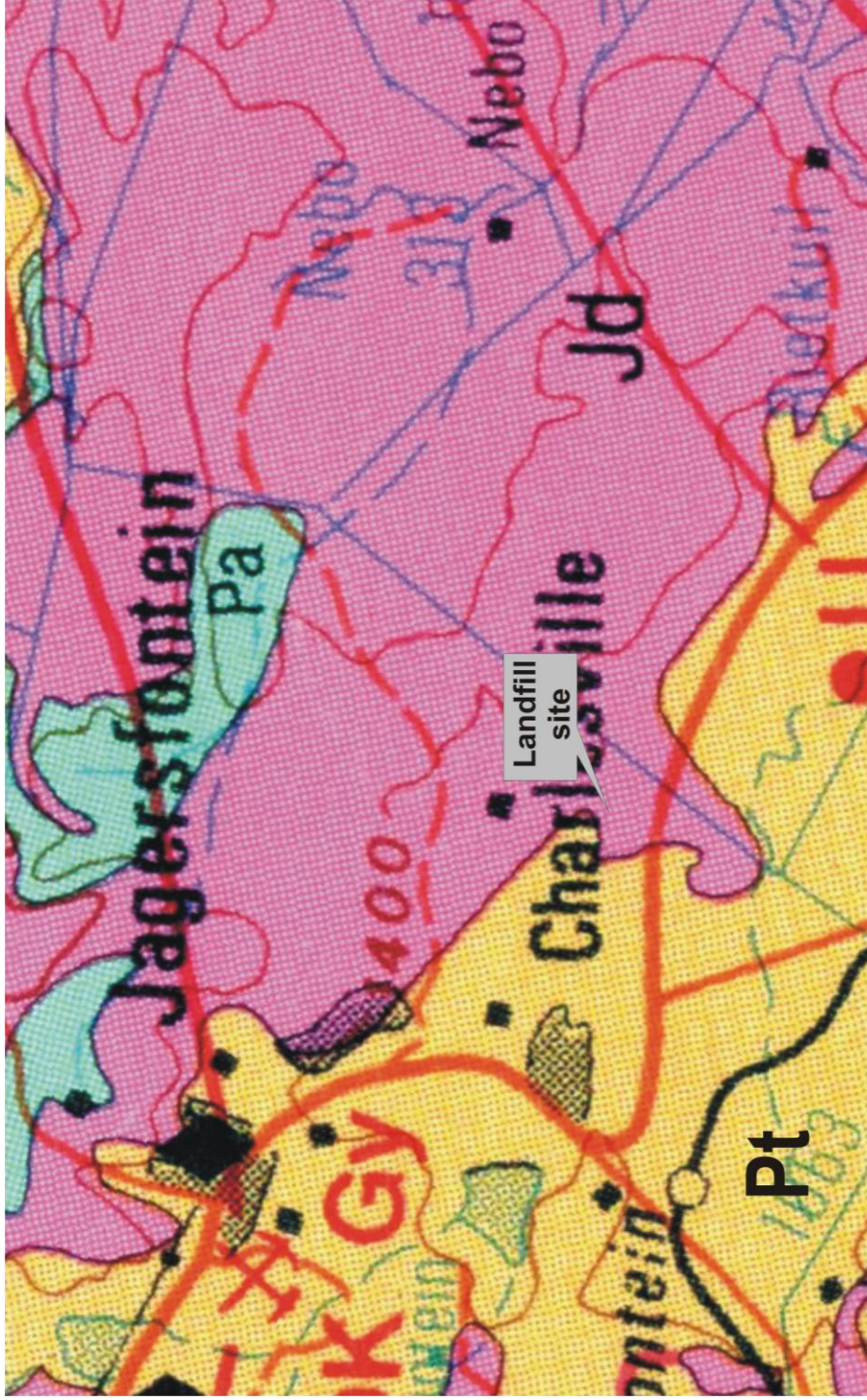


Figure 6. Portion of 1:250 000 scale geological map 2924 Koffiefontein. From oldest to youngest, the geology in and around the affected area is made up of Permian Ecca shales (Tierberg Formation, *Pt*), Beaufort Group mudstones and sandstones (Adelaide Subgroup, *Pa*) and Jurassic dolerite intrusions (Karoo Dolerite Suite, *Jd*).

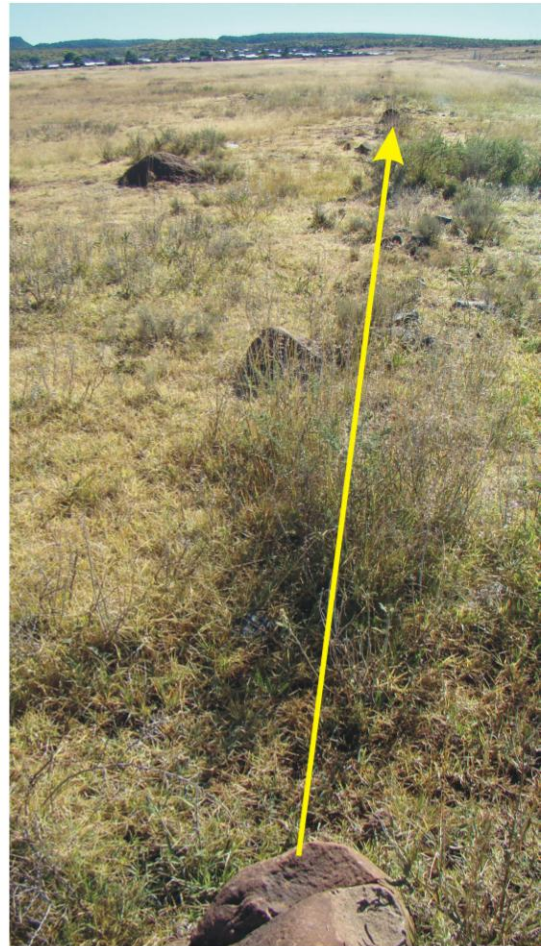


Figure 7. The site is underlain by resistant dolerite bedrock (above).
Outcrop area (dyke) near the eastern margin of the affected
area, looking south (below left) and north (below right).



Figure 8. Superficial sediments capping the site consist mainly of wind-blown sands and well-developed, residual soils.



Figure 9. Heavily rolled cores (scale: 1 = 10cm)