

**Phase 1 Palaeontological Impact Assessment of a  
new township development on Farm Rodenbeck  
2972, Bloemfontein, FS Province.**

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## **Summary**

A Phase 1 Palaeontological Impact Assessment was carried out within a 70 ha area demarcated for residential development on Farm Rodenbeck 2972, Bloemfontein, Free State Province. The study area is underlain by palaeontologically insignificant dolerites and associated contact metamorphic metasediments. It is unlikely that the proposed development will affect palaeontological heritage resources within the superficial component (Quaternary overburden) due to the disturbed condition of the substrate and the absence of suitable Quaternary-aged alluvial contexts. As far as the palaeontological heritage is concerned, the proposed development may proceed provided that all excavations are restricted to within the boundaries of the development footprint.

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## Introduction

A Phase 1 Palaeontological Impact Assessment was carried out within a 70 ha area demarcated for residential development on Farm Rodenbeck 2972, Bloemfontein, Free State Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act (NHRA) 25 of 1999. The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

The NHRA identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site
  - a) exceeding 5000 m<sup>2</sup> in extent; or
  - b) involving three or more existing erven or subdivisions thereof; or
  - c) involving three or more subdivisions thereof which have been consolidated within the past five years;
- The rezoning of a site exceeding 10 000 m<sup>2</sup>; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

A site visit and subsequent assessment took place during November 2014. The task involved identification of possible 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.

### **Terms of Reference**

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

### **Methodology**

The heritage significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant publications, aerial photographs (incl. Google Earth) and site records were consulted and integrated with data acquired during the on-site inspection.

## **Description of the Affected Area**

### **Locality data**

1 : 50 000 scale topographic map: 2926 AA Bloemfontein

1: 250 000 scale geological map 2926 Bloemfontein

The site is located within a residential area on Dr Belcher Road going south towards Dewetsdorp, about 9km south of the Bloemfontein CBD (**Fig. 2**)

Site coordinates (**Fig. 2**):

- A) 29°11'10.50"S 26°16'11.04"E
- B) 29°10'55.54"S 26°16'35.64"E
- C) 29°11'4.17"S 26°16'48.74"E
- D) 29°11'4.25"S 26°17'4.37"E

E) 29°11'23.97"S 26°17'0.35"E

F) 29°11'23.35"S 26°16'50.01"E

G) 29°11'10.23"S 26°16'48.22"E

H) 29°11'30.44"S 26°16'19.95"E

## **Geology**

The geology of the region has been described by Theron (1963) and Johnson (2006). It is situated within the Beaufort Group (Karoo Supergroup), and is primarily represented by late Permian, Adelaide Subgroup sedimentary rocks, which are made up of alternating sandstone and mudstone layers (*Pa*) (**Fig. 3**). Dykes and sills of resistant Jurassic dolerites (*Jd*) determine the relief in the region and are not fossiliferous. Superficial deposits in the region consist mainly of and shallow to well-developed, windblown sand and residual soils of varying depth.

## **Background**

The local palaeontological footprint is primarily represented by Late Permian Karoo vertebrate fauna and Late Cenozoic (Quaternary) macrofossils (Broom 1909 a; Broom 1909 b; Kitching 1977; Churchill *et al* 2000; Rossouw 1999, 2000, 2006). The succession of Beaufort Group sedimentary rocks is subdivided into eight biostratigraphic units, called assemblage zones (Rubidge 1995) and the sedimentary strata underlying the affected area are assigned to the *Dicynodon* Assemblage Zone (AZ) (Kitching 1995) (**Fig. 3**). This assemblage zone is characterized by the presence of a distinctive and fairly common dicynodont genus. Plant fossils (*Dadoxylon*, *Glossopteris*) and trace fossils (arthropod trails, worm burrows) are also present. The sediments assigned to the *Dicynodon* AZ are associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones. In more recent times the central interior and what is now the Free State Province, was once a vast and highly productive grassland ecosystem. Numerous mammal fossils stretching as far back as the Middle Pleistocene are regularly discovered in the Free State Province, especially in fluvial sediments along river courses like the nearby Modder River, Renosterspruit and Tierpoort River. Quaternary palaeontological sites, often associated with Stone Age artefacts, are found eroding out of Pleistocene

alluvial terraces and dongas along the Modder River and its tributaries near Maselspoort and Mockesdam and further east along the Honingspruit near Sannaspos.

## Field Assessment

The study area is underlain by intrusive dolerites and associated contact metamorphic metasediments that are capped by unconsolidated superficial sediments (residual soils), degraded by previous residential development and construction activities (**Fig. 4**). No fossils or fossil sites were observed during the pedestrian survey.

## Impact Statement and Recommendations

The study area is underlain by palaeontologically insignificant dolerites and associated contact metamorphic metasediments. It is unlikely that the proposed development will affect palaeontological heritage resources within the superficial component (Quaternary overburden) due to the disturbed condition of the substrate and the absence of suitable Quaternary-aged alluvial contexts. As far as the palaeontological heritage is concerned, the proposed development may proceed provided that all excavations are restricted to within the boundaries of the development footprint.

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#### DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.



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# Figures

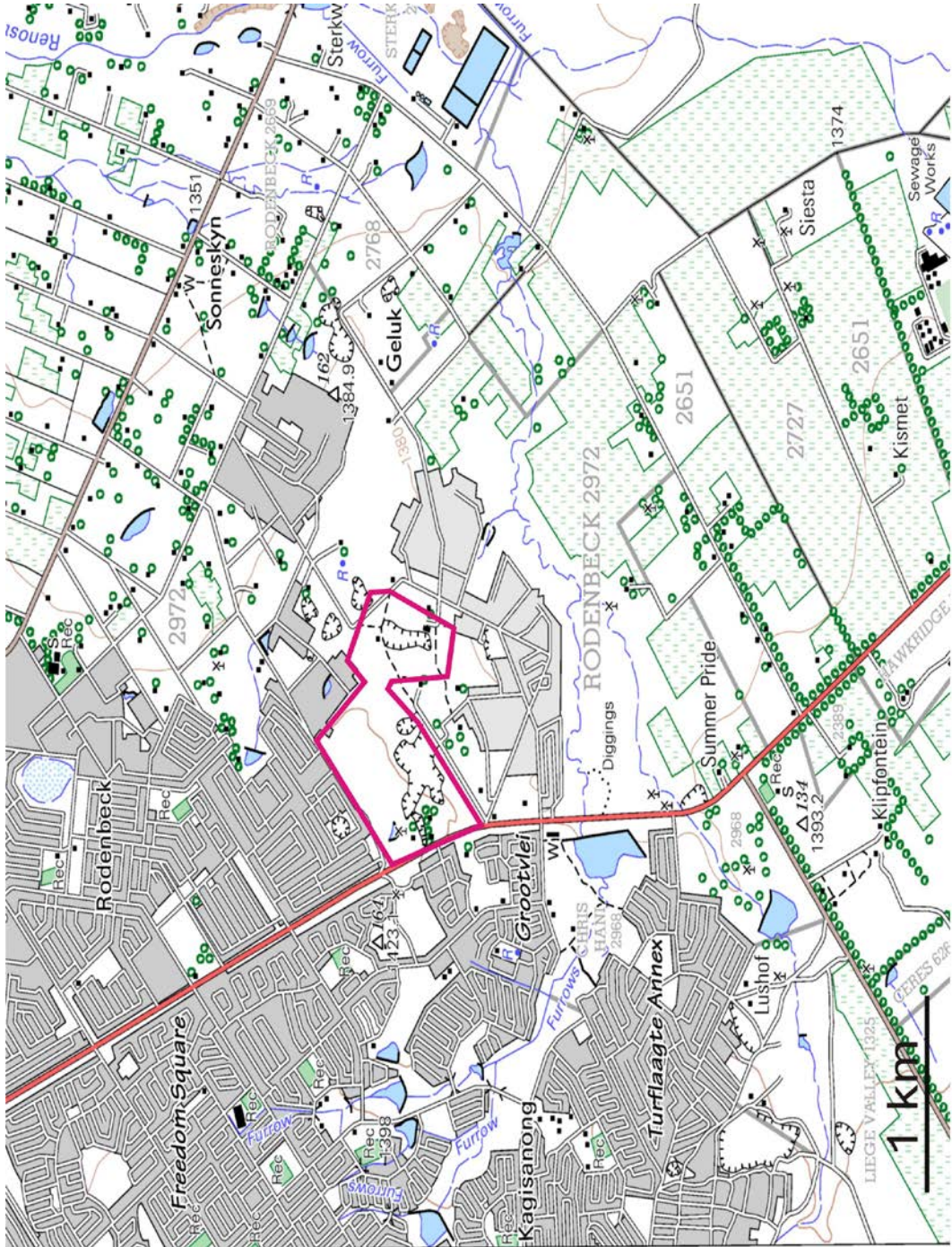


Figure 1. Map of the study area (portion of 1:50 000 scale topographic 2926 AA Bloemfontein).





Figure 2. Aerial view of the study area.



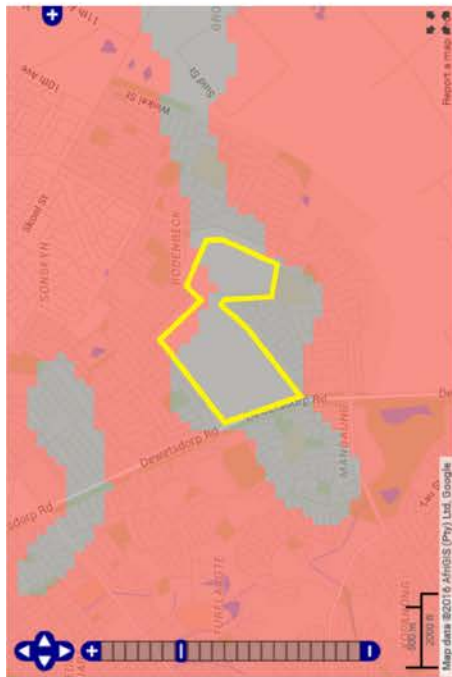
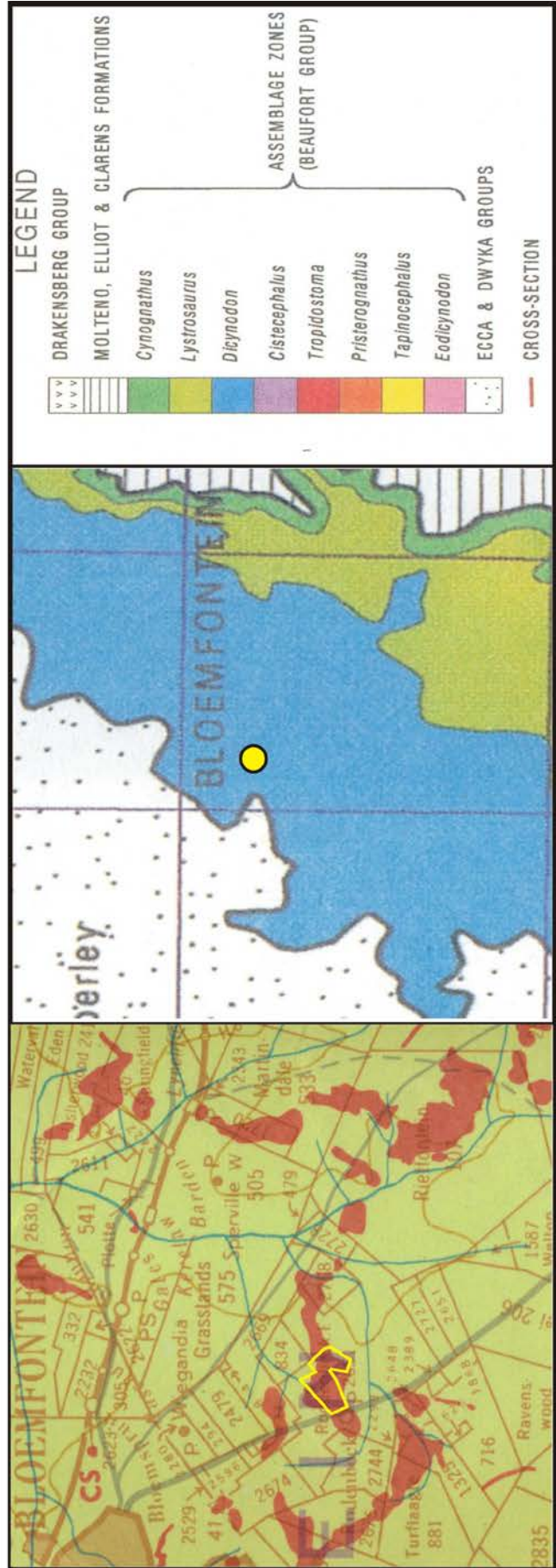


Figure 3. According to the online SAHRIS palaeo-sensitivity map, the site is primarily situated on palaeontologically insignificant dolerites (grey area, top left) that is located within an area considered to be of high palaeontological sensitivity (pink areas, see portion of 1:250 000 scale geological map 2926 Bloemfontein, bottom left), with sedimentary strata assigned to the Dicyonodon Assemblage Zone (map bottom center, based on distribution of vertebrate biozones of the Beaufort Group around Bloemfontein after Rubidge 1995).





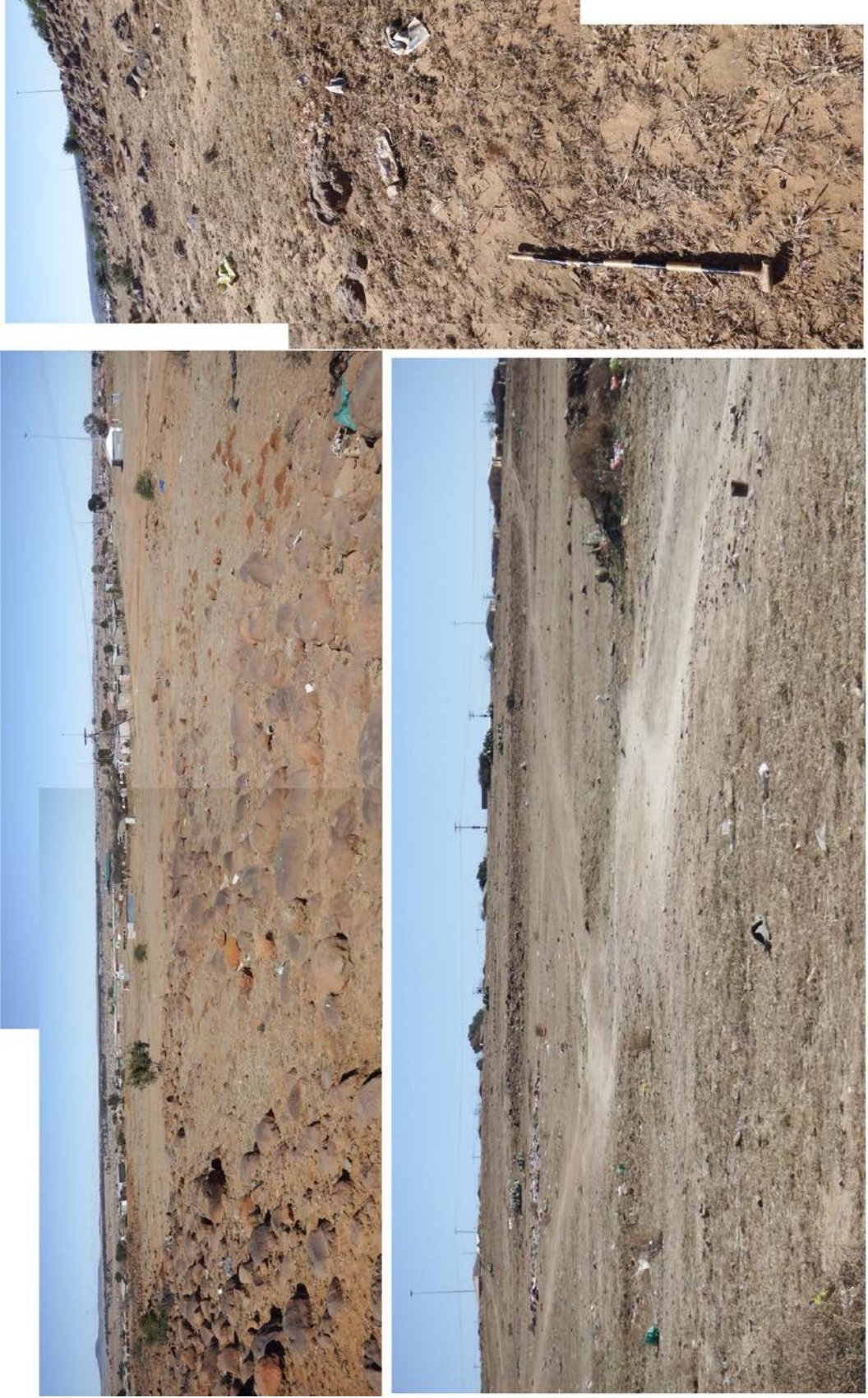


Figure 4. General view of the study area, looking east (top), north (right) and southwest (bottom).